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COCOA RESEARCH INSTITUTE OF NIGERIA, IBADAN

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COCOA PROGRAMME

Experimental Title: On- farm participatory rehabilitation methods in cocoa ecologies in Nigeria.

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Introduction

Rehabilitation of old and moribund cocoa plantations is essential for increasing the crop yield. Cocoa farming in Nigeria reached its peak in the early seventies and has since been on a steady decline. Many reasons have been adduced for or to ? this serious problem such as old age of cocoa plantations and lack oftechnical knowhow by the farmers to bring their unproductive farms to productivity. The project therefore tries to address the above problems using farmers' participatory approach of cocoa rehabilitation in all cocoa ecologies in Nigeria. Rehabilitation is defined as the process of bringing an unproductive cocoa plot back to economic viability and productivity. Some rehabilitation techniques include: (i) Partial replanting (ii) Complete replanting or clear felling (iii) Phased farm replanting. (iv) The Turrialba method; planting under old cocoa tree. (v) Coppicing (vi) Side grafting

Objectives

To gather base line information on cocoa production as well as to train farmers using participatory approach on selected rehabilitation methods in cacao plantations across different agroecologies in Nigeria.

Specific objectives are:

(i) To gather base line information on current production status on cocoa farms in Nigeria through questionnaires administration.
(ii) To determine the physico-chemical status of soils in all selected cocoa ecologies in Nigeria.
(iii) To train cocoa farmers on three rehabilitation methods using farmers' participatory approach
(iv) To establish on-farm and on- station rehabilitation demonstration plots in Nigeria.
(iv) To evaluate on-farm, on-station, selected fertilizer types on soil, growth and yield performance of cocoa in rehabilitated plantations
(vi) To evaluate effectiveness of organic fertilizer on nematode and mycorrhiza management strategies in Oyo and Ondo states
(vii) To evaluate potential effects of coppicing as cocoa rehabilitation methods on carbon sequestration
(viii) To evaluate the degree of responsiveness of cocoa genotypes to side grafting as rehabilitation methods across selected ecologies.

1. **Progress Summary: T**he activities were split into four phases; Activity 1: Base line survey and administration of questionnaires have been achieved and results analyzed. The first activity has been carried out at all the study locations which comprise of Ondo, Osun, Ogun and Cross River states. The details of the locations covered are as follows:

(1) Ondo State: Idanre (Odode-Idanre); Akure South (Kajola); Ifedore (Ijare)
(2) Osun State: Ayedaade(Mokore/ Orile-Owu); Ife East Area Office (Koola-Modakeke); Ife North (Onisoro); Odo-Otin Okuku)
(3) Ogun State: Ijebu-West (Ojelade village)
(4) Cross Rivers State: Ikom (Akparabon), Etung (Ajassor), Boki (Boki town)

The major activities carried out from the eleven local Governments covered so far are:

(a) Administration of 450 questionnaires in eleven cocoa growing communities. Contacts of the farmers were compiled and kept for future reference.
(b) Collection of composite soil samples from each community covered: The teams were led by the farmers' delegates to the selected cocoa plantations to be used as demonstration plots. Soil samples were collected with soil auger at the depth of 0-30cm and were analyzed for physical and chemical properties, exchangeable bases and acidity, also heavy metals determination
© Collection of cocoa leaf samples: Leaf samples were taken from cocoa trees under which the soil samples were collected. (These also have been analyzed for both physical and chemical composition.
(d) Collection of weed samples from study locations: The weed biomass were also collected within the cocoa plantation with the aid of wooden quadrangle, these have been identified and documented.
(e) Collection of pod samples from farmers' farms. All the samples collected were analyzed in the laboratory for physical and chemical compositions.
(f) Training booklets for the project have been published and distributed to cocoa farmers in Cross Rivers state as at the time of writing this report.

Methodology for Second Phase of the Activity

Field demonstration plots were conducted in eleven locations in Ondo, Ogun, Osun, Oyo and Cross- Rivers States (including CRIN Headquarters, Ibadan, Owena and Ajassor CRIN Sub-Stations). The plots served as demonstration and research plots adopting farmers' participatory approach. Two rehabilitation methods ("Turrialba Method" Planting under old cocoa trees and grafting) were demonstrated between August to September, 2014.

(i) Methodology for "Turrialba Method across the locations: The tested organic fertilizer was Oyo

State Organic Fertilizer which was applied at 1.5kg, 0.75kg and a control. At each location, treatments were laid out using Randomized Complete Block Design (RCBD) with three replications. Lay-out of each experimental site (Measurement, pegging and holing) was carried out before planting. Thirty six 5 months old cocoa seedlings (CRIN Tc 4) of average height of 50cm (already raised in the nursery) were transplanted under old cocoa trees (3x3m) on each of the eleven sites in Ogun (one site), Ondo (three sites), Osun (three sites), Cross Rivers (three sites) and Oyo states (one site), also Owena CRIN Sub-Station respectively, and were tagged for data collections. Top soil samples were collected randomly from each demonstration/ experimental sites using soil auger. The samples were bulked and air dried before being subjected to routine laboratory analysis of particle size which was analysis using the hudrometer method (Juo, 1979), soil pH was determined by the electrometric method, Cation exchange capacity and organic matter were determined by the modified methods of Anderson and Ingram (1998 and 1998b). Available phosphorus was determined by Bray and Kurtz (1945) method. Exchangeable K, Ca, Mg were extracted using ammonium acetate, K was determined using flame photometer, and Ca and Mg by EDTA titration. Two grammes (2g) of the organic fertilizer using was also analyzed for nutrients composition. The fertilizer rates were applied to plots at the time of transplanting. Monthly data collection on growth parameters (plant height, stem girth, number of leaves, number of branches and leaf areas) will commence one month after transplanting. Leaf samples (4^{th} will be analysed in the laboratory for chemical composition. The experiments would be monitored for 12 months (52 weeks after transplanting). Soil samples will be collected from treatment plots and will be processed and analysed for physical properties (sand, silt, loam, clay), Chemical properties (soil organic matter, soil pH, N, P, K, Mg, Ca and Na) and soil biological properties (Aarbuscular myccorhizal colonization, soil nematodes fungi, yeast and bacteria) would be determined in some locations using standard procedures (Brundrett *et al*.,1984, Coyne *et al*. (2007). Data collected will be subjected to analysis of variance to test the treatment effect for plant growth parameters and soil properties using SAS analytical package, versions 8.20 (1992) and significant means separated by Turkey's HSD (P<0.05).

(ii) **Methodology for side grafting method**: The field demonstration plots/ experiments were conducted in eleven locations as reported above. The tested organic fertilizer was applied using: Fractional Discovery Fertilizer Factor recommendation approach, Soil Test Based Approach and a Control .

(i) Table 1 below explained organic fertilizer levels per location.

S/n	Locations	Treatment based on soil testing	Treatment based on fertilizer factor	The control (no fertilizer)
1	Ojelade (Ogun)	1.5kg/tree	1.65kg/tree	No fertilizer
2	Wasinmi (Ondo)	1.9kg/tree	2.09kg/tree	No fertilizer
3	Ijare (Ondo)	1.62kg/tree	1.78kg/tree	No fertilizer
4	Aponmu (Ondo)	1.43kg/tree	1.57kg/tree	No fertilizer
5	Idanre (Ondo)	1.70kg/tree	1.87kg/tree	No fertilizer
6	Mokore (Osun)	1.57kg/tree	1.72kg/tree	No fertilizer
7	Onisoro (Osun)	Result of initial soil analysis not yet out	1.65kg/tree	No fertilizer
8	Okuku (Osun)	Result of initial soil analysis not yet out	-	No fertilizer
9	Ajassor (Cross Rivers)	2.01kg/tree	5.03kg/tree	No fertilizer
10	Akparabong (Cross-Rivers)	1.64kg/tree	4.10kg/tree	No fertilizer
11	Biakwan (Cross-Rivers)	0.5kg/tree	1.25kg/tree	No fertilizer

At each location, treatments were laid out using Randomized Complete Block Design (RCBD) with three replications. Lay-out of each experimental site was done before grafting method was demonstrated. Eighteen old and moribund cocoa trees were grafted in each location. The organic fertilizer levels were applied to treatment plots at the time of grafting using ring method of fertilizer application at 5cm away from the base of cacao / cocoa?. Data were collected accordingly.

Summary of available results

Plate 1: Two farmers demonstrating Turrialba method of cocoa rehabilitation in Biawkwan, Cross-Rivers State

Plate 2: Demonstration of grafting method of cocoa rehabilitation using farmers' participatory approach in Osun State.

Plate 3: A team of CRIN scientists with some cocoa farmers in Orile- Owu , Osun state training them on rehabilitation methods.

Plate 4: CRIN Scientists with cocoa farmers in Cross Rivers State during cocoa rehabilitation questionnaires administration.

Experimental Title: Promotion and evaluation of cocoa powder intake in schools

Investigators: Jayeola C.O, Williams, O.A; Famuyiwa, B.S.

Introduction

There are increasing literature evidence and anecdotal reports worldwide on the health benefits of cocoa powder consumption. Regular consumption in dark chocolate form ($\geq$25% cocoa powder inclusion) or as beverage (95-100% cocoa powder) has been shown to combat malaria, diabetes and hypertension. These are three of the commonest killer diseases in Nigeria. Altogether they siphon billions of naira in treatment and management costs while hundreds of thousands of Nigerians die of these ailments annually. Numerous studies have reported a relationship between the consumption of cocoa derivatives especially dark chocolate with beneficial health effects on cardiovascular diseases as a result of the antioxidant activity of procyanidins (Keen *et al* 2005, Cooper *et al* 2008). The antioxidants help to fight free radicals in the body heart diseases, overcome erectile dysfunction and sexual weakness. It lowers blood pressure, prevents malaria as well as diabetes. The presence of flavanoids in cocoa also prevents fat-like substances in the blood stream from oxidizing and clogging the arteries. The regular intake of natural cocoa powder helps to boost immunity among consumers (Olubamiwa, 2007, Akinroye, 2010 and Jayeola, *et al* 2011). Cocoa bread and cocoa powder are form of addictives and derivatives from a main commodity crop known as cocoa.

Justification

1. To contribute to the achievement of developmental goals of CocTA through increased local consumption of cocoa; this in turn will boost international pricing system of cocoa.
2. To boost the health statues of Nigerians against the aforementioned diseases.
3. To improve sustainable livelihood statues of cocoa farmers through better cocoa prices

Objectives

1. To increase local consumption of cocoa
2. To mitigate against glut in the international cocoa market and consequently achieve better price for cocoa farmers and boost the health of Nigerians.
3. To develop cocoa taste in children.
4. To advocate for nationwide media outreach on the health benefits of cocoa powder consumption

Materials and methods

3 Cocoa Producing States = Ogun, Oyo, Ekiti and Ondo states
3 Schools/ State = 3x 4= 12 schools
500 pupils / School = 200 x 12= 2,400 students

Pre-visit to each state to obtain approval from the ministry of education was done.

After approval was given, the materials needed were procured and the cocoa was processed to be sweetened for acceptability by the students. The sweetened cocoa drink was analyzed for proximate analysis, mineral content and for microbiological assay. This was to ensure that the product is safe for consumption. The sweetened cocoa drink was demonstrated in schools and distributed to the students. This was done daily for a period of two months. Questionnaires were administered for the students before the commencement and after the school feeding. Active participation of media houses in the dissemination of information on the health benefits of cocoa powder consumption was also done.

Results and Discussions

There were positive confessions from the students, teachers and the parents on the good effect they have recorded from the day they have started drinking cocoa. Record on healthy life style, improved academic performance and daily attendance were among those factors recorded.

Data Analysis of Questionnaires administered and report writing.

Table 1: Natural cocoa powder

Parameter	Value	WHO/Codex Specification
Proximate Analysis		
%Crude Protein	8.14	6-15
%Crude Fat	2.76	2-5-7.5
%Crude Fibre	0.47	0.35-1.15
% Ash	3.24	3.00-4.50
% Moisture	7.28	3.0-5.0
Energy Kcal/100g	3.86	300 – 500
Mineral Analysis		
Ca mg/100g	80	50 – 100
Mg mg/100g	480	300 – 600
Na mg/100g	350	250 -700
K mg/100g	2560	2000-3000

Table 2: Microbiological assay of cocoa powder

Parameter	Value	WHO/Codex Specification
Lactobacillus cent	0.00	0.0/Nil
E. Cot cent	0.00	0.0/Nil
Total plate count cfu/g	$1.44x10^2$	$3.0x10^3$

Table 3: Sweetened cocoa powder

Parameters	**Value**
%Crude Protein	8.16
%Crude Fat	2.75
%Crude Fibre	0.47
% Ash	3.27
% Moisture	6.83
Energy Kcal/100g	6.94
Chemical Analysis	
Ca mg/100g	640
Mg mg/100g	110
Na mg/100g	160
K mg/100g	290

Table 4 : Microbial assay of sweetened cocoa powder

Lactobacillus count cfu/g	0.00
E. Ccoli count cfu/g	0.00
Total plate count cfu/g	$1.37x10^2$

Conclusion

This project gave a landmark achievement in that it was discovered that many of the student had not got the opportunity to continuously take cocoa drink for such a period of time that led the student and teachers asking for more and the school becoming/became envy to other schools. More importantly, the improvement recorded on their health and up scaling of the students' intelligence. I therefore recommend that this project be repeated in other states and schools in all the cocoa producing areas and beyond.

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Experimental Title: Extension of CRIN technologies on cocoa value chain through training manual.

Investigators: Williams O.A, Ogunlade M.O, Jayeola C.O, Yahaya L.E, Uwagboe E.O. Famuyiwa B.S, Oluyole K.A, Adebiyi S., Ndagi I, Ogunjobi M.A.K, Abdul-Karim I.F, Agbongaruyi A.E., Lawal J.O

Introduction

Cocoa is a major cash crop that has placed Nigeria in the second position in the world market in the past. Cocoa production is a major agricultural activity in Nigeria. Its foreign exchange earning capacity and income generating ability cannot be over- emphasized. In terms of foreign exchange earnings, no single agricultural export commodity has earned more than cocoa. The value chain in cocoa production is one of the networks which link all stakeholders in cocoa production from the field to table together. The chain among others includes the farmers, processors, cocoa merchants, processing and manufacturing industries

Cocoa Research Institute of Nigeria (CRIN) has carried out research in technologies to be adopted by farmers and industrialist to improve production; some of the technologies are cocoa pod husk fertilizer, cocoa liquid detergent and cocoa bread among others. There are diverse ways of using cocoa to improve the sustainable livelihood of farmers and other stakeholders along the value chain. This can only be achieved through training and dissemination of CRIN technologies. The studies of cocoa and their related products have become an area of interest owing to their health-promoting properties / characteristics. In recent years, cocoa and cocoa products, namely cocoa powder, dark chocolate and cocoa liquor, have been discovered to suppress the development of atherosclerotic lesions (Kurosawa *et al.* 2005), decreased platelet functions (Murphy *et al.* 2003), increased dermal blood flow (Neukam *et al.* 2007), and inhibit the proliferation of human breast cancer cells (Ramljak *et al.* 2005) and exerted hypoglycemic properties (Tomaru *et al.* 2007).

Nowadays, consumers are more concerned with the nutritional status of foodstuffs and considering that cocoa powder and chocolate are extremely rich sources of many essential nutrients and phyto-chemicals that can contribute to a healthy diet (Lecumberri *et al*, 2007; Ieggli *et al*, 2011) highlight renewed interest in such products. Hence inclusion of cocoa powder in bread recipe will not only add to the nutritional quality of the bread but also serve as means of adding bioactive compounds that are of healthy values to it. Also, local consumption and utilization of cocoa will increase; thereby reduce the quantity available for the international market where the price of cocoa is always determined. On the other hand, the process which involves the breaking down or rotting of plant and animal materials by microorganisms in the presence of water and air with cocoa pod husk. The end-product is known as compost/cocoa pod husk fertilizer. Compost is a store of organic matter and beneficial microorganisms.

In conclusion, the soaps are largely produced from materials of petrochemical origin, which are rather finite, expensive and exhaustible in nature. This has rekindled interest in sourcing for alternative for its production. To this end, effort has been geared towards evolving such substitute and cocoa pod husk stands possible alternative in this regard. The procedure includes potassium salt which is used for soap production being extracted from cocoa pod husk. The following steps are involved in the process of collection of cocoa pod husk, drying, ashing, extraction of potash, saponification reaction, dissolution and packaging.

Objectives

1. To improve farmers' livelihood.
2. To empower farmers and other stakeholders on the adoption and application of research result, technologies and techniques for agricultural production.

Methodology

The study was carried out in areas where there are requests and prospects for the CRIN technologies. The CRIN technologies as follows: Cocoa pod husk fertilizer, Cocoa bread, and Cocoa liquid detergent.

The study areas were chosen from the following states: Osun and Ondo (the first and second cocoa producing states in the South-West Nigeria). In each state, one cocoa growing community was selected; thus Ondo (Owena) and Osun (Ilare). Number of 35 farmers was selected for training on fertilizer and liquid detergent while 10 bakers will be / were ? selected for training on Cocoa bread. Thus, total number of 85 farmers will be trained in the 2 states. Participatory approach was used throughout the training session.

Activities

Cocoa bread: The exercise was achieved through participatory approach in a selected bakery in the communities of Ondo and Osun states. The stepwise practical demonstration of cocoa bread production was carried out by Dr (Mrs) C.O. Jayeola and Mr M.A.K Ogunjobi. The bakers were made to know the importance of incorporating cocoa in the ingredients of bread and the NAFDAC recommended ingredients to use in baking bread. The power point presentation, the cocoa bread produced was shared to the participants for palatability test and perception of the consumers towards cocoa bread.

Cocoa pod husk fertilizer: Dr. Ogunlade, M. O, a Soil Scientist presented on a power point the use of cocoa pod husk (CPH) and materials such as leaves of *chromolaena Odoratum/Azadiracta indica* /neem/sun flower, cow dung or poultry droppings for making compose fertilizer for cocoa farms. The practical aspect was demonstrated through participatory approach in selected sites by the farmers from both states. The materials (compost) was put in-charge of the representative of the farmers who will do/ did the turning and every other necessary occasional practices required to give the best compost will be observed by the farmers under the supervision of their representative. It is / was more effective to ring apply to cocoa stand to avoid loss from the plant roots. A minimum of 5t/ha will effectively compete with mineral fertilizer. Fortification or complementary use with mineral fertilizer will reduce the above rate. Application rate should be based on the result of soil analysis. It can be applied once in a year as it slowly releases plant nutrients into the soil

Cocoa liquid soap: Dr. Yahaya, L. E. in a power point presentation and practical demonstration on the activities involved in liquid soap production from cocoa pod husk. The steps involved started from collection of cocoa pod husk. He explained that ashing of dried cocoa pod husk is done in a drum with an open end, the process continued with the extraction of potash after which the solution is heat in a container and palm kernel oil is added to form a semi-solid mass after which it is dissolved in water to attain the requisite specific gravity.

The importance of keeping records of every activity in their farms was emphasized by the economists. Economic decision is always based on data collected and this can only be possible if data are collected by the farmers. The importance of inventory records, farm production records and financial records were also emphasized.

Knowledge management and platforms: The Extensionists, in a power point presentation explained the overall objective information through sharing ideas, innovation and experiences for quality practice along the value chain. The wrap-up session was an interesting aspect; majority of the participants came out to explain how much they understood what they have learnt. In addition, the farmers were made to know the benefits of each technology; the use of compost fertilizer to improving soil nutrient on their farms, and the advantages over chemical fertilizer as supported by European Union Regulations (EU) on environment pollution. There was a Health talk/awareness session delivered by the project coordinator on Ebola Virus Disease (EVD). The numbers of participants during the training were more than the expected, in which over 118 participants were present instead of the expected 85.

The monarch (Olu of Owena) and the Participants at the training in Owena, Ondo State.

Presentation of cocoa Pod husk fertilizers materials to farmers in Ilare, Osun State.

Kabiyesi, Owalere of Ilare Osun State (middle), Participants and Scientists

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Experimental Title: Evaluation of the practices of cocoa rehabilitation techniques among cocoa farmers in Nigeria

Investigators: Adejobi K.B* Oluyole K.A, Famaye A.O, Agbeniyi S.O, Ogunlade M.O, Oloyede A. A, Aikpokpodion P.E, Orisajo S. B

IntroductionCocoa has been in cultivation for more than 100 years in Nigeria. Cocoa was introduced into Nigeria in the late 19th century (Opeke, 2005). Since then, Nigerian cocoa industry has witnessed various fortunes as occasioned by International market forces and Nigeria' domestic socio economic and political issues. Cocoa production output in 1895 was a mere 21 metric tons, which developed to over 350,000 metric tons in 1965. Nigeria then became the second largest world producer of Cocoa after Ghana up to the early 1970s. However, with the development of the petroleum industry, emphasis shifted from agriculture and this adversely affected the industry. Then, the volume of Nigerian cocoa export fluctuated unpredictably and came down to 58,700 metric tons in 1986. Nigeria currently stands as the fourth largest producer after Cote d'lvoire, Ghana , and Indonesia (ICCO, 2005). Olaiya (2001) observed that the highest cocoa yields are achieved between 15 and 25 years and that a profitable life span may be 50 years but that from the twenty-sixth year, yields decline gradually and production cost rise steadily . The landmass suitable for cocoa production in Nigeria is about 1 million hectare and there are about 700,000 hectares of land under cocoa cultivation in Nigeria (Fasina, 1999) . The farm holdings of peasant cocoa farmer account for about 90% of these (Fasina, 1999). Many of these farms are scattered with few stands and on the average poorly maintained, neglected or completely abandoned. Consequently, the effective hectarage of cocoa in Nigeria is 300,000-500,000 hectares with the trees therein producing below their genetic potentials.

The current average yield of cocoa (500kg/ha dried beans) is still below the potentials realizable from the use of the available improved materials (1,500-3,000kg). The downward trend of cocoa production in Nigeria resulted from old age of trees of low yielding Amelonado varieties that gave average yield of 250-300kg dry beans per hectare. Two-thirds of the areas under cocoa were planted before 1950. Over 300,000 hectares were planted between 1925 and 1945 (Adesimi and Ladipo, 1975). Lack of organized efforts at increasing or even maintaining production and degradation of much of his suitable cocoa land restricted to the southern parts of Nigeria also contributed to the downward trend (Fasina el al, 2000). Olaiya (2001) suggested that apart from age consideration, a plot could be declared unproductive if the yield has declined to about the quarter of what is obtainable at the peak period of 10-25 years while Oduwole (2001) based his own recommendation on the cost/benefit ratio of conductive rehabilitation. Rehabilitation through coppicing and chupon generation have been reported to improve yield by Olaiya et al (2003) foliarly applied. Adenikiju (1993) also reported that F3 Amazon came to bearing 18 months after coppicing operations . Adeyemi (1996) also got yield improvement under rehabilitated plot with soil application of NPK fertilizer. Also, a significant percentage of Nigeria's stock of cocoa trees has reached or is close to reaching the end of its useful economic life, hence the decline in the yield. All these situations call for rehabilitation. Generally speaking, rehabilitation is defined as the process of bringing an unproductive cocoa plot back to economic productivity. Some rehabilitation techniques include (a) Partial replanting (b) Complete replanting or clear felling (c) Phased farm replanting (d) The Turrialba method; planting under old cocoa trees (e) Side grafting. (f) Coppicing and (g) Top grafting.

The objective of the study was to evaluate the rehabilitation methods practiced among cocoa farmers in Nigeria.

Methodology

The study was carried out in four cocoa producing States namely Ondo, Cross River, Osun and Ogun. In Ondo State, the randomly chosen Local Government Areas (LGAs) are Ifedore, Akure South and Idanre. The randomly chosen LGAs in Cross River State are Etung, Ikom and Boki. In Osun State, the selected LGAs are Ayedaade, Odo-Otin, Ife East and Ife North while in Ogun State, the selected LGA is Ijebu East. A total of 450 respondents were randomly selected from the selected States; 134 respondents from Ondo State, 144 from Cross River, 137 from Osun and 35 respondents from Ogun States. Data were collected from the respondents with the aid of structured questionnaire. The data collected were analyzed with the use of Descriptive Statistics.

Results and Discussion

Table 1 shows the socio-economic characteristics of the respondent farmers. The Table showed that 56.44% of the respondents are aged 50 years and below while 13.56% are 61 years and above showing that most of the respondents are still in the active age. As regards the educational level of the respondents, 28.29% of the respondents have primary education and above while 56.35% of the farmers had no formal education. Hence, the substantial proportion of the respondents has no formal education. This could impact negatively on the farmers' productivity as it would be difficult for the farmers to read and interpret research findings. Table 1 also shows that 29.33% of the respondent farmers had between 1 and 6 members of households while 3.32% of the respondent households had between 7 and 30 members. Large household members have positive implication on cocoa production as large household members have the tendency to supply more family labour thus minimizing the problem of unavailability of labour for farm work. Table 1 also shows that only 2.88% of the respondent farmers are having more than 5 hectares of farm while 90.45% of the total respondents are having less than 5 hectares of farmland. Hence, the farmers are predominantly small scale farmers. In terms of farming experience, 26.70% of the total respondents are having more than 20 years of farming experience. However, 18.44% of the respondent farmers are having between 11 and 20 years of experience while 39.33% of the farmers are having between 1 and 10 years of experience. Hence a total 45.81% of the respondent farmers are having more than 10 years of farming experience showing that most of the farmers are experienced in their farm work. This is a positive indicator towards improved productivity as high experienced farmers would be more productive than the low experienced ones. As regards the age of cocoa farm, 66.89% of the respondent farms are aged 30 years and below while 24.89% of the farms are aged 30 years and above. This shows that most of the farms are still within the active productive age in as much that a well maintained cocoa farm would expected to produce actively till 30 years after when the production would start to decrease.

Table 2 shows the rehabilitation techniques that the farmers had the knowledge about. The table shows that farmers had the knowledge of four rehabilitation techniques, these are coppicing, partial replanting, planting under old cocoa trees and side grafting. A total of 19.42% of the total farmers are having the knowledge of coppicing; 15.40% of the farmers had the knowledge of partial replanting while 3.79% of the respondent farmers had the knowledge of planting under the old cocoa trees

Table 1: Socio-economic characteristics of the farmers s

Variables	Frequency	Percentage
Age (years)		
No response	47	10.47
≤ 30	60	13.36
31-40	103	22.94
41-50	91	20.27
51-60	87	19.38
61-70	44	9.58
> 70	18	4.01
Total	450	100.00
Educational levels		
No response	67	14.92
No formal education	253	56.35
Primary education	65	14.48
Secondary education	52	11.58
Tertiary education	10	2.23
Others	2	0.45
Total	450	100.00
Household size		
No response	99	22.00
1-6	132	29.33
7-12	164	36.45
13-30	52	11.55
>30	3	0.67
Total	450	100.00
Farm size (Ha)		
No response	30	6.67
< 1.0	286	63.56
1.0-2.0	36	8.00
2.1-3.9	28	6.22
4.0-5.0	57	12.67
> 5.0	13	2.88
Total	450	100.00
Farming experience (Yrs.)		
No response	70	15.56
1-10	177	39.30
11-20	83	18.44
> 20	120	26.70
Total	450	100.00
Age of cocoa farm (Yrs.)		
No response	37	8.22
1-10	103	22.89
11-20	117	26.00
21-30	81	18.00
> 30	112	24.89
Total	450	100.00

Source: Field survey, 2014

While Olaiya 2006 reported improved yield in rehabilitation plots than in old plots when Boron was

Table 2: Farmers' knowledge of rehabilitation techniques

Rehabilitation techniques	Frequency	Percentage
No response	274	61.16
Coppicing	87	19.42
Partial replanting	69	15.40
Planting under old cocoa trees	17	3.79
Side grafting	5	0.22
Total	450	100.00

Source: Field survey, 2014.

Table 3: Organizations that trained on rehabilitation

Organizations	Frequency	Percentage
No response	292	64.88
CRIN	116	25.77
USAID	19	4.22
ADP	16	3.55
State extension agent	2	0.44
Others	5	1.11
Total	450	100.00

Source: Field survey, 2014.

Table 4: Period of last training

Period	Frequency	Percentage
No response	300	66.67
1-2years	116	25.78
3-4 years	33	7.33
Above 5 years	1	0.22
Total	450	100.00

Source: Field survey, 2014.

Table 5: The proportion of the farmers that have adopted cocoa rehabilitation techniques

Categories of farmers	Frequency	Percentage
No response	402	89.53
Adopters	45	10.02
Non-adopters	2	0.45
Total	449	100.00

Source: Field survey, 2014.

and just a small proportion (0.22%) of the farmers had the knowledge of side grafting. However, 61.16% of the farmers did not give any response as regards the knowledge of rehabilitation techniques.

Table 3 shows the organization that trained the respondent farmers on rehabilitation techniques. It could be observed from the Table that a total of four organizations (CRIN, USAID, ADP and State extension agents) trained the respondent farmers on rehabilitation techniques. Out of these organizations, 25.77% of the respondent farmers indicated that they received training on rehabilitation techniques from CRIN while 4.22% and 3.55% of the respondent farmers indicated that they received training from USAID and ADP respectively. Only 0.44% of the farmers indicated that they received training on rehabilitation techniques from the State extension agents. However, there was no response from 292 farmers representing 64.88% of the total farmers. From the analysis, it clearly showed that CRIN is making an impact regarding the spreading of rehabilitation technologies to cocoa farmers as more than 70% of the respondent farmers indicated that they received training on rehabilitation techniques from CRIN. It could also be observed that State extension agents are not doing much as regards the training of farmers on rehabilitation techniques.

Table 4 revealed the last time farmers were trained on rehabilitation techniques. The result showed that 25.78% of the respondent farmers received training on rehabilitation techniques within the last two years while 7.33% of the farmers received the training in 3-4 years ago. Only 0.22% received the training in 5 years ago. There was no response from 300 farmers representing 66.67% of the total respondents. It could be observed from the analytical result that the training of farmers on rehabilitation techniques was more pronounced just of recent (1-2 years ago). This is because 77.3% of the total respondents indicated that they were trained within this period.

Table 5 shows the responses of the farmers regarding the adoption of rehabilitation techniques by the farmers. The Table shows that 10.02% of the farmers have adopted the techniques while 0.45% indicated that they have not started practicing the techniques on their farms. However, 402 farmers representing 89.53% of the total respondents did not have any response. It could be noticed that there was a high proportion of no responses because the technologies have just been predominantly introduced to the farmers recently (1-2 years ago), hence the farmers have not really settled down properly to start implementing the technologies.

Table 6: Analysis of the adopted cocoa rehabilitation techniques

Rehabilitation Techniques	Frequency	Percentage
No response	257	57.11
Coppicing	36	8.00
Complete replanting	26	5.77
Partial replanting	19	4.22
Phased planting	48	10.66
Planting under cocoa	51	11.33
Side grafting	10	2.22
Top grafting	3	0.66
Total	450	100.00

Source: Field survey, 2014.

Table 7: Benefits of cocoa rehabilitation techniques

Benefits	**Frequency**	**Percentage**
No response	285	63.33
Increases yield	114	25.33
Controls weed	24	5.33
Controls pests and diseases	23	5.11
No effect at all	4	0.09
Total	450	100.00

Source: Field survey, 2014.

The analysis of the rehabilitation technologies that were adopted is shown on *Table 6*. The Table shows that 11.33% of the farmers adopted planting of young cocoa seedlings under cocoa trees while 10.66% of the farmers adopted phased planting. Coppicing was adopted by 8% and the least adopted rehabilitation technique was top grafting which was adopted by just 0.66% of the total respondents. No response from a total of 257 respondents representing 57.11% of the total farmers interviewed. Generally, from the result, it could however be discovered that the adoption rate for cocoa rehabilitation techniques in the study area is very low.

However, as a result of the adoption of the rehabilitation techniques, farmers derived the benefits of rehabilitation techniques as observed on their farms. The benefits derived are as shown on Table 7. The Table shows that 25.33% of the respondent farmers agreed that the techniques increases cocoa yield on their farms while 5.33% and 5.11% of the farmers are of the opinion that rehabilitation techniques controls weeds as well as pests and diseases respectively. Meanwhile, 285 farmers representing 63.33% of the farmers did not have any response.

Conclusion and Recommendation

Though most farmers are still within the active age in which case they are still agile to work, majority of them are not having formal education. This could impact negatively on the farmers' productivity as it would be difficult for the farmers to read and interprete research findings. Also, majority of the farmers are small scale producers as almost all the respondent farmers cultivate not more than 5 hectares of farm. The rehabilitation techniques that farmers had knowledge of are coppicing, partial replanting, planting under old cocoa trees and side grafting. Most of the farmers were trained these rehabilitation techniques under five years ago. This has resulted to the low adoption of the techniques. However, of all the adopted techniques, planting under old cocoa trees is mostly adopted while the least adopted technique is top grafting. The benefits of practicing rehabilitation techniques include increases yield, controls weed as well as controls pests and diseases.

It is hereby recommended that farmers should be enlightened more on the need to practice rehabilitation techniques on their farms so as to increase their cocoa yield and consequently improves their livelihood.

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Experimental Title: Evaluation of some agricultural wastes and NPK fertilizer on soil, leaf chemical properties and growth performance of cocoa (*Theobroma cacao* L)

Investigators: Adejobi, K.B, Famaye, A. O; Adeosun, S. A. and Akanbi, O. S.

Introduction

Cacao has been classified as member of the family sterculiaceae until recently through the application of molecular marking technology; the crop was reclassified as a member of the family Malvaceae. (Aversion *et al*, 1999). Its natural habitat is the lower middle storey of the evergreen rain forest. There are over twenty species in the genus but *Theobroma cacao* is the only one cultivated widely. Since its discovery in the 18th century in the Amazon Basin, its cultivation has spread to the other tropical areas of south and central America and indeed West Africa which became major producer from the Mid-1960s (Opeke, 1985).

Cocoa productivity in Nigeria which falls between 250-400kg/ha is low when compared with over 700kg/ha in some other parts of the world (Ogunlade and Iloyanomon, 2009). One of the reasons for this low yield is the poor nutritional status of soils of Cocoa plantations in Nigeria. Cocoa is a deep- rooted plant and requires deep, well-drained soils that are free from concretion, high in nutrient content and having top soil that is rich in organic matter(Shamshuddin *et al*, 2003).Un-amendable soil condition particularly those of a physical nature may impose a limitation on production regardless of the quality of materials used or the level of crop husbandry implored. This implies planting cocoa on unsuitable soil will among other things lead to poor productivity and poor economic returns.

Long ago, the problem of soil fertility depletion was not immediately evident because cocoa was cultivated in nutrient rich virgin forests but the situation has changed. Continuous "mining" of nutrients through pod harvest without replacement via fertilizer application has led to nutrient depletion. A yield of 1000kg cocoa beans removed 20kg-N, 4kg-P and 10kg-K, and when the method of harvesting as in Nigeria involves the removal of pod husk from the field, the amount of K increased five fold (Ogunlade and Iloyanomon, 2009). Though nutrients are returned to the soil through cocoa litter fall, the quantity of the leaf and other nutrient contents especially P, K and Ca are not sufficient to sustain cocoa productivity (Omotosho, 1975). The P content of cocoa leaf litter across the plantations ranged between 5-24kgP/ha which is far lower than the P required for cocoa in a P deficient soil (Omotosho, 1975). The K and Ca content of cocoa leaf litter ranged respectively between 20-30 and 7-12kg/ha. These values are inadequate for cocoa production. Therefore, there is need for soil amendment for cocoa production.

Objective: To examine the influence of some organic wastes to improve growth performance of cocoa seedlings in the nursery

Methodology

The experiment was carried out between 2010 - 2011 in Akure, Ondo State

Soil sampling and Analysis before planting: Soil samples were randomly collected from 0-15cm depth on the site, mixed thoroughly and the bulked sample was taken to the laboratory, air dried and sieved to pass through a 2mm screen for chemical analysis. The soil pH (1:1 soil/water) was determined using pH meter. Organic matter was determined by the wet oxidation method (22). Soil phosphorus (P) was extracted by the BrayP1 and measured by the Murphy blue coloration and determined by Spectronic 20 at 882um (13). Soil potassium (K), calcium (Ca), and magnesium (Mg) were extracted with 1MNH$_4$OAC, P^{H}7 and were determined with flame photometer, Mg was determined with an atomic absorption spectrophotometer. The total Nitrogen (N) was determined by the microjedah method (9)

Processing of the Organic Residues used for the Experiment: The organic materials used include Kola Testa (KT): outer covering of Cola *nitida* and *Cola acuminate*, Cocoa Testa (CT): outer covering of the cocoa bean and Melon Testa or Melon shell (MT).KT and CT were obtained from crop processing unit of Cocoa Research Institute of Nigeria, Ibadan. They were sun-dried for three weeks; ground to powder bagged and kept in dry place ready for application while MT was obtained from a local market in Ibadan. NPK 15-15-15 fertilizer was purchased from merchandant/distributor.

Chemical analysis of the organic materials used: Two (2) grammes each of the processed forms of the organic materials used were analyzed for nutrient composition using the methods previously applied for soil analysis

Nursery establishment: The mature, disease free cocoa pods were harvested from experimental plot of the Cocoa Research Institute of Nigeria (CRIN). The pods were broken and the beans were scooped for planting. The bulk soil taken from the site (0-15cm depth) was sieved to remove stones and plant debris and 2.5kg of the sieved soil was placed into a polythene bag (25cmx13cm). There were five treatments: kola Testa KT 2.5t/ha, Melon Testa

2.5t/ha, Cocoa Testa2.5t/ha, NPK15-15-15 2.5t/ha and the control (No fertilizer and no manure)
Two cocoa beans were sown per polythene bag arranged in a completely randomized design (CRD) replicated three times and the seedlings were later thinned to one seedling per bag. The treatments were applied using spot method a month after sowing, the parameters such as plant height, number of leaves, leaf area, stem diameter and number of branches was recorded from 10 weeks after planting (WAT). Growth parameters were measured every four weeks for 34 weeks after planting. Hand weeding was done at three weeks after planting and repeated at 6, 9, 12, 15 and 18 weeks. At 34 weeks after planting in the nursery, the seedlings were carefully removed from the polythene bags for the measurement of the fresh shoot and root weights. which were oven dried. The dry shoot and root weights were taken before finally analyzing for N, P, Coca, Mg and Na contents. At the time of taking the shoot weight, soil sample were taken from each polythene bag, air dried and sieved for analysis of soil N, P, K, Ca, Mg, Na, PH, and OM as described earlier.

Results and Discussion

Table 1: Physicochemical characteristics of the soil before planting

Soil properties value	
Sand	76.02%
Silt	16.25%
Clay	7.73%
Texture class	sandy loam
Chemical properties	
P^H (H_20)	5.40
Organic carbon	0.25
Organic matter	0.52%
Total Nitrogen	0.11%
Available P	6.05mg/kg
Exchangeable bases	
K^+	1.20cmol/kg
Ca^{++}	2.42cmol/kg
Mg^{++}	0.92cmol/kg
Exchangeable acidity	
Al^{3+}	1.39cmol/kg
H^+	6.97cmol/kg
ECEC	13.79

Table 2: Chemical analysis of the organic fertilizers used for the experiment

Treatment	P^H H_20 (1:1)	C/N Ratio	OM%	N%	P mg/kg	K mg/kg	Mg mg/kg	Ca mg/kg	Nag/kg
Kolatesta (KT)	7.10	6.61	2.32	2.10	11.28	4.98	3.44	50.5	5.31
Melontesta(MT)	7.30	7.30	4.08	1.96	16.32	5.21	4.21	6.23	6.33
Cocoatesta (CT)	7.11	5.50	3.19	3.22	18.09	4.20	6.21	5.04	5.53

Table 3: The growth parameters of cocoa seedlings under different organic fertilizers application

Treatments	Plant height (cm)	Number of Leaves	Stem diameter (cm)	Leaf area (cm)
Kola testa (KT)	26.43^b	9.73^b	2.14^a	49.13^b
Melontesta (MT)	26.92^b	9.84^b	2.31^a	47.80^b
Cocoa testa (CT)	31.51^a	11.70^a	2.38^a	57.41^a
N P K 15- 15- 15	30.37^a	11.27^a	2.16^a	52.26^a
Control	19.96^c	6.86^c	1.13^b	28.96^c

Treatment means within each column followed by the same letters are not significantly different from each other using Duncan Multiple Range Test at 5% level

Table 4: The fresh and dry matter yield of cocoa seedlings under different organic fertilizers

Treatments	Fresh root weight(g)	Dry root weight(g)	Fresh shoot weight(g)	Dry shoot weight(g)
Kola testa(KT)	6.96^a	5.43^a	12.80^c	10.03^b
Melon testa(MT)	5.96^a	4.00^a	11.56^c	9.23^b
Cocoa testa(CT)	5.93^a	4.16^a	13.80^b	10.76^b
N.P.K 15-15-15	6.86^a	2.85^b	10.90^a	12.83^a
Control	3.37^b	2.88^b	10.00^d	6.33^c

Treatment means within each column followed by the same letters are not significantly different from each other's using Duncan Multiple Range Test at 5% level

Table 5: Soil chemical composition after he experiment under different organic manure application

Treatments	Soil PH(1:1)	Organic carbon (C)g/kg	Organic matter (OM)%	N%	P mg/kg	K mg/kg	Mg mg/kg	Ca mg/kg	Na mg/kg
Kola testa(KT)	7.53^{a}	0.88^{c}	3.50^{a}	0.27^{b}	20.60^{b}	1.54^{a}	1.2^{b}	2.26^{b}	0.70^{b}
Melon testa(MT	7.05^{a}	2.05^{a}	3.50^{a}	0.32^{b}	35.52^{a}	1.60^{a}	1.51^{a}	2.99^{b}	0.33^{b}
Cocoa testa	7.29^{a}	1.00^{b}	1.72^{b}	0.29^{b}	14.60^{c}	1.79^{a}	1.46^{a}	3.10^{a}	0.17^{b}
N.P.K15-15-15	5.38^{b}	2.09^{a}	0.85^{c}	0.99^{a}	20.00^{b}	1.40^{a}	1.10^{b}	2.93^{b}	0.60^{b}
Control	5.95^{b}	1.00^{b}	0.56^{c}	0.11^{c}	12.00^{d}	1.20^{b}	0.58^{c}	1.42^{c}	0.50^{b}

Treatment means within each column followed by the same letters are not significantly different from each other's using Duncan Multiple Range Test at 5% level

Table 6: The leaf chemical composition under different organic manure application.

Treatments	N%	P mg/kg	K mg/kg	Ca mg/kg	Mg mg/kg	Na mg/kg
Kolatesta(KT)	1.45^{b}	1.23^{b}	5.55^{b}	1.81^{b}	2.72^{a}	2.07^{a}
Melontesta(MT)	1.61^{a}	2.11^{a}	6.83^{a}	1.94^{b}	2.97^{a}	2.11^{a}
Cocoa testa(CT)	1.54^{b}	1.32^{b}	5.86^{b}	2.03^{a}	1.97^{b}	2.21^{a}
N.P.K 15-15-15	1.93^{a}	1.20^{a}	5.28^{b}	2.06^{a}	1.88^{b}	1.99^{a}
Control	1.10^{c}	0.27^{c}	0.81^{c}	0.83^{c}	0.92^{c}	1.08^{b}

Treatment means within each column followed by the same letter are not significantly different from each other using Duncan Multiple Range Test as 5% level.

The pre- planting soil physiochemical properties and analytical data of the organic wastes used for the experiment were presented in Tables 1and 2. According to the result of the particle size analysis, the soil was texturally sandy loam (76.02% sand, 16.25% silt and 7.7% clay) and belonging to Akure series, an Altisol. Based on the established critical levels for the soil in South -Western Nigeria, the soil was acidic (5.40) and low in organic matter (0.52%) (Agboola and Cory, 1773). The soil Nitrogen was less than 0.15% which is considered optimal for most crops (Agboola 1982) while the available P was less than 10mg/kg which is considered as adequate for crop production .(Agboola and Cory, 1973). The exchangeable K value (1.20cmol/kg) was higher than 0.2cmol/kg soil as the critical levels. Also, the level of Ca and Mg were very low indicating poor soil fertility, therefore the soil is inevitably has to rely on soil amendment for meaningful and sustainable agricultural productivity.

The chemical analysis of the organic fertilizers (KT, MT and CT) used in growing cocoa seedlings is presented in Table 2. Among the organic residues used: Cocoa testa has the highest value of N (3.22%) followed by Kola testa and Melon testa least in C/N ratios of 5.50, 6.61 and 7.30 for Cocoa, Kola and Melon testa respectively. Again Cocoa testa had the highest value of available P(18.09cmol/kg) and exchangeable Mg (6.21cmol/kg) followed by Melon testa and kola testa respectively while the highest Ca (6.23mg/kg) and Na (6.33mg/kg) contents were obtained from melon testa.

The plant height, number of leaves, stem diameter, leaf area, and root fresh and dry weights, shoot fresh and dry weights of cocoa seedlings under different organic manures is presented in Table 3 and 4. The application of organic fertilizers increased significantly ($P<0.05$) both growth and yield parameters of cocoa seedlings compared to the control treatment. This result revealed the soil amelioration potentials of these organic manures to increase availability of N, P, K, Ca, Mg, and Na in soil and their uptake by cocoa plants thereby leading to enhanced growth performance of cocoa. Improvement in the soil fertility by the addition of organic manures may be partly due to increase of cation and anion holding capacity or through the neutralization of soil acidity, improved physical conditions and added source of nutrients. In this study, it was observed that the growth parameters of cocoa seedlings increased significantly when the soil acidity was reduced by the addition of organic manures (Table 3 and 5). This is consistent with the results of cocoa field trials by Ng and Chan (1977). Studies in the past indicated that organic fertilizers treatment at an appropriate rate would increase organic matter contents of the soil and there by eliminate Al^{3+} activity in the soil solution to make the nutrient available for cocoa growth (Shamshudding and Auxtero, 1991). The higher dry weight of roots and shoots of cocoa seedlings as a result of the treatments application indicated that cocoa seedlings under these treatments application had larger root surface area, better photosynthetic activities and nutrients observation than the control plot; .Relative to the NPK 15-15-15 fertilizer treatment, Cocoa testa (CT) increased plant height, number of leaves, stem diameter and leaf area of cocoa seedlings by 10%, 10%, 9% and 9% respectively (Table

3). These significant increases could be attributable to the fact that CT could be a good source of both macro and micro nutrients which encourage better seedlings growth. This finding was consistent with earlier works of Adeniyan and Ojeniyi (2005) and Adejobi et al (2011,a,b,c, & d) who reported that organic manures supported crops growth performance and yield. Application of CT, KT, and MT also helped in improving soil pH from5.40 before planting to 7.29, 7.53, and 7.05 respectively after harvesting. This would have further improved root growth since Al^{3+} toxicity occurred at soil pH below 5.5 affected root growth. An improvement in soil pH further improved nutrient availability and crop growth. Poor growth of cocoa seedlings as a result of low nutrient status of the soil and leaf N, P, K, Mg, Ca, Soil pH and OM was generally observed in control plot.

Although, the inorganic fertilizer applied (N. P. K 15-15-15) also increased growth, yield and leaf nutrient uptake of cocoa seedlings compared with the control, but it reduces soil pHand this might also be as a result of absorption of NH_4^+ ions on the soil surface. Barber (1962) reported that large application of N.P.K fertilizer continually might influence the cation concentration in the soil solution and on the exchange phase, thereby affecting their equilibrium, selection and effective diffusion co-efficient.

Conclusion and Recommendation

Some selected organic manures and N. P .K fertilizer were studied in terms of their effect on soil, leaf chemical properties and growth performance of cocoa in the nursery. It was observed from the results that cocoa testa(CT) increased in plant height; stem diameter; number of leaves; leaf area and dry shoot weight of cocoa seedlings compared to other treatments. The treatment (CT) is recommended for optimum growth of cocoa seedlings as it is readily available in cocoa growing areas of Nigeria. This recommendation was based on the fact that CT was effective source of both macro and micro nutrients. It is a better replacement for not readily available and expensive inorganic fertilizer like N. P. K 15-15-15.

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Experimental Title: Evaluation of polycyclic aromatic hydrocarbons (PAHs) in cocoa beans from selected cocoa producing states in Nigeria

Investigators: Aikpokpodion P., Oduwole O.O.

Introduction

Cocoa is the main non - oil source of foreign earnings in Nigeria. Nigeria is the fourth largest producer of cocoa in the world with 200 metric tonnes (ICCO, 2011). Other major cocoa producers include Cote d'Ivoire, Ghana, Cameroon, Brazil, Malaysia and Indonesia. Post harvest handling of cocoa influences the final quality of cocoa beans to a large extent. Whatever reduces the quality of the beans may certainly affect the quality of the finished products intended for direct consumption such as cocoa powder, chocolate bar and chocolate confectionery (Lowor *et al.*, 2012). A lot of contaminants are likely to be introduced into cocoa beans during post harvesting and processing stages.

Polycyclic aromatic hydrocarbons (PAHs) have recently been identified as a serious contaminant of cocoa. It is an important class of environmental contaminants with prevalent and demonstrated adverse health effects (IARC, 1987). PAH are formed by the incomplete combustion of organic compounds and geochemical processes (Barranco *et al*., 2003). They have been the subject of much concern in recent years because of their toxic potential and comprise some well-known carcinogens formed by four to seven fused benzene rings (Moret et al., 2005).

The most critical step through which PAH can gain entrance into cocoa beans is the drying stage when cocoa beans are dried on asphalt, bitumen or by using direct firing model (Misnawi, 2012). Furthermore, cocoa beans can be contaminated with PAH during storage and transport in jute or sisal bags that had been treated with batching oil (Grob *et al*., 1993). However, since 1998, International Standards recommend that ingredients of batching oils must be non-toxic and approved for use in packaging materials (Ziegenhals *et al*., 2009). Despite the fact that there are about 660 compounds belonging to the PAH group (Sanders and Wise, 1997) benzo[a]pyrene is the most toxic and carcinogenic (ATSDR, 1995) and therefore, used as a marker (EC, 2006).

In order to protect the health of consumers of cocoa and cocoa products, the European Union has set a maximum level of 2 ppb for benzo [a] pyrene in foods (EC Regulation 208/2005).

On June 9, 2008, the scientific panel on contaminants in the food chain of EFSA adopted an opinion on polycyclic aromatic hydrocarbons. In this opinion, EFSA concluded that, benzo [a] pyrene is not a suitable marker for the occurrence of PAH in food and that, a system of four specific substances (PAH4) would be the most suitable indicators of PAH in food. Based on the recommendations, the commission regulation (EU) No835/2011 of 19 August 2011 amending Regulation (EC) No1881/2006 as regards maximum levels for PAH in foodstuffs was published and applied on September 1st, 2012.

Objectives

The objective of the study was to assess the level of PAHs in cocoa beans and determine the safety in relation to European Union regulation on PAHs in food.

Methodology

Site selection: Cocoa samples were collected in selected areas in Boki-biakwan, Ikom, Etung and Efraya in Cross River State. Cocoa beans were also collected in Idanre, Akure and Ile-oluji in Ondo State. Some cocoa farmers in the selected areas of cocoa production in Cross River and Ondo States dry their cocoa beans on concrete slabs within the compound while others dry their beans on tarpaulin in front of their houses. Cocoa beans which have been well sun-dried and ready for sales to cocoa merchants were collected from each of the farmers in the study areas. The samples were carefully kept in nylon bags to prevent contamination from the outside.

Reagents: All chemicals and reagents used were of analytical grade and of highest purity. Dichloromethane used for extraction was obtained from USA; silica gel used to clean up extracts was supplied by BDH. A PAH standard mixture containing different chemicals among which are benzo[a]anthracene, benzo[b]fluoranthene, benzo[a]pyrene, benzo[ghi]perylene, indeno[1,2,3-cd]pyrene was used in the study.

Clean up: Each extract was concentrated to 1ml and loaded onto a silica gel column. The silica gel column was prepared by loading an activated silica gel onto a chromatographic column (1cm internal diameter) to about 5cm. an additional 1cm of anhydrous sodium sulphate was added to the column. This was conditioned with methylene chloride. 1ml of concentrated extract was loaded and eluted with 10ml of methylene chloride (Anyakora, 2005). The eluate was evaporated with a rotary evaporator and the volume reduced to 1ml with liquid nitrogen

Gas Chromatographic analysis: The gas chromatographic analysis of PAH was performed on an HP 5890II gas chromatograph with a split/splitless injection port. The GC was equipped with a VF-17 capillary column (60m x 0.25mm i.d., 0.25µm film thickness) from Varian, Germany. Helium was used as carrier gas at a constant pressure of 27psi. The injection temperature programme was used: isothermal at 50^{o}C for 1min, at 25^{o}C/min to 280^{o}C, at 1^{o}C/min to 330^{o}C and isothermal at 330^{o}C for 30 minutes.

The quantification of PAH by GC was performed by using a VG Autospec.

Results and Discussion

The Benzo[a]pyrene contents of the analyzed cocoa beans from Ondo State ranged from 0.0055 to 0.0066 $\mu g\ kg^{-1}$ and

0.0032 to 0.009 in samples from Cross River State. The B[a]P as contaminant in the analyzed cocoa beans is much lower than the 2ppb limit set by the European Union for cocoa. Ziegenhals *et al*. reported a range of 0.07 – 0.63 µg kg^{-1} B[a]P in 40 sample of chocolate. Within the group of the two Benzofluoranthenes, B[b]F dominated the samples except in sample CR6 in which B[k]F dominates. Similarly, B[b]F dominated the group of Benzofluoranthenes in cocoa beans obtained from Ondo State. A similar observation was made and reported by Ziegenhals *et al*.(2009), where B[b]F was found to dominate the three groups of Benzofluoranthene in chocolate. The B[a]P concentration in the present study is lower than the level of B[a]P (0.23 – 0.57 µg kg^{-1}) obtained in the study carried out by reported by Misnawi on cocoa beans in Indonesia. It has been reported that, cocoa beans shell absorb PAH from the outside of the cotyledon and it is mainly retained within the shell. De-shelling of cocoa reduces the PAH accumulation in the nib. According to Ziegenhals. *et al*.(2009), the shell contamination can give rise to the possibility of increase in PAH concentration in cocoa beans cotyledon through butter migration especially during bean roasting and micronizing.

The total B[a]P in all the cocoa beans obtained from Cross River and Ondo States were far below the 2 µg kg^{-1} set as maximum limit by the European Union. In a recent study carried out by Misnawi in Indonesia, the level of B[a]P was also less than 2 µg kg^{-1} set by the European Union. The mean value was however, higher than the mean value in the present study. The B[a]P contents of the various cocoa beans analyzed in the present study are lower than the mean B[a]P contents in chocolate (0.33 µg kg^{-1}) reported by Lodovic *et al*., (1995) and 0.13 – 0.32 µg kg^{-1} reported by Dennis *et al*., (1991). Similarly, the B[a]P contents of 40 samples of chocolate analyzed in Germany as reported by Ziegenhals *et al*.(2009), were higher than the B[a]P contents of cocoa beans analyzed in the present study. This is an indication that, cocoa beans processed in the study areas of Cross River and Ondo states are safe for consumption with respect to PAH contamination in food. One possible reason why the values of B[a]P in the analyzed cocoa beans may be due to the fact that, most of the cocoa farmers in the study area sundry their cocoa beans on concrete slab in front of their houses while others spread theirs on tarpaulin very close to their residential buildings. It was also observed during sample collection that, most of the farmers encountered during sample collection do not dry cocoa beans on bitumen tarred roads or near roads where vehicular movement is high. This does not in any way conclude that, all cocoa farmers or processors in the two states follow this method of drying.

The plot of the B[a]P and the total PAH contents in cocoa beans from Ondo and Cross River States are shown in figures 1 and 2 respectively. A linear correlation between B[a]P contents and the sum total of the 16 priority PAH exist. The linear regression of B[a]P and the sum total of all the individual PAH in cocoa samples obtained from Ondo State was 0.53 while those from Cross River State had linear regression of 0.74. These values are however, lower than the value (R^2 = 0.94) reported by Ziegenhals et al.(2009), for B[a]P and 15+1 priority PAH in 40 chocolate samples in Germany.

Recently, European food Safety Authority (EFSA) concluded that B[a]P is not a suitable indicator for the occurrence of PAH in foods. The decision led to the introduction of PAH4 which is the sum of four selected individual PAHs (B[a]P, CHR, B[a]A and B[b]F) as the most suitable indicator (EFSA, 2008). Consequently, linear regression between the sum of all individual PAH and PAH4 was evaluated in each sample in order to determine the relationship between PAH4 (Benzo[a]Pyrene, Chrysene, Benzo[a]Anthracene and Benzo[a]fluoranthene) and the sum of the 16 priority PAH in each sample. Result from the evaluation of samples from Ondo State is presented in figure 3 which showed a linear regression R^2 = 0.4368 and 0.5095 for samples from Cross River State. Results however, showed that, B[a]P gave higher R^2 values than PAH4 in the studied cocoa samples from both States.

In cocoa samples obtained from Ondo State, linear correlation between B[a]P and individual priority PAH showed significant ($P < 0.05$) positive correlation with naphthalene, acenaphthalene, acenaphthene, anthracene, B[a]A, D[ah]A and B[hgi]A while in cocoa samples obtained from Cross River State, B[a]P had significant ($P < 0.01$) correlation with B[k]F and singnificant ($P < 0.05$) negative correlation with phenanthrene and pyrene. On the other hand, PAH4 had significant ($P< 0.05$) correlation with with anthracene, fluoranthene, chrystene, B[a]A and B[b]F in samples obtained from Ondo State while it had significant ($P< 0.05$) positive correlation with naphthalene, B[a]A and B[b]F in samples from Cross River State.

Low and high molecular weight PAHs in cocoa beans: Result of the determination of polycyclic aromatic hydrocarbon is presented in Tables 1 and 2. Among the 16 priority polycyclic aromatic hydrocarbon detected in the cocoa beans, Dibenzo[ah]anthracene had the lowest concentration in samples from both States. it ranged from 7E-06 to 5.8E-05 µg kg^{-1} in samples from Cross Rivers and 7E-06 – 5.8E-05 µg kg^{-1} (mean = 4.23E-05 µg kg^{-1} in samples from Ondo State. Fluoranthene had the highest mean value (0.1989 µg kg^{-1}) with a range of 0.082 – 0.30 µg kg^{-1} in cocoa from Cross River while anthracene had the highest concentration in samples from Ondo State with a mean value of 0.2385 µg kg^{-1} .The total PAH ranged from 0.60 – 1.26 µg kg^{-1}. Cocoa sample from CR 2 had the least total PAH while sample from CR 4 had the highest total PAH. The ratio between phenanthrene and anthrancene ranged between 0.488 and 1.0 with a mean of 0.6257 in cocoa obtained from Cross River while it ranged between 0.456 and 0.898 µg kg^{-1} with an average value of 0.5846 µg kg^{-1}. The ratio between fluoranthene and pyrene ranged between 8.53 and 13.57 with a mean of

11.12 in sample from Cross River and 9.8 – 15.56 in samples from Ondo State. The sum of low molecular weight PAH ranged from 0.5093 – 1.143 µg kg^{-1} (mean= 0.8095 µg kg^{-1}) in cocoa from Cross River and 0.664 – 1.095 (mean = 0.8745 in cocoa beans from Ondo State. The sum of high molecular weight PAH ranged from 0.038 to 0.193 µg kg^{-1} (mean = 0.13 µg kg^{-1}) in cocoa from Cross River and 0.105 – 0.1170 µg kg^{-1} in samples from Ondo State. Percentage of low molecular weight PAH in the total PAH of the analyzed samples ranged from 72.55 to 93.71% in Cross River sample and 85.79 – 90.65 µg kg^{-1} in samples from Ondo State. The percentage of high molecular weight PAH in the total PAH ranged from 6.29 – 27.45% (mean = 14.76%) in Cross River samples and 9.35 – 14.21% in samples from Ondo State. Benzo[a]pyrene content of the cocoa beans obtained from Cross River State ranged from 0.0032 - 0.0082 µg kg^{-1} with a mean of 0.0067 µg kg^{-1} and 0.0055 – 0.0066 µg kg^{-1} (mean = 0.0059 µg kg^{-1}). The total PAH4 in samples from Cross River ranged from 0.7739 – 1.2118 µg kg^{-1} with a mean of 0.9855 µg kg^{-1} while PAH4 in samples from Ondo State ranged from 0.2395 – 0.2826 µg kg^{-1}.

It was observed in the study that, the 3-4 rings (low molecular weight) PAHs were more predominant in all the cocoa beans from the two States of study. However, fluoranthene, phenanthrene and anthracene were the most predominant individual PAHs in cocoa beans obtained from Cross River and Ondo States. These compounds are more water soluble than higher molecular weight PAHs compounds and may be more susceptible to deposition from polluted air and retained in water vapor (Aikpokpodion *et al.*, 2012). Their low weight and each of being carried by air molecules compared to higher molecular weight PAHs may be responsible for their predominance in cocoa samples as contaminants. The predominance of low molecular weight PAHs in foods have been reported by authors. Baran *et al.*, (2002) reported that, 65% of the total PAHs in food was low molecular weight PAHs while Aikpokpodion et al., found 90% of the total PAHs in kola nuts was the low molecular weight PAHs with 3-4 rings. Among the high molecular weight PAHs, the Benzo[b]fluoranthenes and Benzo[k]fluoranthenes were predominant in all the analyzed cocoa samples. The study carried out by Aikpokpodion *et al* showed similar pattern in the assessment of PAHs in kola nuts from selected markets in south western Nigeria.

Determination of the source of PAHs in the studied samples was carried out using the molecular ratios of specific individual polycyclic aromatic hydrocarbons. This method was used by Lin and Zhu (2005) and Azza (2006) and to investigate the source of PAHs in foods. According to the model, a ratio of fluorine to pyrene greater than 1.0 was characteristic of pyrolytic origin whereas, ratio less than 1.0 was characteristics of petroleum hydrocarbon (Banmard *et al.*, 1998). A ratio of phenanthrene to anthracene less than 10 suggests combustion sources while ratio greater than 10 implies petrogenic sources (Yunker *et al.*, 1996; Benlaheen *et al.*, 1997). Based on the various values obtained from the ratios of phen/anth and Fluo/Pyr (Tables 1 and 2) it therefore suggests that, PAHs in the cocoa beans obtained from selected areas of Ondo and Cross River States resulted from incomplete combustion products of petroleum in moving automobiles within the vicinity of the locations where the cocoa beans were processed or sun-dried. In the report of Fernades *et al.*, 1997, it was stated that, predominance of low molecular weight PAHs in food is derived from fossil fuel combustion.

Table 1: Polycyclic aromatic hydrocarbons in cocoa samples obtained from Ondo State

	OD 1	OD 2	OD 3	OD 4	OD 5	OD 6	OD 7	OD 8	OD 9	OD 10	Mean
Naph	0.0081	0.0073	0.0045	0.0041	0.0065	0.0043	0.0062	0.0071	0.0083	0.0047	0.00611
Aceny	0.0058	0.0051	0.0037	0.0032	0.004	0.0033	0.0041	0.0042	0.0061	0.005	0.00445
Acen	0.091	0.0815	0.0523	0.045	0.047	0.062	0.062	0.0512	0.093	0.078	0.0663
Fluo	0.303	0.28	0.0753	0.0811	0.24	0.131	0.096	0.252	0.316	0.31	0.20844
Phen	0.136	0.131	0.114	0.159	0.127	0.135	0.124	0.142	0.145	0.138	0.1351
Anth	0.271	0.254	0.256	0.177	0.264	0.216	0.205	0.195	0.286	0.261	0.2385
Flua	0.0187	0.0192	0.0251	0.0196	0.023	0.0189	0.019	0.0184	0.028	0.024	0.02139
Pyr	0.0016	0.0017	0.00168	0.002	0.0018	0.0017	0.0016	0.0016	0.0018	0.0018	0.001728
B(a)A	0.126	0.135	0.139	0.117	0.13	0.125	0.126	0.128	0.14	0.132	0.1298
Chry	0.059	0.0633	0.0612	0.056	0.0652	0.063	0.058	0.0603	0.071	0.069	0.0626
B(b)F	0.065	0.071	0.067	0.061	0.07	0.069	0.066	0.072	0.065	0.068	0.0674
B(k)F	0.0292	0.032	0.031	0.038	0.032	0.035	0.032	0.029	0.039	0.03	0.03272
B(a)P	0.006	0.0064	0.0059	0.0055	0.0058	0.0057	0.0055	0.0056	0.0066	0.0057	0.00587
IP	0.0043	0.0047	0.0041	0.0049	0.0045	0.0043	0.0039	0.004	0.005	0.0048	0.00445
D(ah)A	0.000043	0.000051	0.000039	0.000031	0.00004	0.00003	3.8E-05	4.6E-05	0.00006	4.5E-05	4.23E-05
B(ghi)A	0.00073	0.00081	0.00054	0.00051	0.00072	0.00068	0.0006	0.00067	0.00094	0.00057	0.000677
Phen/Anth	0.5018	0.516	0.456	0.898	0.4810	0.625	0.605	0.728	0.507	0.529	0.58468
Flua/Pyr	11.69	11.29	14.94	9.8	12.78	11.12	11.88	11.50	15.56	13.33	0.01527

Σ LPAHs	1.0202	0.9781	0.7328	0.6640	0.9085	0.7619	0.7019	0.8598	1.0952	1.0235	0.87459
Σ HPAH	0.105	0.1149	0.1085	0.1099	0.1131	0.1130	0.1080	0.1113	0.1170	0.1091	0.11098
PAH 4	0.256	0.2757	0.2731	0.2395	0.2710	0.2627	0.2560	0.2660	0.2826	0.2747	0.26573
Σ PAH	1.1254	1.0930	0.8413	0.7739	1.0215	0.8749	0.8099	0.9711	1.2118	1.1326	0.98554
% LPAH	90.65	89.49	87.10	85.79	88.93	86.89	86.66	88.53	90.38	90.37	88.479
% HPAH	9.35	10.51	12.90	14.21	11.07	13.11	13.34	11.47	9.62	9.63	11.521

Naph- Naphthalene, Acety – Acenaphthalene, Acen – Acenaphtene, Fluo- Fluorene, Phen – Phenanthrene, Anth- Anthracene, Flua -Fluoranthene, Pyr - Pyrene, B(a)A – Benzo[a]anthracene, Chry – Chrysene, B(b)F - Benzo [b] fluoranthene, B(k)F - Benzo[k]fluoranthene, B(a)P - Benzo[a]pyrene, D(ah)A- Diben[a,h]anthracene, B(ghi)P - Benzo[ghi]perylene, IP - indeno[1,2,3,-cd]pyrene; LPAH- Low molecular PAHs; HPAH - High molecular PAHs

Table 2: Polycyclic aromatic hydrocarbons in cocoa samples obtained from Cross River State

CR1											
CR2											
Aceny	0.0039	0.0016	0.0069	0.0035	0.0042	0.0051	0.0032	0.0047	0.0061	0.0021	0.00704
Acen	0.047	0.05	0.12	0.13	0.064	0.058	0.15	0.11	0.086	0.07	0.00413
Fluo	0.082	0.137	0.301	0.317	0.096	0.211	0.29	0.205	0.21	0.14	0.0885
Phen	0.0727	0.151	0.136	0.147	0.085	0.104	0.152	0.104	0.14	0.18	0.1989
Anth	0.124	0.0194	0.274	0.294	0.163	0.207	0.216	0.213	0.219	0.22	0.1717
Pyr	0.0026	0.093	0.0017	0.0019	0.0014	0.0014	0.0013	0.0014	0.0013	0.0019	
Flua	0.0212	0.0019	0.0189	0.0209	0.00012	0.018	0.016	0.019	0.0176	0.018	0.0107
B(a)A	0.103	0.061	0.13	0.149	0.108	0.124	0.136	0.114	0.136	0.0018	0.10628
Chry	0.048	0.046	0.0609	0.0677	0.049	0.054	0.071	0.063	0.055	0.05	0.05646
B(b)F	0.112	0.0257	0.067	0745	0.082	0.036	0.07	0.086	0.094	0.03	0.06772
B(k)F	0.066	0.0053	0.0305	0.0338	0.074	0.051	0.053	0.066	0.048	0.008	0.04356
B(a)P	0.0082	0.0032	0.0062	0.0069	0.009	0.0081	0.007	0.008	0.0059	0.004	0.00665
IP	0.0061	0.0032	0.0045	0.0051	0.0073	0.0065	0.0069	0.0056	0.007	0.006	0.00582
D(ah)A	9E-06	3.6E-05	0.00005	4.3E-05	0.00001	7E-06	0.00006	4.2E-05	5.8E-05	3.8E-05	3.53E-05
B(ghi)A	0.00036	0.00034	0.00079	0.00075	0.00061	0.00046	0.00058	0.0006	0.00047	0.0004	0.000536
Phen/Anth	0.586	1.0	0.5	0.5	0.52	0.5024	0.704	0.488	0.639	0.818	0.62574
Flua/Pyr	8.53	10.26	11.32	11	8.57	12.68	12.30	13.57	13.54	9.474	11.1244
Σ LPAH	0.5093	0.5624	1.0604	1.143	0.5804	0.7893	1.0465	0.8377	0.8804	0.6854	0.80948
Σ HPAH	0.1930	0.0377	0.1090	0.1210	0.2037	0.1020	0.1430	0.1653	0.1546	0.1142	0.13435
PAH 4	0.2712	0.2053	0.2357	0.2981	0.2480	0.2220	0.2840	0.2710	0.2900	0.1680	0.24933
Σ PAH	0.7019	0.6001	1.1694	1.2640	0.7841	0.8913	1.1890	1.0039	1.0358	0.7996	0.94391
% LPAH	72.55	93.71	90.68	90.65	74.02	88.55	88.01	83.44	85.06	85.71	85.238
% HPAH	27.45	6.29	9.32	9.35	25.98	11.45	11.99	16.56	14.94	14.29	14.762

Naph- Naphthalene, Acety – Acenaphthalene, Acen – Acenaphtene, Fluo- Fluorene, Phen – Phenanthrene, Anth-Anthracene, Flua-Fluoranthene, Pyr- Pyrene, B(a)A – Benzo[a]anthracene, Chry – Chrysene, B(b)F - Benzo [b] fluoranthene, B(k)F- Benzo[k]fluoranthene, B(a)P- Benzo[a]pyrene, D(ah)A- Diben[a,h]anthracene, B(ghi)P- Benzo[ghi]perylene, IP - indeno[1,2,3,-cd]pyrene; LPAH- Low molecular PAHs; HPAH - High molecular PAHs.

Conclusions and Recommendation

The study has shown that, exhaust from automobiles is a major source of PAHs contamination in cocoa beans dried within the vicinity of traffic movement. The low molecular weight polycyclic aromatic hydrocarbons predominates PAHs in cocoa beans obtained from Cross River and Ondo State. The levels of Benzo[a]pyrene, PAH4 and total PAHs in the examined cocoa beans are far below the level set for B[a]P and PAH4 by the European Union. Hence, cocoa beans from the area of study are safe for consumption with respect to PAHs contamination.

However, due to the fact that, some major cocoa merchants further sun-dry the beans after purchase from farmers, it is recommended that, cocoa samples from the stores and warehouses of cocoa merchants and possibly sea-ports should be collected and analyzed for PAHs in order to cover a wider area of study.`

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Experimental Title: Socio-economic study of consumer preference and acceptability of cocoa bread: the Cocoa Research Institute of Nigeria (CRIN) case

Investigators: Lawal, J.O

Background of Study

The study empirically studied the consumer preference and acceptability of the cocoa bread produced by the CRIN Venture. Questionnaire was administered to 66 respondents (consumers and marketers) of the CRIN cocoa bread; the data collected were analysed using descriptive and inferential statistics.

Introduction

Value additions to products have been seen as a way of improving livelihood, income, shelf life, taste and outlook. Value addition is generally seen as a way of improving the welfare of producers and acceptability by consumers.The case of the value addition done on the wheat flour bread by Cocoa Research Institute of Nigeria (CRIN) by incorporating 5% pure cocoa powder into the dough of bread used in the production of Cocoa Bread is an innovation on its own.

Nigeria exports 97% of her Cocoa beans production, while only 3% is been consumed locally; these situation keeps farmers still in the vicious cycle of poverty and constant lack and penury. Local consumption of our Cocoa bean powder will make the product command better prices in the world market most especially when the Nigerian cocoa has a peculiar flavour and taste which is highly desirable by buyers in the international market. Also with the health benefits of the Cocoa powder in treating Malaria, high blood pressure, osteoporosis and many more.

The production or innovation of this type is incomplete without the determined acceptance of the product developed for consumers.

Objectives of the study

- To determined the preference and acceptability of CRIN Cocoa Bread;
- To find the determinants of the preference of CRIN cocoa Bread to other white loaves;
- To empirically harvest suggestions for improvements of the developed Bread recipe.

Results and Discussion

The results showed that mean age of respondents was 36 years ± 10.70, mean household size was 4; 60% are male while the remaining 40 % are female; 33.3% are single while 66.7% are married. In the sample, 87.9% are civil servants while 12.1% do other businesses; the mean monthly income range among respondents was N82, 875 ±54.21; while 45.5% do own shops where the cocoa bread is sold. 93.9% and 97% claim to have seen and tasted the cocoa bread respectively; the colour of bread attracted 90.9% while aroma of loaf attracted 9.1% the very first time they saw it.

Table 1: Socio-economic characteristics of respondents

Variables	Mean	Std. Deviation
Res.Age	36.88	10.697
H.H.Size	4.37	1.476
Mon.Inc.Ran	82.87500	54.209988

Field survey: 2013

Every respondent (100%) claimed to like the bread but more specifically 75.8% claim to like the taste; 51.5% have been eating the bread in the last one year; 30.3% in the last two years; 6.1 and 9.1% in last three and four years.

About 72.7% prefer it to other loaves in town while the remaining 27.3% prefer other loaves because of packaging and bulkiness/weight. 18.2% suggested that the taste of the cocoa bread be improved; 57.6% suggested improved packaging of the loaves; 9.1% said the prices should be made round figures like N50, N100, N150, N200; majority of 51.5% of the sampled respondents prefer the N160 sized loaf; while 9.1% suggested there should be slices of all sizes; 3.0% asked that the weight of loaves should be improved.

When probed further on the need for improvements, 60.6% still suggested better customized packaging, 24.1% said the weight of loaf should be improved to enhance sales; 9.1% reacted that the cocoa powder added should be increased to improve the shelf life of the bread, 4.2% said the hygiene of the baking pans and mixing process should be improved to avoid dents and sand/stones in loaves while 2.0% advised that the NAFDAC approval should be obtained to enhance wide spread distribution and acceptability.

Conclusion and Recommendation

This study concludes that the CRIN cocoa bread has created a niche market for itself by the acceptability it got from the consumers and this opportunity must be tapped into for increased cocoa local consumption at the same time generate internal revenue for the Institute.

Experimental Title: The effect of selected forest tree plant extracts on nutrient composition of cocoa seedlings

Investigators: Oloyede, A.A, Adejobi, K.B, Fademi, O.A, Olaniyi ,O.O and Akanbi,O.S.O.

Justification

Cocoa (*Theobroma cacao*) is a traditional cash crop in Nigeria, contributing significantly to Gross Domestic Product of the country. Currently Nigeria ranked number four among producing countries after Cote d' Ivoire Ghana and Indonesia (ICCO, 2012.). The early growth of cocoa production in Nigeria was Phenomenal, from 183ha in 1900 to 4,082 in 1912, 400, 000 ha in 1945, 408,163 ha in 1958. Present average yield on farmers' farm is put at 300kg/ha (CRIN, 2008). Low productivity is mainly ascribed to old age or plantation abandonment, poor planting materials and sudden removal of overhead shade from cocoa plantation. Some forest trees and non-timber forest species however are of interest to cocoa farmers in provision of food, fruits, medicine and timber. These trees also provide overstay for cocoa thereby modify microclimate of cocoa trees. FAO (2011) underscores the importance of forest trees in food security viz provision of wild leaves, fruits, seeds/nuts, root and tubers mushroom and honey. Combining forest trees with cocoa production has environmental, economic and social benefits. Cocoa produced within forest tree may not be as high yield as monocropped cocoa, and production under trees are more sustainable through prolongation of cocoa trees lives. Cocoa agroforest discourages further encroachment into available forest land, thereby discouraging deforestration. Some trees also filter ultraviolet radiation into cocoa plantation thereby providing optimal insulation. Some forest species have also been found to improve cocoa soils through nitrogen fixations, litter falls leading to release of such nutrients to the soil.

Among forest trees that have been observed in cocoa plantation include *Milicia excelsa* (Iroko tree), *Albizia zygia* (Ayunre),*Tetrapleura tetraptera(Aidan)*, *Triplochiton scleroxylon* (obeche) e.t.c

There has not been scientific validation of the compatibility of these selected trees with cocoa hence the study to evaluate their suitability in cocoa agroforest.

Materials and Methods

A screen house experiment was conducted in year 2010 at the Cocoa Research Institute of Nigeria (CRIN) to investigate effect of water extracts of leaves and bark of some selected tree species present within cocoa plantation of the Institute for their desirability or otherwise as agroforestry species. Leaf and bark water extracts of four species viz: *Tetraplera tetraptera*; *Albizia zygea*; *Triplochiton scleroxylon* and *Cedrella odorata* at a concentration of 4kg in 20 litre of rain water for 24 hours. The leachates were sieved out after 24 hours. Topsoil was collected under each of the selected species and sieved through a 2mm sieve. The sieved soil was then filled into a 7.5kg capacity bucket and arranged in a completely randomized design (CRD). There were nine treatments of leachates of leaf and bark of each species and rainwater on no tree species soil as control. Four beans of F3 Amazon were sown per pot and watered every other day with the leachates while the control was watered by rainwater. By 21st day, germinated beans were extracted from each treatment to measure radicule and plumule development while overall germination percentage was noted by 21st day after sowing(DAS) for each treatment. Number of stands was then reduced to one to evaluate the height, stem diameter; number of leaves, length by width of leaves was taken at monthly interval for six months. At the end of 6-month growth period data were obtained dry weight of seedlings were obtained after oven-drying of samples for 72 hours at 70^0c. They were grinded, milled, sieved and taken for laboratory analysis in 2013. Data so obtained were subjected to statistical analysis of variance using SAS statistical package. Means that were different were separated using least significant difference (P<0.05).

Results and Discussion

The results of the nutrients analysis are as presented in Table 1.

Nitrogen (N) content: the various leachates used positively increased the N content of cocoa seedlings relative to control. The organic carbon content of cocoa seedlings was significantly increased (P<0.05) by the application of the leachates.. Similar trend was obtained for organic matter content. Magnesium content of cocoa plant was also enhanced by the extracts with those from Albizia bark, Cedrella bark and Tetrapleura leaf been the most outstanding. The lowest Mg value was obtained in no application control. Contributions of all the plant extracts to Ca content of cocoa seedlings were similar but significantly different from the control treatment. .The pattern of Mn content was similar to that obtained in Calcium content of cocoa.

The sodium contents were also significantly different (P<0.050) in all the treatments. Extracts of Albizia leaf lowered the Na content of the cocoa while the other extracts enhanced it.

The K content of the cocoa seedlings were not significantly different

Table1: Cocoa seedling nutrients composition as influenced by leaf and bark extracts of selected forest tree species

Treatments	N%	Organic carbon(%)	Organic matter(%)	Na mg/g	Km g/g	Ca mg/g	Mg mg/g	Mn mg/g
AZa	2.40d	7.17c	12.43bc	0.87b	1.73a	1.12a	1.30bc	0.11a
AZb	2.16f	6.45e	11.15d	1.20ab	2.27a	1.12a	1.35a	0.11a
CDRa	2.56ab	7.66a	13.25a	1.20ab	1.93a	1.12a	1.30c	0.12a
CDRb	2.49bc	7.45ab	12.88ab	1.20ab	1.80a	1.12a	1.32abc	0.12a
TRPa	2.57a	7.71a	12.99ab	1.00ab	1.53a	1.12a	1.31bc	0.13a
TRPb	1.86g	5.61f	9.70e	1.00ab	1.87a	1.12a	1.29c	0.13a
TTa	2.30e	6.90d	11.94c	1.33a	2.27a	1.12a	1.34ab	0.12a
TTb	2.43cd	7.28bc	12.58b	1.33a	2.20a	1.12a	1.31bc	0.12a
CTR	1.69h	5.11g	8.83f	0.93ab	1.73a	1.10b	1.22d	0.08b

AZ= Albizia zygia; CDR= Cedrella odorat, TRP=Triplochyton schleroxylon: TT=Tetrapluera tetraptera, a=leaf leachate; b=bark leachate

Means with the same letter are not significantly different from one an other at 5% level of significance

Conclusion

Results obtained from this study indicated that most of the forest plant extracts could improve the nutrition of cocoa plant and may therefore bee suitable in cocoa agro forest.

Experimenta Title: Perception of farming as a profession among youth in cocoa growing areas of Oyo and Ogun States, Nigeria: implications for Cocoa Transformation Agenda

Investigators: Famuyiwa, B.S. Aigbekaen, E.O, Uwagboe, E.O Agbongiarhuoyi, A.E, and Adebiyi, S.

Introduction

Farming is the traditional profession of the rural people in Nigeria. Onasanya (2009) alluded that 80% of Nigeria is made up of rural area and the major profession is farming. Agriculture used to be a leading industry before the advent of crude oil in the 60s, while Nigeria was the second largest producer of cocoa in the world market (Daramola *et al.*, 2009). However, with the oil boom in the 70s, agriculture and most especially cocoa industry started facing a lot of problems among which are incidences of pest and diseases, long gestation of agricultural products, non availability of good marketing structure, land nutrient depletion and serious old age of both farm and farmers (Gockowski and Oduwole, 2001.). In spite of these problems, cocoa industry still contributed 2% of the nation's export earnings in 2002, and serves as a means of livelihood to 200,000 household in the fourteen cocoa producing states in Nigeria (NCDC, 2008). It also contributed 11% of the world's 3.5 million tons of cocoa supported in 2005 (Nzeka, 2005). Furthermore, Agboola and Ochigbo (2011) reported that cocoa and cocoa preparations contributed $533.4 million to Nigeria non-oil export earnings between January and June 2011. ICCO (2008) also highlighted some other new benefits that cocoa consumption leads to: reduction of fatigue, prevention of malaria, diabetes and hypertension.

However, for cultivation to meet the requirements of ICCO, of sustainable production in terms of economy, social and environment, there is need to find solution to the problem of aged farmers in the industry. Cocoa farming according to Gockowski and Oduwole (2001), Oluyole and Sanusi (2009) and Famuyiwa (2013) agreed in separate studies that for some decade's now agricultural practices and more importantly cocoa has being in the hands of old and aged farmers. The same studies also emphasized that cocoa farming is labour intensive and requires promptness to major issues on pests and diseases. To bring back the agricultural glory of Nigeria; the Federal Minister of Agriculture and Rural Development established Agricultural Transformation Agenda (ATA) to look holistically into the problems of Agriculture and proffers solutions. However, Cocoa Transformation Agenda (CocTA) emerged from ATA to also look into problems of cocoa production by bringing back the glory of cocoa in the World market. Within the constructs of these agenda, Agricultural production in Nigeria is said to increase while cocoa production is said to rise from 250 Million metric tons to 300Million metric tons. One major pivot on which these propositions of increase rest is empowerment of youth (CocTA, 2012).

Youth participation in cocoa production can be a panacea in overcoming major problems in cocoa production considering the qualities and characteristics of youth as being active and change oriented (Famuyiwa, 2008). Bihis-Tolentino (1995) described them as young, energetic, dynamic, eager to learn, bounds spirit, optimistic for future, receptiveness to new ideas and searching for avenue to direct their energies. Jibowo (1989) opined that these characteristics, if well articulated are very important for agricultural transformation. As great resource to the Nation, Famuyiwa and Torimiro (2011) described youth as the prism a Nation can use in projecting into the future, if their socialization process into farming is well articulated from their farm families.

Famuyiwa (2008) also described youth as a period when norms, attitude, values and life patterns are established. It corroborated the program of Agricultural Research Council of Nigeria (ARCN) in mandating and supporting financially the Research Institutes and Colleges of Agriculture in establishing Adopted School program Uwagboe (2010). This involves the adoption of Secondary schools in about 20 kilometers radius of the Research Institute to encourage farming enterprises among youth.

Haven established the importance of agriculture in the nation's economy and the consequence role of youth in agricultural transformation; it is pertinent to access the perception of the youth in choice of farming as profession and see if lacuna exists between their interest in farming and choice as a profession.

Keywords: Youth, Perception, Farming, Profession and Cocoa Transformation Agenda

Objectives

The objective of the study was to assess the perception of young farmers' club members in two adopted schools of CRIN; Prospect High School Aba-Nla and Mamu community comprehensive High School, Mamu, towards choosing farming as a profession.

Specific objectives were to:

1. determine the characteristics of the youth in YFC,
2. identify the activities of the club members on their parents cocoa farms,
3. determine the perception of the youth toward agriculture as profession,
4. identify the preferences of the youth towards agriculture and other professions, and
5. identify their constraints against the choice of agriculture as a profession

Materials and Methods

CRIN adopted schools; Prospect High School Aba-Nla, Oyo State and Mamu Community Comprehensive High School, Mamu, in Ogun State were purposely selected for the study. In each of these Clubs, CRIN established farms that were planted with their five mandate crops (cocoa, kola, cashew, tea and coffee), other enterprises include fish farming and soap making. The group activities include training, demonstration, seminars, project participation and excursion in related areas of agriculture were carried out in the two clubs for a period of two years. Forty structured interview schedule were administered in each of the two clubs that gave 80 respondents. The data were analyzed using percentages, frequency count, mean and standard deviation. Perception level of the respondents were determined using grand mean plus or minus standard deviation to categorize into two perceptional levels; high perception for respondents that scored above mean and low perception for respondents that scored below mean. Inferential statistical tool was used to determine the correlation between youth perception of farming as profession and some demographic characteristics.

Result and Discussion

Demographic characteristics of the respondents: The data in Table 1 show that the mean age among the respondents was 14.7±2.2 year's standard deviation. However, 66.3% of the respondents were between the age range of 10 and 15 years. Though there was little difference in the findings of Adereti (2007) that gave an age range of 14-19 years, it may be as a result of early enrollment of children to schools. This is the age in which they develop a mind set on issues hence, a proper time when their perception can be influenced through knowledge. Table 1 further shows that, 56.3% of the YFC were male, while 43.7% were female. Though with a slight difference in percentage, it shows a gender inequality in agricultural practices as described by Oladipupo *et al* (2010) that men and boy child are more decisive, aggressive logical and ambitious compared to their female counterpart. While Olabisi (2008) opined that agricultural activities are more labour intensive and require the strength of male. Torimiro *et al* (2007) corroborated this finding by indicating gender gap in education in Nigeria. The trend in membership of YFC with respect to distribution into class were; slightly above average (56.3%) in SS2, 40% in SS1 and 3.7% in SS3. The few members in SS3 class may be due to students' preparation for Senior Secondary Certificate Examination (SSCE). Majority (70%) of the respondents have spent between 1 and 2 years.

Activities of youth on their parents' farm: Table 2 revealed that majority (76.2%) like farming. It negates the belief that youth do not like farming or have disinterest in farming as reported by Business Day paper Sunday, March 10th (2013). Though the environment through which the study was carried out may have influence on their interest in farming. Majority (70%) practice fulltime farming, while 87.5% of the parents were farmers. 95% assists their parents on farm and 77.5% enjoyed assisting their parents. Majority (75%) were not paid for their assistance while 12.5% wished they were paid.

Table 1: Respondents socio-economic characteristics

S/N	Variables	Frequency	percentage	Mean	SD
	Age				
	<10 years	2	2.5	14.7	2.2
	10 - 15 years	53	66.3		
	16 - 20 years	25	31.2		
	Sex				
	Male	45	56.3		
	Female	35	43.7		
	Religion				
	Christianity	58	72.5		
	Islamic	22	27.5		
	Class				
	SS1	32	40		
	SS2	45	56.3		
	SS3	3	3.7		
	Years in YFC				
	<1 year	18	22.5	1.2	1
	>1<2 years	56	70		
	>2<3 years	4	5		
	>3 years	2	2.5		

Source: Field survey, 2012

Table 2: Showing activities of respondent to farming

S/N	Variables	Frequency	Percentage	Mean	SD
1	**Like farming**				
	Yes	61	76.2		
	No	19	23.8		
2	**Parent farming**				
	Fulltime	56	70		
	Part-time	14	17.5		
	Not farming	10	12.5		
3	**Parents farm enterprise**				
	cocoa and other crops	54	67.5		
	Arable crops	16	20		
	None farm enterprise	10	12.5		
4	**Assisted Parent in farming**				
	Yes	76	95		
	No	4	5		
5	**Enjoy Assistance**				
	Yes	62	77.5		
	No	18	22.5		
6	**Parent paid for Labour**				
	No	60	75		
	Yes	20	25		
7	**Wish to be Paid**				
	Yes	10	12.5		
	No	70	87.5		
8	**Constrain to farming as choice**				
	Lack of government support	75	93.8		
	Lack of parents encouragement	60	75		
	No interest	43	53.8		
	Labour intensive	62	77.5		

Source: Field survey, 2012

Youth perception of farming as a profession: The findings in Table 3 revealed the perception of YFC toward farming as a profession. The respondents agreed on most of the negatively stated perceptional statements such as I don't like to become a farmer (85%), farming is too tedious (68.75%), farmers are not rich (68.8%), I prefer to read a more lucrative profession (90%) and I don't know a rich farmer 85%. However, some stated positive perceptional statements such as; farmers feed the world (68.7%), farming improved livelihood (62.4%), farmers are self employed (68.75%). It can be deduced from the foregoing that the respondents agreed to the potentials of agriculture to be self employed, sufficient but still preferred other jobs believing to be better than farming. Further investigation by categorizing the respondents into levels, Table 4 showed that majority (88.8%) had a low level perception while 11.3% perceptions had high perception.

This gap can be explained by the submission of Badcock-walter *et al*., (2004) that key antecedents of behavioural change are knowledge, attitude and belief. However, Grice (1961) in his causal theory of perception agreed that knowledge is the foundation in perception while Health (2003) further explained that all human activities revolve round perception. The gap in the study can also be likened to health belief system theory explained by Universitteit Twente (2004). This theory is a psychological model that explained and predicted behavior by focusing on the attitude and beliefs of individual. The studies of Igodan and Jabar (1993) and Heath (2003) deduced that perception is the building block of individual attitude which can be acquired through knowledge hence, which leads to behaviours.

Table 3: Respondents perception of farming as a profession

		SA		A		U		D		SD	
S/N	Perception statements	Feq	%	Feq	%	Feq	%	Feq	%	Feq	%
1	I don't like to become a farmer		0	68	85	8	10	4	5		0
2	Farming is too tedious		0	55	68.75	10	12.5	15	18.75		0
3	Farmers are not rich		0	72	90		0	4	5	4	5
4	Farming is a dirty job		0	76	95		0	2	2.5	2	2.5
5	Farming is not dignifying	4	5	77	96.25		0		0	4	5
6	I prefer to read a more lucrative profession	4	5	72	90		0	4	5		0
7	I don't know any rich farmer	4	5	68	85		0	4	5	4	5
8	Agriculture is not a good profession		0	76	95		0		0	4	5
9	Agriculture is too broad		0	14	17.5		0	62	77.5	4	5
10	Government does not encourage agriculture	4	5	67	83.75		0	9	11.25		0
11	I enjoy farming	4	5	10	12.5		0	62	77.5	4	5
12	Farmers are rich people	12	15	7	8.75	3	3.75	55	68.75	3	3.75
13	I want to be a big time farmer	17	21.25	6	7.5	2	2.5	45	56.25	10	12.5
14	Farming is self employed	8	10	47	58.75	3	3.75	21	26.25	1	1.25
15	Farming improves livelihood	15	18.75	35	43.75		0	20	25	10	12.5
16	I want to be a medical Doctor	10	12.5	36	45	7	8.75	13	16.25	14	17.5
17	Farmers feed the world	6	7.5	55	68.75		0	13	16.25	6	7.5
18	My parents encouraged me to read agriculture	2	2.5	5	6.25	5	6.25	65	81.25	3	3.75
19	Agriculture is lucrative	6	7.5	20	25		0	41	51.25	13	16.2 5
20	Agriculture experts are self sufficient	11		47	58.75	2	2.5	13	16.25	7	8.75

Source: Field survey, 2012
Key: SA=Strongly Agree (5), A= Agree (4), U= Undecided (3), D = Disagree (2) and SD = Strongly Disagree (1)

Table 4: Perception levels of respondents towards farming as a profession

Perception level	Scores	Frequency	Percentage
Highly perceived	> 78.	9	11.3
Lowly perceived	< 78.	71	88.8

Source: Field survey, 2012
Minimum score = 59
Maximum score = 82
Mean = 73.5
Std = 4.7

Youth choice of subjects: Figure 1 shows that 41.2% of the respondents were reading science related subjects, 40% were in arts and 12.5% in social sciences, while just 6.3% were in commercial class. Though farming is a traditional profession that can be chosen by any of the classes in future but agriculture as a profession can only be supported by those in the science class because of the chemistry and biology required in higher institution.

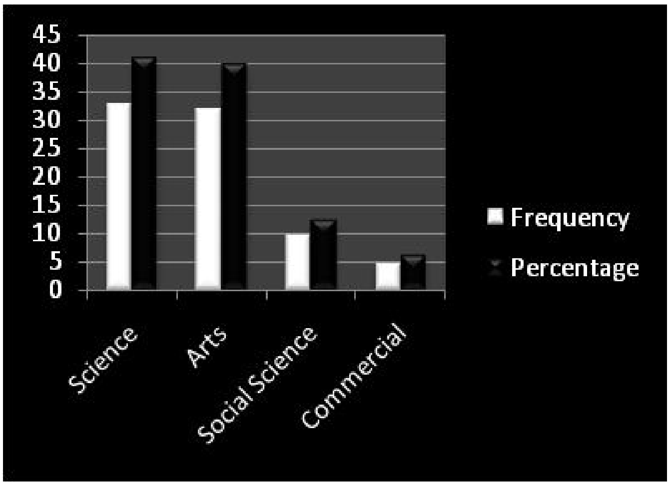

Figure 1: Showing distribution of respondents into classes

Youth preferences for other profession: The data in figure 2 showed that very few (11.2%) preferred agriculture as future profession while majority (88.8%) preferred other profession to agriculture. Thirty seven and half percent (37.5%) preferred to be medical doctor; 11.2% engineer, 16.3%, business tychoon; 10% banker while 13.8% preferred to be teacher. This result is supported by the study of Adereti (2007) that secondary school students prefered other subjects to agriculture. The implication of this is that schools produce few students that have interest in farming as a profession.

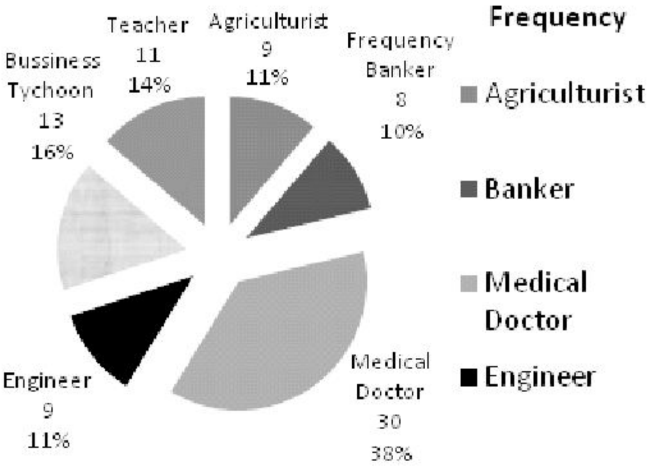

Figure 2: Respondents preferred profession

Experience in farming: The respondents experience in farming is shown in Figure 3. Majority (82.5%) had experience in farming while just 17.5% had no experience. This result indicated that the environment where the study was carried out had influence on them. As rural area, the predominant profession is farming. It supports the finding of Neukom and Ashford (2003) who reported that human behavior is related to the dynamic interaction between personal behavior and environmental factors which led to majority of students in the rural areas have experience in farming. The implication to this study is that their environment may influence them in to farming but in view of other factors such as subjective norm that affect individual perception; expert contact, government policies, celebrities experience, family opinion and peer influence, these interest in choice of profession can be influenced.

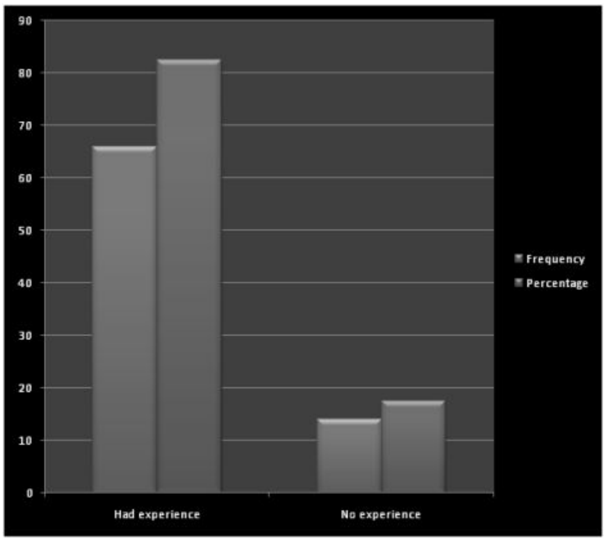

Figure 3: Distribution of respondents to experience on farming

Implications of the study to CocTA

1. There are evidences from Gockowski and Oduwole (2001), Oluyole and Sanusi (2009) and Famuyiwa (2012) showing an ageing farmers' population in Nigeria and by extension has influenced the food security negatively. With a low perception reported by this study, there may be reduction in labour among the age bracket which lies in the strength to carryout cocoa farming.
2. Individual perception is an ingredient of their belief achieved through knowledge of a concept. Hence, the perception of youth with respect to the image of farmers must be changed to ensure the profession.
3. The roles of parents in youth socialization into the society cannot be overemphasized. Parents may not want to encourage their wards to go through what they are going through in life and persuade them to pursue more lucrative professions. This will also give a negative effect to cocoa production.
4. Since there was a positive and significant correlation between youth perception of farming and years spent in YFC, establishment of Young Farmers Club in all secondary schools may be an arbiter to encouraging youth in farming hence increasing cocoa production.

5 Majority (71%) believed government needs to encourage youth about farming. The youths believe in Government should be built to facilitate more trust in them

6 Based on the belief system, youths may have low perception on agriculture as a profession owning to the fact that they have not seen a rich farmer

7 Majority (62%) enjoyed farming, 47% perceived farming as self employed but 68% do not like to become farmers.This creates a lacuna in the youth perception. It may be as a result of not seeing a rich farmer

8 Agricultural activities require energy, timeliness and high acumen which are qualities that are high among the youth. If this group of population prefers other profession, agriculture will be left in the hands of aged, tired and uneducated farmers

Conclusion

The study revealed that the youth has very low perception to farming as a profession hence, concluded that youth enjoyed farming, believing that it can sustain the economy if practiced but prefers other profession than farming.

Recommendation

From the study, it is recommended that the gap between the perception and the consequent choice of profession of youth be looked into by stakeholders (parents, government and tutors,) to create a conducive frame of mind among the youths where positive perception on farming can lead to consequence choice of farming as profession.

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Experimental Title: Competitiveness and comparative advantage of cocoa production management systems in Nigeria. A policy analysis approach

Investigators: Oluyole, K.A., Taiwo, O., Uwagboe, E.O., Ogunlade, M.O.

Introduction

Cocoa production is a vital stage in cocoa value chain. This is because all other nodes build upon the production node of the chain. Sustainable cocoa production determines the marketing, processing as well as consumption of the commodity. However, according to

Nkang *et al*, (2009), there are three cocoa production management systems. These are Owner-managed farms, Lease-managed farms and Sharecropped-managed farms. Owner-managed farm is the one that is established oneself or the farm that is purchased out right or the farm that was inherited. Lease-managed farm is the farm that is hired for a period of time while sharecropped-managed farm is the one that is jointly managed between the original owner of the farm and the sharecropper. The proceeds from the farm are shared at certain proportion between the original owner of the farm and the sharecropper. These management systems are practiced across all cocoa producing regions in Nigeria. In view of the contribution of the production stage to cocoa enterprise, it is quite imperative to determine the competitiveness and comparative advantage of cocoa production among the three cocoa production management systems in Nigeria.

Objectives

i. To analyse the competitiveness of cocoa production among cocoa production management systems in Nigeria
ii. To determine the comparative advantage of cocoa production among cocoa management systems in Nigeria.

Materials and Methods

The project was carried out among cocoa farmers in Ondo and Osun States. Ondo and Osun States are major cocoa producing states in Nigeria. Two Local Government Areas (LGAs) were purposively selected from each LGA, thus making a total of four LGAs for the study. In Ondo State, Ondo East as well as Akure South Local Government Areas were selected for the study. In Osun State, the chosen Local Government Areas were Atakunmosa East and Ayedade. Simple random sampling technique was used to select 88 cocoa farmers from the two states. Data were collected from the respondents with the aid of structured questionnaire and the data obtained from the questionnaires were analysed using descriptive analysis, Private Profitability, Private Cost Ratio, Social Profitability and Domestic Resource Cost.

Results and Discussion

Table 1 showed the socio-economic characteristics of the farmers. The table showed that 63.64% of the total respondents are of age 50 years and below. Hence, the greater proportions of the respondents are still in their active age. This is a good pointer to cocoa production efficiency as younger farmers are more active on farm work than the aged ones. Table 1 also shows that 80.68% of the respondents are males. This is quite obvious in that farm work is a tedious work and is only men that could cope effectively with it. As regards the educational level of the respondents, the result of the analysis shows that 84.09% of the respondents are having formal education. This would improve the efficiency of the farmers in as much that literate farmers would find it easier to adopt new technologies on cocoa than the illiterate ones. Table 1 also shows that 95.45% of the respondents are married. This however contributes significantly to family labour supply thus easing the problem of labour inadequacies for farm work in the area. The analysis on farm size shows that 87.50% of the respondents had farm size of 5 hectares which shows that majority of the farmers are small scale farmers.

The result of the competitiveness analysis as shown on Table 2 showed that cocoa production is highly competitive in the three cocoa production management systems. This is because the Private Profitability (PP) and the Private Cost Ratio (PCR) result is positive and is less than one respectively in all the three management systems. Considering the values of PP, cocoa production in the three management systems is highly competitive since the values are very high in the three management systems. However, cocoa production is more competitive in Owner management system because the value of Private Profitability is the highest among the three management systems. This is followed by Leasthold management system with PP value of 80,340.38 while the least is Sharecropping management system. The values of Private Cost Ratio showed that cocoa production in the three management systems is highly competitive, meanwhile, the lower the PCR the higher the competitiveness. Therefore, cocoa production in Owner management system is more competitive since it is having the lowest PCR. This is followed by Leasthold management system and the least is Sharecroping management system. Looking at the values of both the PP and PCR together, it clearly showed that cocoa production is more competitive in Owned management system than the other two management systems given current technologies, prices of inputs and outputs, and the prevalent government policy.

Table 3 shows the result of the analysis on Comparative Advantage of cocoa production in the three management systems. The results showed that cocoa production in Nigeria is having comparative advantage in the three cocoa production management systems. This is because the value of Social Profitability (SP) and Domestic Resource Cost (DRC) is positive and less than unity respectively in the three management systems. Considering the value of SP, the table shows that cocoa production in Nigeria is having comparative advantage because of the high values of SP. It indicates that each of the management system uses scarce resources efficiently and contributes to national income (Nelson and Panggabean, 1991; Keyser, 2006), hence, the commodity has a static comparative advantage in the three management systems. However, Owner management system has the highest comparative advantage being the one that is having the highest value of SP (188,962.00), this is followed by Sharecropping with SP value 48,705.29 while the least is Leasthold management systems. The values of DRC on the table (Table 3) shows that cocoa production in Nigeria is having high comparative advantage in Nigeria with the values of DCR far less than unity. It shows that the value of domestic resources used in cocoa production in the three management systems is lower than the value added. This implies an efficient use of domestic resources in production and that production is socially profitable. However, cocoa production under Owner management system had the highest comparative advantage with the DRC value of 0.52 since the lower the value of DRC, the higher the comparative advantage. This is followed by Sharecropping management system with the DRC value of 0.59 and the least is that of Leasthold management system.

Conclusion

The study conclude that out of the three cocoa production management systems, cocoa production in Owner management system is more competitive than the other management systems Also, cocoa production under Owner management system has more comparative advantage than the other cocoa management systems. Therefore cocoa farmers should strive to establish their own farm rather than be engaging in sharecropping or leasthold management systems.

Table 1: Socio-economic characteristics of the farmers

Variables	Frequency	Percentage
Age (years)		
≤ 30	6	6.82
30-50	50	56.82
>50	32	36.36
Total	88	100.00
Gender		
Male	71	80.68
Female	17	19.32
Total	88	100.00
Educational status		
No formal education	14	15.91
Primary education	33	37.50
Secondary education	30	34.09
Tertiary education	11	12.50
Total	88	100.00
Marital Status		
Single	2	2.2
Married	82	93.18
Widow/widower	4	4.55
Total	88	100.00
Farm size (hectares)		
≤ 5	67	87.50
5.1-10	9	10.23
>10	12	2.27
Total	88	100.00

Source: Field survey, 2013.

Table 2: Result on analysis of competitiveness

Management systems	Private Profitability (PP)	Private Cost Ratio (PCR)
Owner	205,353.20	0.49
Leasthold	80,340.38	0.53
Sharecropping	55,328.57	0.54

Source: Field survey, 2013.

Table 3: Result of analysis on Comparative Advantage

Management systems	Social Profitability (SP)	Domestic Resource Cost (DRC)
Owner	188,962.00	0.52
Leasthold	45,016.05	0.68
Sharecropping	48,705.29	0.59

Source: Field survey, 2013.

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Experimental Title: Gross margin analysis of cocoa bread production: A case of Cocoa Research Institute of Nigeria (CRIN)

Investigators: Shittu, T. R; Yahaya, A. T, and Ogunjobi M.A.K.

Introduction: The current thrust of Agricultural Transformation Agenda (ATA) aimed at meaningful contribution of agriculture to overall economic development and growth of the country; and cocoa has a great role to play in the achievement of this as it is the leading agriculture contributor of about 42% (Akoroda 2012) to the Gross Domestic Product (GDP). In the recent past, Nigeria government through its agricultural policy of increasing Nigeria cocoa production figure had established Cocoa Seed Gardens in all the 14 Cocoa producing states and also rehabilitated the existing ones. But for the country not to remain in the buyers' market (Price-taker), the government also deemed if fit to promote its local consumption having considered its health benefits.

The promotion of Cocoa consumption locally geared CRIN to include Cocoa powder in the production of bread so as to bring it to the reach of average Nigerian as there is hardly any household that does not eat bread. Cocoa powder has a high proportion of dietary fiber of up to 30% (ICCO, 2004). Such dietary fiber aids the movement of food in the digestive system, one of the requirements for healthy living.

Bread is a staple food in several parts of the globe and also one of the oldest prepared foods. Among all cereals and cereal foods, bread provides best for our nutritional needs (Pomeranz and Shellenberger, 1971). It is a rich source of carbohydrates, fibre, protein and vitamins.

Bread is an important source of food in Nigeria. It is consumed extensively in homes, restaurant and hotels. Bread is made of low protein wheat, it usually contain several ingredients apart from flour are table salt, sugar, flavors and at least a flour improver. (Vicki, 1997). The bread making process has undergone dramatic development over the ages, from traditional home baking to commercial industrial production on a large scale basis. Several varieties of bread are available in the market today, allowing consumers to choose according to their preferences (flavor, nutrition, etc) (Sivasekari Balasubramanian, 2007).

Consumption of Cocoa Bread (CB) is fast gaining ground in Nigeria due to its health benefit in preventing age related diseases. Researchers had shown that consumption of food rich in polyphenotic compound may reduce the risk of cardiovascular diseases (Ding *et al* 2006; Hollenberg 2006). Cocoa contain flavonoid which is a sub class of polyphenols that has been shown to prevent age related health problems, promotion of better cardiovascular and mental and mental health as well as fascinating the treatment of many diseases conditions. It has pronounced effect on the central nervous system, that it can be said to have a “doping” effect (Guy, 1992) Therefore, cocoa bread contains nutrients that are not found in the conventional bread because of the presence of cocoa powder which has special benefits in increasing the spoilage- free shelf-life of the product (Stanley and Young, 2006).

It is therefore the thrust of this study to provide insight into the cost and benefit flow of Cocoa Bread Production in CRIN for profitability assessment. The result will also guide policy prescription for small and medium entrepreneur bakery production using cocoa powder as one of the recipes as well as gather information on Cocoa perception for feedback into the system.

Materials and Methods

The study area, Oluyole Local Government Area of Oyo State, is where CRIN is situated and are predominantly inhabited by CRIN staff. CRIN has mandate to conduct research for development on five crops -cocoa, kola, cashew, coffee and Tea. For the purpose of this study, primary and secondary data were used. The primary data was used to gather information from cocoa bread consumers on the perception of the novel product while the secondary data was sourcing of information on record of sales of cocoa bread in CRIN from January to December, 2012.

A well-structured questionnaire was administered on 100 randomly selected respondents. The data was analysed using descriptive and inferential statistics. The descriptive statistics used includes table, percentages, Gross Margin and Measures of project work. The Gross Margin (GM) was obtained by subtracting Total Variable Cost (VC) from Gross Return (GR) (Erhabor and Kalu 1993). The measures of project worth used in determination of project viability as indicated by Gittinger (1972), Ahmad 1978, Anandarup (1984), are Benefit Cost Ratio (BCR) Net Present Value (NPV) and interval rate of return (IRR) as adapted by Yahaya et al 2012 and Aroyeun et al (2013).

The Mathematical computation assumed that (i) Durable assets have zero salvage value (ii) increased production sequel to customers patronage and cost of input was held constant (iii) straight line depreciation for fixed assets (iv) Ruling interest rate is the discount factor which bring future streams of benefit and cost to a present value. The decision rules adopted in accepting or rejecting project are as given by Gittinger (1972) as follows:

(i) A project is profitable if NPV is positive and it is rejected if NPV is negative.
(ii) Accept all projects with BCR of one or more and reject all project if BCR is less than 1 and,
(iii) Accept project values whose IRR is greater than cost of capital and a project is rejected if its IRR is less than the cost of capital.

For generation of cash flow, all items of value relating to the project are taken into consideration. Items which are not strictly bought or sold have their values imputed and in some cases, opportunity costs for such items are worked out for use in the calculation to ensure that the economic principles of project analysis are followed:-

Results and Discussion

The socio-economic variables of the respondents like age, educational level, sex, marital status were presented in table 1.

The distribution of the respondents according to age revealed that people within the age bracket of 31-40 years and 41 – 50 years represents the larger percentage of Cocoa Bread consumers in the study area. None of the respondents was below 20 years of age because at this age, most of these people are in school and not likely to be in CRIN environment when the questionnaire was being administered. The respondents' distribution according to level of education indicated that people with at least secondary school education dominated in cocoa bread consumption in this study area. This group constituted 81 percent of the total respondents.

The gender distribution of the respondents showed that the male gender with 69% patronized cocoa bread more than their female counterpart. This is likely to be so as they are the head of the family, they purchased consumption. Of the respondent classes, greater percentages of the Cocoa Bread consumer are married 58 percent while only 42 percent are single. Table 2 showed the respondents quality perception of Cocoa Bread. The product pricing compared favourably well with the price of other bread as 95 percent of the respondents were satisfied with the price at which it is being sold. They even thought that it should have been higher than that because of the included cocoa powder which is very expensive.

The Gross Return on CRIN Bread production for the period of study was found to be ₦2, 889,880 and the total variable cost was N1, 855,400. The total variable cost is subtracted from the gross revenue to give the gross margin of N1, 034,480. The year under review was never crisis free as production of Cocoa Bread was not done in some periods due to strike actions embarked upon by the Labour unions.

Table 3: indicates the cost benefit analysis of cocoa bread production. The revenue and the cost of production for some years were discounted at 20% to obtain present value of cost and that of benefits. The difference between the two gives the Net Present Value (NPV) of 3,462,358.72. The NPV of benefit divided by NPV of cost gives the Benefit cost ratio of 1.142 which indicates that the project Cocoa Bread production is profitable.

In the same vein, the Internal Rate of Return (IRR) was found to be 38.82% meaning that the project has a higher earning capacity than the ruling cost of capital (interest rate) that may have been employed in the business. The three investment parameters used (NPV, BCR and IRR) were all positive. Hence, it can be concluded that the Cocoa Bread Production is a viable and worthwhile business that can be embarked upon.

Conclusion and Recommendation

Promotion of consumption of cocoa powder locally within the country would be achieved through its inclusion in bread making thus improving the health status of the Nigeria citizen. Besides, many young graduates can occupy themselves with production of cocoa bread thus reducing the high level of unemployment in the country.

Table 1: Socio-economic distribution of cocoa bread consumers

Socio-Economic Variable		Number	Percentage(%)
(1)	**Age**		
	<20	0	0
	21 – 30	5	5
	31 – 40	43	43
	41 – 50	32	32
	51 and above	20	20
(2)	**Educational Level**		
	No formal education	0	0
	Primary school	19	19
	Secondary school	22	22
	Tertiary	59	59
(3)	**Purchasing frequency**		
	Daily	71	71
	Weekly	18	18
	Fortnightly	3	3
	Monthly	0	0
	Occasionally	8	8
(4)	**Gender**		
	Male	69	69
	Female	31	31
(5)	**Marital status**		
	Married	58	58
	Single	42	42

Source: Field survey 2012

Table 2: Quality perception of cocoa bread by the respondents.

Parameter	Excellent	Good	Fair	Poor
Product Pricing	30	65	5	0
Packaging Quality	13	16	43	28
Taste	49	37	11	3
Storability	62	33	3	2
Fluffiness	22	49	29	0
Awareness	100	0	0	0

Source: Field survey 2012

Table 3:

YR	Cost	Benefit	Inc. Benefit	DF@20%	Ds Cost	DsBen	NPV@20%	DF@50%	NPV@50%
1	8640200	9660000	1019800	0.8333	7199878.7	8049678	849799.34	0.6667	679900.66
2	7274300	8930250	1655950	0.6944	5051273.9	6201165.6	1149891.7	0.4444	735904.18
3	8001730	9376762.5	1375032.5	0.5787	4630601.2	5426332.5	795731.31	0.2963	407422.13
4	8801903	9845600.6	1043697.6	0.4823	4245157.8	4748533.2	503375.35	0.1975	206130.28
5	9682093	10337881	655787.6	0.4019	3891233.2	4154794.2	263561.04	0.1317	86367.23
					25018145	28580503	3562358.7		2115724.47

Source: Computed values

Table 3 Profitability (Decision Rule)

Estimate	Value	Remark
NPV	3462358.7	Positive
BCR	1.142	>1
IRR	38.82%	>ERR of 20%

Source: Computed values

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Experimental Title: Population structure of *Phytophthora megakarya* in Nigeria

Investigators: Kolawole, O. O.

Introduction

Worldwide, about 3.5million tons of *Cacao* beans is produced annually (WCF, 2010a). Notwithstanding, the demand has been increasing by an average of 3% a year for the past 100 years. Industry representatives estimated that the Cacao beans needed for production will need an annual production of at least 4.5 million tonnes by 2020 to satisfy the growing demand (WCF, 2010b). Therefore, to meet this demand, *Cacao* production must increase. Seventy percent of *Cacao* produced is contributed by Africa (WCF, 2010c). Obviously, *Cacao* production is one of Africa's greatest industries. In Nigeria today, the amount of *Cacao* produced is not conmensurate with the large area of land used for *Cacao* cultivation. This is due to several factors, most importantly pest and disease outbreaks (PAN, 2001). Black pod disease of *Cacao* caused by *Phytophthora megakarya* is the most devastating in West Africa (Opuku *et al*., 2000) including Nigeria, frequently causing total loss of pods. Currently, heavy reliance on copper and metalaxyl-based fungicides is most popular among farmers for control of the disease because of its quick short-term effect. Despite the indiscriminate use of these chemicals, regular outbreaks occur every cropping season (Agbeniyi and Adedeji, 2003), with increasing chances of emergence of resistant pathogens, deleterious effects on non-targets and the environment. To circumvent this situation, breeding for resistant cultivars has been a top priority. However, to combat *Phytophthora megakarya*, there must be a good understanding of it population biology. This pathogen is relatively unstudied, and little is known about its population structure in Nigeria *Cacao* agro-ecological zones. This work tries to investigate the population structure of *P. megakarya* which is a prerequisite for understanding the epidemiology of black pod disease and for selecting disease resistance sources for cocoa breeding.

Materials and Methods

Collection of Samples: Diseased *Cacao* pod samples were obtained from *Cacao* producing agroecological zones in Nigeria. Diseased *Cacao* pod samples were collected from each of the plantations visited in each

State. The diseased pod samples were enclosed in ice packed coolers until they were used in the laboratory.

Isolation and Identification of *P. Megakarya:* V8 agar was used for the isolation. Standard laboratory procedure was employed. Isolates were subcultured continously until pure cultures were obtained. Pure cultures of isolates obtained are maintained on V8 slants. Preliminary identification of the pure isolates was carried out using culture characteristics of the isolates.

Results and Discussion

A total of 125 isolates have been obtained from diseased *Cacao* samples collected. The isolates have been identified preliminarily as strains of *Phytophthora megakarya* (Fig. 1)

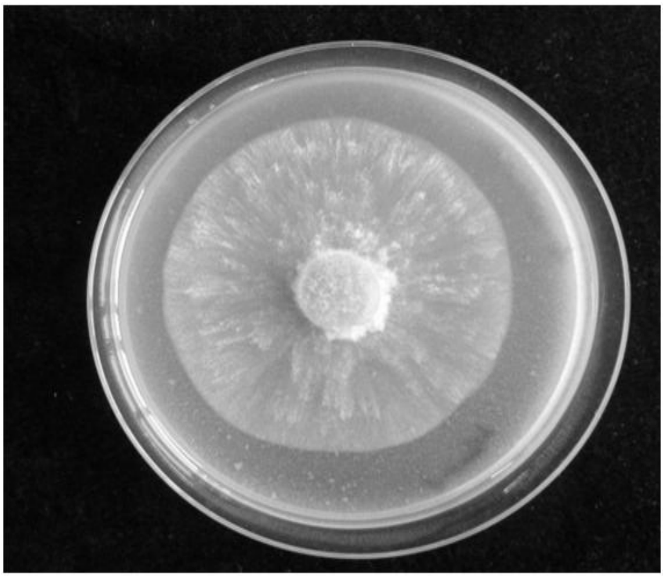

Fig. 1: *Phytophthora megakarya* on V8 agar

The work done so far has been primarily on collection of diseased *Cacao* samples, isolation of *Phytophthora megakarya* and preliminary identification of the isolate obtained. Other activities are yet to be carried out. The research is ongoing; the final deductions will be made at the end of the work.

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Experimental Title: Evaluation of the activities of cocoa buying agents in Nigeria

Investigators: Oluyole, K.A., Taiwo, O.O., Shittu, T.R., Lawal, J.O. and Yahaya A.T.

Introduction

The issue of cocoa marketing has been an interesting issue and it has been affected by various government policies. Before 1986, Cocoa Marketing Board was in existence. The board was characterized with monopoly for internal and external crop marketing. Once the cocoa beans were purchased from the farmers, became the property of the marketing board and would be handled by the board in all the stages of the marketing chain. Prices are determined by the board and are fixed for the entire crop year. Fixing of prices allows the producers to be less vulnerable to fluctuations in world market prices. However from 1986, cocoa marketing in Nigeria was liberalized. With this development, the internal cocoa marketing was fully liberalized and there is competition in domestic marketing by allowing private Licensed Buying Agents (LBAs) to purchase cocoa from farmers. The LBAs in turn bag the cocoa and sell to produce merchants who sell the beans to the industries or export it outside the country. Therefore, in the current policy of cocoa marketing, it could be observed that buying agents play a major role. Therefore any effort to evaluate the activities of cocoa buying agents is a worthwhile effort.

Objectives

1. To assess the activities of cocoa buying agents as they affect cocoa business sustainability in Nigeria
2. To estimate the profitability level of cocoa buying agents

Methodology

The study was carried out in Ogun and Oyo States. According to the National Cocoa Development Committee (NCDC) classification, Ogun and Oyo States belong to medium cocoa producing States in Nigeria. Purposive random sampling technique was used to select a total of ninety-four cocoa buying agents from the two states. The buying agents surveyed included both the LBAs and the local buying agents. Structured questionnaire was used to elicit information from the respondents and the data retrieved from the information supplied was analysed using descriptive statistics as well as budgetary analysis. The descriptive statistics was used to analyse the socio-economic variables as well as the activities of the buying agents while the budgetary analysis was used to determine the profitability level of the buying agents.

Gross Margin (GM) = Total Revenue (TR) – Total Variable Cost (TVC)

Total Revenue = Total Output X Price

Results and Discussion

The result of the socio-economic analysis shows that 84.04% of the respondents were males while 15.06% were females. Results also showed that 79.79% of the respondents were aged 50 years and below showing that majority of the respondents are still in their active age. This is a good pointer to the sustainability of the business. All (100%) of the respondents had formal education and 70.21% had above primary school education. This is quite obvious because cocoa buying agency requires a certain level of formal education before it can be easily carried out. Hence, education enhances the efficiency of the trade. As regards the sources of buying cocoa beans, 100% of the respondents sourced their cocoa beans from farmers while 2.12% source their beans from local buyers. The result of the analysis also showed that 84.04% of the respondents claimed they buy well dried but not sorted cocoa beans while 61.70% submitted that they buy not well dried cocoa beans from the farmers. They however claimed that such cocoa beans would eventually be properly dried up by them before it is sold to the exporter. All (100%) of the buying agents claimed that they assist farmers in boosting their production. All the respondents claimed that they assists the farmers by giving them loans; 74.47% claimed that they supply inputs such as chemicals and implements to the farmers while 70.21% of the respondents claimed that they give trainings to farmers on how to produce good quality cocoa beans.

The budgetary analysis revealed that in 2013 cocoa production season, there was an average revenue per buying agent of N1,653,948.51 while the average variable cost was N1,236,587.23. Hence, the average gross margin per buying agent was N417,361.28 representing 33.75%.

Conclusion

From the findings in the study, it was observed that the activities of cocoa buying agents by way of assisting farmers such as provision of loans as well as sales of inputs on credit to farmers. These activities contribute to the sustainable cocoa production in Nigeria. However, as claimed by the farmers, this system often resulted in extorting the farmers by the buying agents. This is because having committed to the loan facility and the purchasing of inputs on credit from the buying agents; the agents would now seize the opportunity to buy their cocoa at a price below what is obtained in the market. The study also concluded that cocoa buying business is profitable.

Table 1. Socio-economic characteristics of cocoa buying agents

Variables	Frequency	Percentage
Age (years)		
≤ 30	16	23.40
31-50	53	56.39
>50	25	20.21
Total	94	100.00
Gender		
Male	79	84.04
Female	15	15.96
Total	94	100.00
Educational level		
No formal education	0	0.00
Primary education	12	12.77
Secondary education	51	54.25
Tertiary education	31	32.98
Total	94	100.00
Marital status		
Single	15	15.96
Married	79	84.00
Total	94	100.00

Source: Field survey, 2013

Table 2: Sources of buying cocoa beans

Sources	Frequency	Percentage
From the farmers	94	100.00
From local buyers	49	52.12
From LBAs	6	6.38

Source: Field survey, 2013

Table 3: The form in which cocoa beans is bought

Form of purchasing cocoa	Frequency	Percentage
Well dried and well sorted	25	26.59
Well dried but not sorted	79	84.04
Not well dried but later	58	61.70

Source: Field survey, 2013

Table 4: Areas in which buying agents assist farmers

Areas of assistance	Frequency	Percentage
Supplying of input to farmers	70	74.47
Giving loan to farmers	94	100.00
Assists farmers in obtaining loan from financial organisations	3	3.19
Giving trainings for the farmers	66	70.21

Source: Field survey, 2013

Table 5: Budgetary analysis result of cocoa buying agents

Item	N
Total variable cost	116,239,200.00
Average variable cost per buying agent	1,236,587.23
Total revenue	155,471,160.00
Average revenue per buying agent	1,653,948.51
Total gross margin	39,231,960.00
Average gross margin per buying agent	417,361.28

Source: Field survey, 2013

Experimental Title: Economic analysis of the input use efficiency among cocoa farmers in South-West, Nigeria (Taiwo O., Oluyole K., Shitu. T.R., and Yahaya, A.T.)

Introduction

So much has been written on Nigerian cocoa economy as documented in numerous literatures. Cocoa is known to be the most important agricultural export crop in Nigeria. It has earned the country a significant percentage of the foreign exchange earnings as well as providing employment, directly and indirectly to over 3 million farmers (CRIN, 2008). Nigeria is known to be the 4th producer of cocoa in the world, producing about 250,000 metric tons annually when she has the potential of producing about 1 million metric tons on annual basis. Given the latest technological breakthrough of research in cocoa, farmers can produce cocoa yields of 1000kg/ha or more (CRIN, 2011). The great parity between the current production and the potential in cocoa production in Nigeria is not unconnected with the low adoption rate of improved technology in cocoa production, diseases and pests control, inefficiency in the use and allocation of resource. Also, farmers might use resources rationally but not at the economic optimal level. To meet up with the current cocoa transformation agenda of the Federal government of Nigeria, it is imperative that the factors responsible for enhancing cocoa productivity be identified and as such a detailed examination of the farm efficiency of resource use in terms of technical allotment and economic efficiencies for increasing productivity be done which necessitate this work.

Objective of the Study

The main purpose of the study is to analyze the economic efficiency of resource utilization in cocoa production so as to provide information for effective application and management of farm input in Nigeria cocoa farms and for policy.

Methodology

The study was carried out in Ondo State of Nigeria. Two cocoa producing Local Government Areas (LGAs) namely,Idanre and Ondo East were purposively selected for the study. Total samples of 120 cocoa farmers were randomly selected (sixty cocoa farmers were randomly selected in each local government area). The data used for the study were collected by administering a well-designed questionnaire to the cocoa farmers in the study area. The questionnaire sought the general information on farmer's socio-economic characteristics as well as the inputs used by the farmers. The data collected were analyzed with the use of analytical techniques such as descriptive statistics, farm budgetary technique and production function analysis. Budgetary technique was used to estimate the cost and returns on cocoa production while the production function analysis was done to ascertain how efficient the cocoa farmers allocate their recourses using the cob-doglas production function as follows:

$InQ = B_o + lnB_1 X_1 + lnB_2 X_2 + InB_3 X_3 + lnB_4 X_4 + InB_5 X_5 + InB_6 X_6 + In B_7 X_7 + e_i$ 2

Where:

InQ = Cocoa output in kilograms, X_1 = quantity of fungicides used, X_2 = quantity of insecticides X_3 = Number of labour used, X_4 = Cost of cutlass, X_5= Cost of spraying, X_6= Cost of file, X_7 = cost of hoe and e_i= composed error term defined as V_1-U_2 in equation (1)

The functional form used has the ability to reveal whether the resources is constant return to scale (in which case all the coefficient sums up to be one) or increasing return to scale (a situation where all the coefficient when summed up, is greater than 1) or when It is at a decreasing return to scale (ie the addition of the coefficient is less than 1). The marginal value product [MVP] is also estimated based on the coefficient of each resource and it is given by $MVP=B_IX_I$.

Results and Discussion

The study examined the economic analysis of input use efficiency among cocoa farmers in Ondo State. The study reveals that majority of the cocoa farmers are male and are below the age of fifty years. About 81% of them have formal education and has between 10-40 years of farming experience. The result presented on the table 1 shows an R^2 of 0.6078 indicating that 60.76% of the independent variable included in the model jointly explains the dependent variable. Critical factors affecting cocoa output are found to be cost of pesticide, labour and cutlass which are significant at 1%. The study also revealed that the farmers are operating on an increasing return to scale given an elasticity of production of 2.64. It was also found that all the resources are underutilized. It is therefore recommended that more resources, particularly pesticide, labour and cutlasses be employed in cocoa production, incentive for farmers to enable them procure the critical inputs should be put in place either in form of subsidy or credit so that cocoa output can be enhanced and the farmers livelihood be improved.

Determinants of Resource use Efficiency in Cocoa Production in South- West

$InQ = B_o + lnB_1 X_1 + lnB_2 X_2 + InB_3 X_3 + lnB_4 X_4 + InB_5 X_5 + InB_6 X_6 + In B_7 X_7 + e_i$

$lnQ = -9.1+0.142X_1+0.792X_2+0.28X_3+1.19X_4+0.021X_5+0.305X_6-0.079X_7$

Table 1: Cob-Douglas production function estimate for the farmers

Inputs	Coefficient	P-value
Fungicide	0.1418346	0.105
Pesticide	0.7922252	0.000**
Labour	0.2799347	0.009**
Cutlass	1.189853	0.000**
Cost of spraying	0.0208593	0.876
Cost of file	0.3051421	0.197
Cost of hoe	-0.0793939	0.549
Constant	-9.070966	0.018*

Source: Survey data, 2013.

R^2=0.6078, F-value=10.96 significant at1% level.

** 1 per cent significant

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Experimental Title: Integrated soil fertility management for small holder cocoa farms using combination of cocoa pod husk based compost and mineral fertilizers in South Western Nigeria

Investigators: Ogunlade, M.O. Orisajo S.and Oluyole, K.

Introduction

More than 78% of cocoa farmers in Nigeria do not use fertilizers on cocoa. Nutrients are being 'mined' through pod harvest without replacement in the form of fertilizer application. For instance,

harvest of 1000kg dry cocoa beans removed 20kg nitrogen, 4kg phosphorus and 10kg potassium from the soil. Furthermore, there is a dearth of virgin forest land to be opened up for expansion. Raising soil fertility status through integrated management is a sustainable alternative to enhance cocoa production. Chemical fertilizers are scarce, costly and beyond the reach of small scale farmers. The use of readily available sources of organic fertilizer like cocoa pod husk (CPH) being generated annually in large quantity on cocoa farms augmented with mineral fertilizer to avoid bulkiness provides a suitable options in soil fertility management. This also has the potential to reduce the inoculums levels of *Phytophthora* spp. and suppress populations of root-knot nematodes.

Materials and Methods

Site Selection: Four cocoa communities were selected for thes. These study were Soko (Ondo State), Ipinlerere (Ondo State), Ode-Omu (Osun State), Koola (Osun State) cocoa communities.

Soil Samples Collection: Soil samples were collected with the use of soil auger from selected cocoa farms in each of the four communities. The core samples per location were bulked into composite sample in order to have a representative sample for each of the location. In all, we had 4 composite soil samples. Nematodes were extracted from the soil and were transferred to the Nematology Laboratory, USDA for pre-treatment analysis. The remaining soils were air-dried, sieved through 2 mm sieve and analyzed for chemical and physical properties.

Selection of Farmers and Administration of Questionnaires: Cocoa farmers were selected with the assistance of the communities Head and Farmer Field School (FFS)/CLP facilitators. The questionnaires were structured to assess the current level of farmers' awareness and understanding of composting practices for soil fertility, pest and disease management in the study areas. Questionnaires were administered in each of the selected locations with not less than 30 farmers (respondents) per location.

Locally sourced materials like cocoa pod husk (CPH), chromolaena leaves, cowdung/ poultry litter were used to prepare compost fortified with mineral fertilizer to avoid bulkiness. Cocoa farmers in the selected communities were involved in the procurement, processing, preparation and application of the compost fortified with mineral fertilizer on selected cocoa farms. The project explored nutrient integration by mineral fertilizer-fortified CPH based compost and evaluation on farmers' field comparing the

Figure 1. Cross section of farmers completing the questionnaires at Ipinlerere, Ondo State

Figure 2. Cross section of farmers completing the questionnaires at Koola, Osun State

Results

Analyses of the questionnaires showed that 56% of the cocoa farmers were 50 years and above. 77% of the farmers were male while 23% of them were female. 82% of the farmers were married with 29% of them having no formal education, while 62% had formal education ranging from primary to secondary education. Only 9% of the farmers had formal tertiary education. All the cocoa farmers (100%) acquired their knowledge on Good Agricultural Practices (GAP) through Farmer Field School (FFS) training previously organized and executed by STCP/CLP. All the farmers (100%) do not use cocoa pod husk generated on their farms for anything. None of the farmers apply organic fertilizer on their cocoa farms, thereby indicating their interest to participate in the training on the production of cocoa pod husk based compost. Results from the soil analyses showed that the available phosphorus contents of the cocoa plots in the four project sites were considerably low (Table 1) compared to the critical level of 10mg/kg required for cocoa.

Conclusion

The research work is still on-going; the initial result is pointing to the fact that farmers in the selected locations did not apply fertilizers on their cocoa farms. Hence, the need to sensitize and train farmers, through participatory approach, on the neglected integrated soil fertility for enhanced and sustainable cocoa production.

Table 1: Pre-treatment soil physical and chemical properties of the project sites

Properties	Ipinlerere	Soko	Koola	Odeomu
Sand (g/kg)	898	888	858	888
Silt (g/kg)	68	68	58	48
Clay (g/kg)	34	44	84	64
pH	6.7	6.4	6.5	6.5
N (g/kg)	1.5	1.9	0.8	1.3
O.C (g/kg)	13.4	25.0	5.7	13.3
P (mg/kg)	3.66	3.56	3.36	4.54
K (cmol/kg)	0.23	0.32	0.16	0.21
Ca (cmol/kg)	16.6	21.07	16.51	20.86
Mg (cmol/kg)	2.21	3.55	0.79	1.35
Na(cmol/kg)	0.47	0.64	0.34	0.44
Exch.Acidity(cmol/kg)	0.06	0.07	0.08	0.08
ECEC(cmol/kg)	19.57	25.65	17.88	22.94
Base Saturation(%)	99.57	99.72	99.55	99.65
Fe(mg/kg)	0.7	1.11	0.62	0.51
Cu(mg/kg)	0.16	0.05	0.24	0.35
Zn(mg/kg)	0.66	0.46	0.63	0.53

Table 2: Chemical composition of mature compost

Properties	Ipinlerere	Soko	Koola	Odeomu
pH	8.70	8.20	8.20	8.40
N (%)	0.41	0.32	0.33	0.36
P (%)	1.45	1.05	0.61	0.12
K (%)	0.78	0.97	0.68	1.29
Ca (%)	22.06	9.53	2.94	1.01
Mg (%)	1.85	0.96	0.54	0.55
Na (%)	0.76	0.95	0.66	1.26
O.C (%)	10.02	5.69	5.43	8.41
C/N	24.4	17.79	16.46	23.37
Fe (%)	0.98	1.85	1.46	1.12
Cu (%)	0.006	0.007	0.004	0.005
Zn (%)	0.014	0.006	0.014	0.009
Mn (%)	0.07	0.10	0.06	0.08

Experimental Title: The effect of rootstock on photosynthesis and growth of *Theobroma cacao* L. under ideal and marginal environments in Nigeria

Investigator: Ayegboyin, Kayode Olufemi

Introduction

Cacao is naturally an under storey tree species of the lowland rainforest of the Amazon basin which is characterised by high annual rainfall (Bartley, 2005). However, the largest commercial area of production is currently in West Africa where about 71% of the total world production in 2008/2009 planting season was produced predominantly by smallholder farmers. (ICCO, 2009).

In much of West Africa there is a defined dry season, typically lasting from mid-November until mid to late February. Global climate changed coupled with local deforestation is resulting in a sometimes more severe and less predictable dry season.

As a consequence of these changes, the establishment of new cacao on farms in West Africa has been becoming more difficult (Bae et al., 2009). Strategies to improve establishment can include exploitation of different genotypes (Ayegboyin et al., 2015) and use of cultural practices such as overhead shade and mulching (Acheampong et al., 2015). An area that has received little attention to date is the use of different rootstocks. Currently, almost all cultivated cacao in West Africa is grown from seed. However, given the movement in other cocoa-producing regions, such as Brazil and Indonesia towards growing cocoa as clones, it is pertinent to consider the impact of rootstocks on cacao within a West African context.

Previous studies on other crops have shown that particular rootstocks can confirm a degree of drought-tolerance through better supply water and nutrients to the above-ground scion thereby maintaining photosynthetic activities during times of low soil moisture (Walker, 1986, Abeledo et al., 2002, Garcia-Sanchez et al., 2006). In the case of cacao, the apparent trends of the results obtained in the early investigations rootstocks expressed doubt on the possibility of much, if any, influence of rootstocks on cacao scions (Murray and Cope, 1959, Atanda, 1975). In Nigeria, the first attempt at investigating the relative importance of rootstock and scion interactions for cacao establishment ability of cacao started in 1971 (Atanda, 1975) but the results showed a general poor performance and the failure was attributed mainly on late transplanting and relative longer period the budded materials stayed in the nursery (Atanda, 1975). However a more recent study carried out by Yin (2004) in Malaysia gave an indication that cacao rootstock influences the vigour and the yield of the scion, at least, in the early years of establishment. .The aim of the present experiment was to test the performance of a range of cacao clones on two genetically distinct rootstocks. In order to examine the extent to which the rootstocks conferred differing tolerance to water deficit stress abilities the experiment was conducted at two sites in Nigeria, one which was considered marginal and the other in which rainfall patterns were more favourable.

Materials and Methods

Study Sites

The study was carried out at the Cocoa Research Institute of Nigeria (CRIN) Headquarters in Ibadan, Oyo State and in a CRIN Substation located at Owena, Ondo State, Nigeria. Ibadan is located between 7°26′ North and 3°54′ East with an altitude of 200 m above sea level and has a bimodal rainfall pattern of an annual average rainfall of about 2000m. Owena lies between 7°12′ North and 5°1′ East and located in the tropical rain forest ecosystem with annual average rainfall of about 2500mm. The total monthly rainfall during the period of data collection at Ibadan and Owena is shown in Table 1. While Ibadan, with a mixture of rain forest and derived savannah vegetation and a more pronounced dry season, is characterised as a marginal cacao climate, Owena has an ideal cacao climate ecology (Aikpokpodion et al., 2009).

Plant Material

Hand pollination of cacao genotypes for rootstocks started in May 2008 both at CRIN, Ibadan and at the Cocoa Research Institute of Ghana, Tafo. The cacao varieties crossed were N 38 * N 38 and PA 7 * PA 150. About 6 months after pollination, the seeds were extracted from their ripe pods and then raised in the CRIN Central Nursery, Ibadan. Seeds were planted into saw dust for pre-germination under nursery conditions and after 2 weeks, the sprouted seed were transferred to about 2kg top-soil filled polythene bags where they were raised as the rootstock materials. They were patched budded after about 4 months.

Buds were collected from the cacao clones AMAZ 15/15, MAN 15/2 SPEC 54/1 PA 150 and N 38 and budded to three rootstocks to form a total of ten cacao rootstock-scion combinations for the field experiment. The composite plants were watered three times a week until they were between 6 and 7 months when they were planted out into the field.

At each sites, the cacao composite plants were set up in a Randomised Complete Block Design with a factorial combination of 10 combinations of rootstocks and scions planted in 4 blocks and 5 trees representing each of the genotypes to make a total of 200 trees per field at each of the sites . The budded cacao were planted out in at a spacing of 3m (square planting). Since a total clearing method was adopted for site preparation, Plantain (*Musa* spp.) was used as the 'nurse crop' to provide shade for the cacao plants during the first two dry seasons of establishment. All plantain suckers for this study were planted at the same spacing of 3m x 3m, located just 1.5m from each of the cacao stands and planted about approximately about one month before cacao establishment.

Data were collected on the stomatal conductance, transpiration and photosynthetic rates of cacao using a portable infra-red gas analyser (ADC Bio Scientific, United Kingdom) while leaf area determined destructively using AM300 portable leaf area machine (ADC Bio Scientific Ltd). Plant height, stem diameter and number of leaves were collected non-destructively.

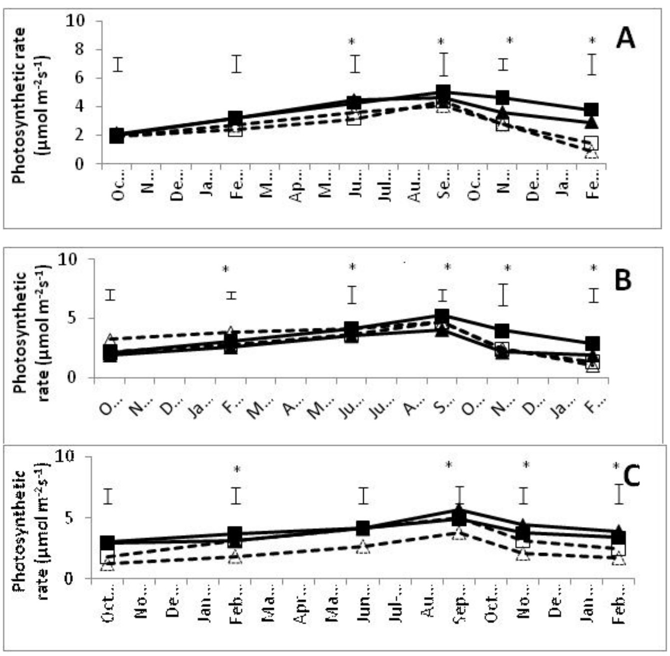
Fully mature leaves to be sampled were labelled. The leaf was painted with clear nail varnish on the abaxial surface but avoiding the midrib. The painted spot was approximately 2cm wide and 4cm long. After the nail varnish had dried a short strip of clear Scotch tape (not frosted) was firmly pressed over the dried nail varnish, carefully peeled from the leaf and gently affixed to a clean microscope slide. The prepared slides were observed under an *Axioscope* 2 microscope with an *Axiocam* camera attached (*Carl Zeiss*, Jena, Germany) at 40X magnification. Image were saved from 3 different fields for each slide and the number of stomata pores in the JPEG image was counted with the aid of ImageJ (Java-based image processing programme).

Statistical Analysis: Genstat (VSN International Limited) 13th edition was used to analyse the data by means of analysis of variance and significant means were determined by least significant difference (LSD) at P = 0.05 value. General ANOVA was used where each of the measured parameters was treated as a variable while rootstock, scion and site were the factors. For time series data two-way ANOVA was was conducted for each time point with rootstock and scion? being the treatment factors.

Simple Linear Regression in Genstat was first used to determine the level of significance between any two tested variables. Then regression models were constructed to the photosynthetic rate of the cacao with their height and number of leaves using Microsoft Excel 2010.

Results and Discussion

Gas exchange characteristics of the composites



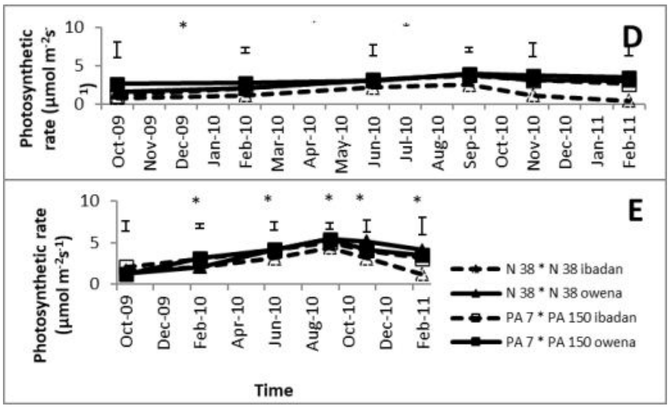
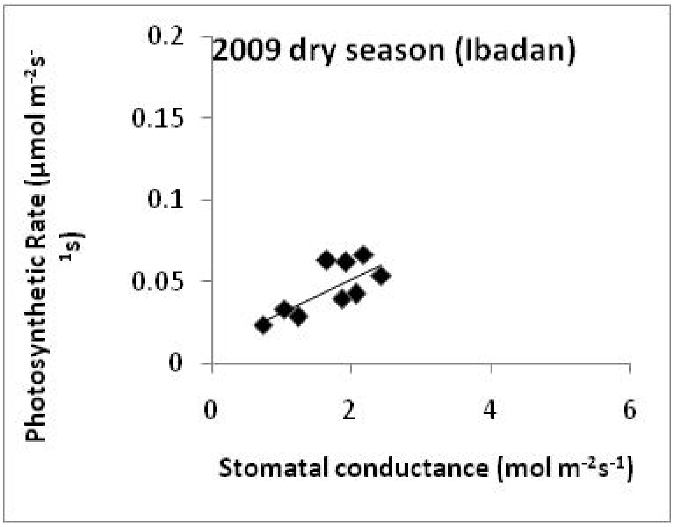
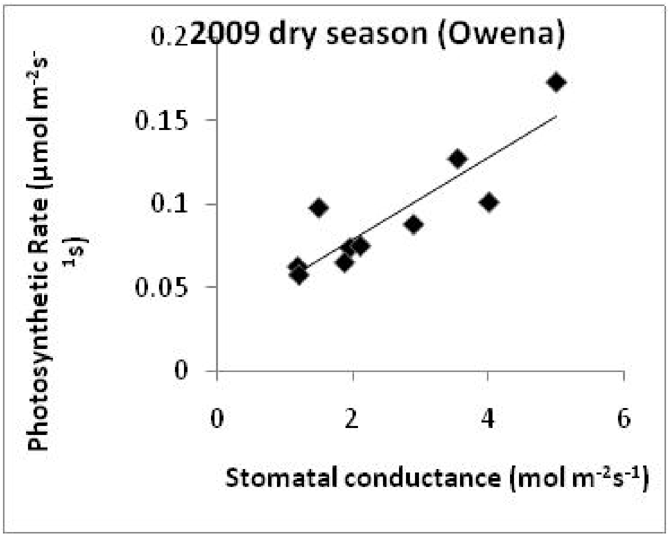
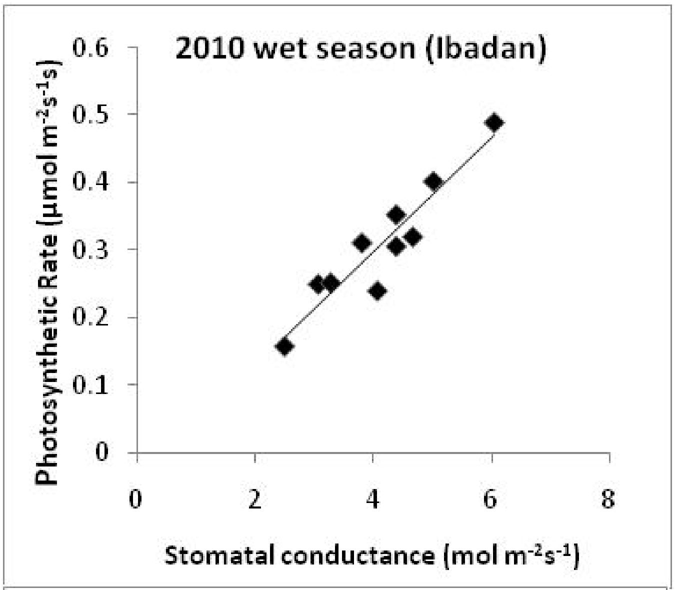
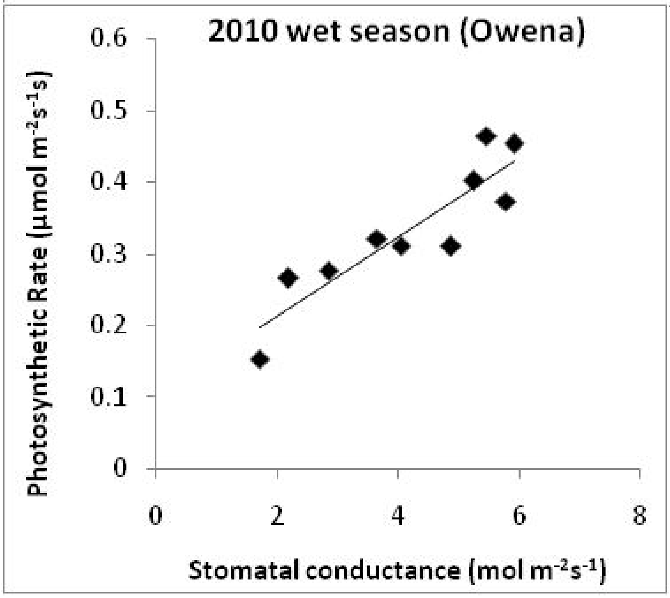


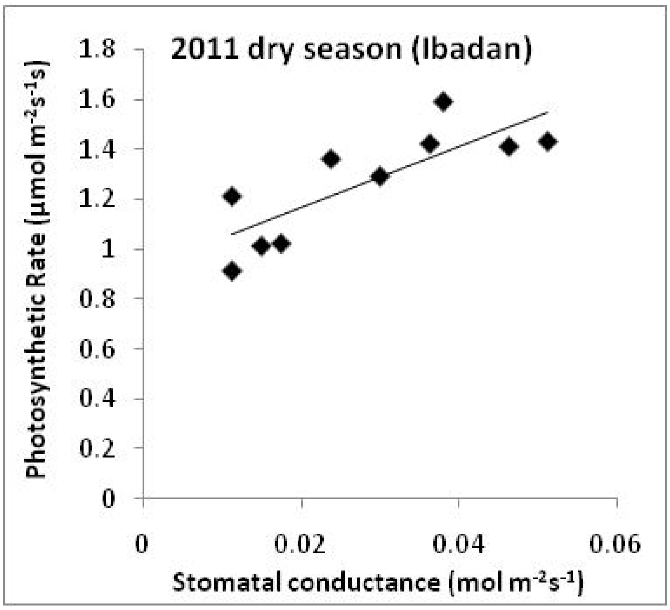
Fig. 1. Photosynthetic rate of AMAZ 15/15 (A), MAN 15/2 (B), PA 150 (C), SCA 6 (D) and SPEC 54/1 (E) on N 38 * N 38 and PA 7 * PA 150 rootstocks. Each point represents the mean of 8 plants while the bars are LSD values at P = 0.05. Asterisk shows significant LSD.











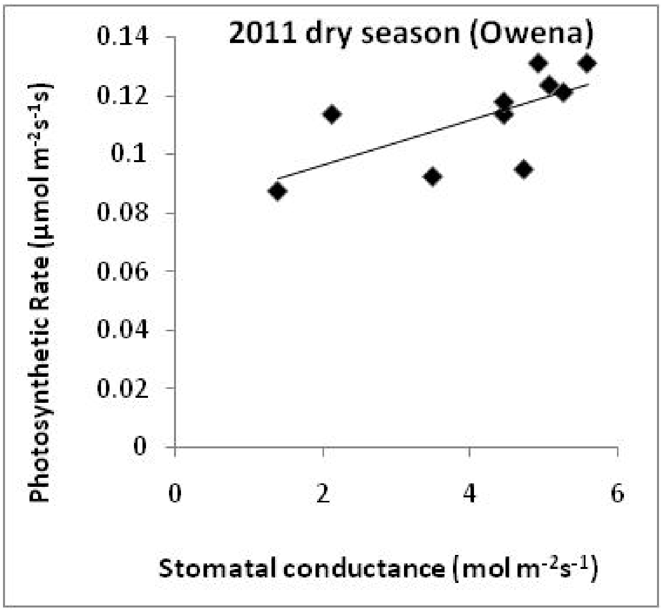
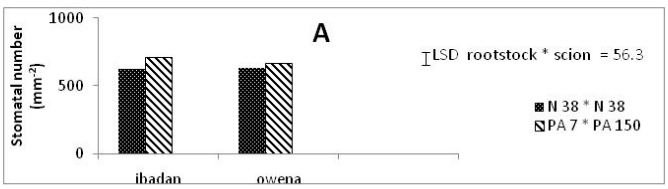


Fig. 2: Relationship between photosynthetic rate and stomatal conductance of budded cacao in Ibadan and Owena (n = 10). Each point represents a particular rootstock*scion combination.

The rate photosynthesis (Figures 1) increased from the start of the data collection until a peak in September 2010 and then began to decrease either sharply or gradually until the end of the data collection in February 2011, which corresponds to the dry season. In the 2009 dry season, a significant scion * site (P = 0.049) interaction was recorded but there was no rootstock effect. There were no significant interactions in the 2010 wet season although there was a significant main effect of scion (P = 0.021) and of rootstock (P = 0.038); on average photosynthetic rates were higher for clones on the PA 7 * PA 150 rootstock. However, in the 2011 dry season, there were significant rootstock * scion (P = 0.042) as well as scion * site (P = 0.026) interactions. By February 2011, the effect of rootstock was seen on all the five cacao clones such that scions on PA 7 * PA 150 rootstock had higher photosynthetic rates than those on N 38 * N 38 at the two sites. The effect of rootstock was also greater for SCA 6 and SPEC 54/1 than for PA 150 and AMAZ 15/15 clones. There was an observed effect of site with plants in Owena having higher photosynthetic rates than their counterparts in Ibadan (P=0.024)

There were significant positive relationships between the stomatal conductance of the different cacao composites and their photosynthetic rates for each season and site (Fig. 2).

Stomata density of the cacao clones



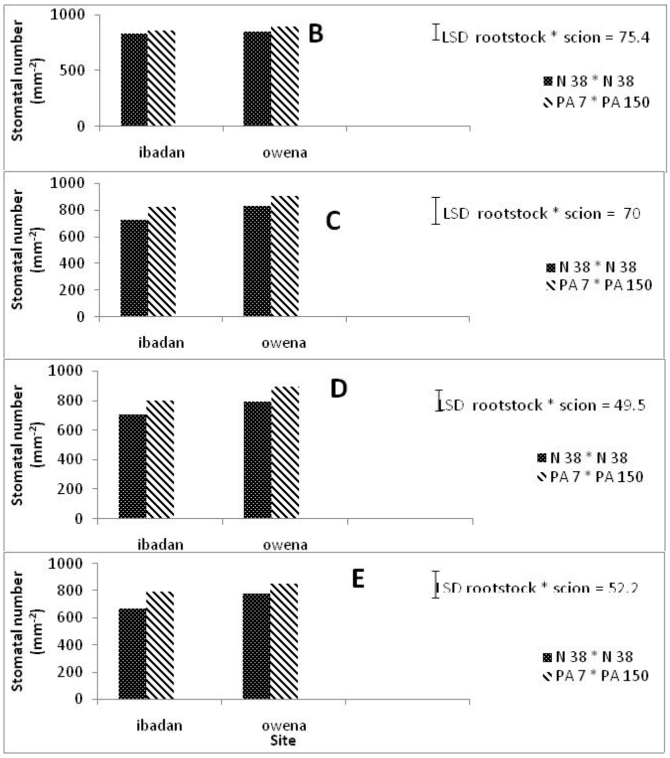


Figure 3: Stomatal density of AMAZ 15/15 (A), MAN 15/2 (B), PA 150 (C), SCA 6 (D) and SPEC 54/1 (E) on N 38 * N 38 and PA 7 * PA 150 rootstocks. Each bar represents mean of 8 plants. Bars show LSDs at P = 0.05.

There were significant rootstock * scion (P = 0.043) and scion * site (P = 0.015) interactions for stomatal density (Fig. 3). Cacao clones on the PA 7 * PA 150 rootstock had a significantly higher stomatal density than those on N 38 * N 38 at both sites but the overall stomatal number was greater at Owena (P = 0.039).The number of stomata per square millimetre for plants fell into the range of 625 for AMAZ 15/15 to 834 for MAN 15/2 for clones on N 38 * N 38 rootstock in Ibadan while the range was between 67 for AMAZ 15/15 to 901 for PA 150 for clones on PA 7 * PA 150 in Ibadan. The overall mean values of stomatal density for plants were higher at Owena site compared with those in Ibadan. Furthermore, the effect of rootstock on stomatal density of cacao clones was greater for SCA 6 and SPEC 54/1 than for AMAZ 15/15 and MAN 15/2.

Discussion

There was an observation that cacao genotypes with high stomatal conductance also had higher transpiration and photosynthetic rates while these parameters were lowest during the dry season. Due to high sensitive nature of cacao, in the effect of lower soil field capacity, stomatal conductance become minimal and further transpiration is either ceased or reduced by its efficient stomata control. This seems to be the first internal water conservational strategy for cacao once deficit plant water potential is detected. However, lower transpiration rate invariably reduces the CO_2 absorption and assimilation which leading to lower photosynthetic rate during water stress. The strong and direct relationships that exist between the photosynthetic rate and agronomic parameters of all cacao clones shows that inherent gas exchange characteristics reflect the growth rate and pattern in the early establishment period of cacao. This phenomenon is that stomata closure is an important process in the protection of plants from exposure to severe water stress and could be regarded as the '*first line of defence*' (Mansfield and Davies, 1981) from protecting the leaves from tissue desiccation. Stomata remain fully opened until a critical or threshold leaf water potential is reached (Lecoeur and Sincair, 1996) and from this value, the aperture begins to narrow as a result of further water loss and can result in a complete closure, causing the cessation of photosynthetic CO_2 uptake as well as stomatal transpiration (Hsiao, 1973). However, there is a considerable variation in both the threshold and full closure values amongst cacao clones might be the basis of their genotypic response to water stress species.as there is variability in both physiological and biochemical reactions of crop species to water stress (Sircelj et al., 2007) and in the present work, cacao clones showed an efficient stomatal regulation resulting into reduced water loss through transpiration under stress, be a major strategy of its water conservation. Similar results on cacao had been reported (Balasimha, 1987).

The influence of rootstock increase with the age of cacao clones an effect of rootstock effect was just becoming evident for all growth parameters in the 2010 wet season and reached its peak by the 2011 dry season. However, a significant rootstock * scion interaction in the photosynthetic rates of cacao genotypes by 2009 dry season might also be an indication that rootstock ability on plant to survive and thrive in water limited environments starts soon after transplant, although there are genotypic differences in the magnitude of such effects.

Cacao clones on the PA 7 * PA 150 rootstock had higher plant height, stem diameters and number of leaves than their counterparts on N 38 * N 38 both in Ibadan and Owena. This reveals that rootstock plays a significant role at modifying the growth characteristics of cacao clones whilst such influence is scion specific and varies between rootstocks. Although, the relative growth performance of cacao genotypes in the ideal condition (Owena) was higher than in those of the marginal environment (Ibadan), the interaction effect of rootstock was higher in marginal climate at the early years of establishment and varied among scions. These results showed that cacao growth is influenced by genotype as well as the environment whereas rootstock can influence the physiological and growth rates of their scions and that rootstock had more of an impact on some clones than on others. Difference in anatomical features between the scion and the rootstock will cause a discontinuity in the water conduction system that negatively impacts water transport (Reyes Santa Maria et al., 2002). The differences in the rate of water movement and root anatomy between rootstock and scion might partly responsible for variation in the physiological performances of the clones (Fassio et al., 2009). Olmstead et al. (2006) discovered that the combination of smaller and fewer vessels in the scion and graft union as well as irregular vessel orientation in the vascular tissue could contribute to hydraulic resistance in the graft union resulting in a significant resistance to water from the root system to canopy.

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KOLA PROGRAMME

Experimental Title: Identification, selection and establishment of high yielding Kola varieties on/farm and on/station

Investigators: Adenuga,O.O., Adebiyi, S., Oduwole, O.O., Abdulkareem, I. F., Adebowale, L. A, Oduwaye, O., Ugioro, O.

Introduction: Over fifty species of the genus *Cola* have been described in West Africa (Adebola, 2003). Twenty-eight of these species occur in the forest between the Cross River of extreme SE Nigeria and the Mungo River of Western Cameroon (the eastern boundary of the Flora of West and Tropical Africa, FWTA). Of these, only a few are fruit bearing while majority are woody species of economic importance. The most commonly used species are *Cola nitida* [(Vent) Schott and Endlicher], *Cola acuminata* [(Pal de. Beuav) Schott and Endl] and *Cola anomala* (Schott and Endlicher). These, in addition to many uncultivated species

are of great importance for their economic, pharmaceutical, confectionery, nutritional, socio-cultural and other uses. The genus, no doubt, is of great economic and scientific importance.Yet not much is known in terms of attempts to unravel its genetic diversity with the aim of improving upon the crop through breeding and other improvement procedures. The average kolanut production per tree of *C. nitida* is 250 nuts per year, in contrast to an annual of 3,000 to 10,000 kolanuts per tree per year recorded in experimental plantings which were hand pollinated (Morakinyo and Olorode, 1984). There is the need to solve the problem of self and cross incompatibilities and inefficient pollination, regarded as responsible for low yield. Solution needs be found to the problem of fruit loss due to pest and disease attack, and untimely harvesting as a result of cryptic green colour of the pod as well as unpleasantly tall height of the trees. There is the need to reduce the gestation of the crop. All these will encourage further farmer interest in the crop.

Objectives

The objectives of the study are:

i. To identify existing kola Germplasm collection within the institute so as to know the better performing trees for further improvement activities;
ii. To identify and collect good performing kola accessions from farmers' plots across Nigeria;
iii. To establish new Germplasm plots from the collected accessions at CRIN headquarters and sub-stations so as to expand the genetic base of the Institute's kola Germplasm;
iv. To characterize the Germplasm using molecular markers so as to determine their genetic profile; and
v. To select superior parents from collections for the development of improved varieties.

Methodology

(i) Identification procedures: Visits will be conducted to the areas known for kola production to know the production periods. Two locations will be chosen from each of Osun, Ondo and Ogun states to give six (6) locations for the study;

(ii) Selection and Collection of plant materials: All available good performing accessions of Cola nitida existing in the plots of farmers surveyed will be collected during nut production periods. One hundred (100) kola genotypes will be collected in each location to give six hundred kola genotypes from the six locations. Both vegetative materials and seeds will also be collected from each of these locations. The Germplasm materials thus collected will be raised in the nursery and later established in the field;

(iii) The field will be maintained and all necessary Good Agricultural Practices will be adopted on the plot, with the established materials periodically evaluated. In the experimental design, each accession will be replicated three times in the gene bank at each location.

Results and Discussion: Work is yet to commence.

Experimental Title: Combined effect of kola testa based organic manure and NPK fertilizer on soil, leaf chemical composition and growth performance of kola (*Cola nitida* Vent)

Investigators: Adeosun, S.A., Adejobi, K.B.; Famaye, A.O.; Idrisu, M.; Ugioro, O. and Nduka, B.A.

Introduction

Kola, an evergreen tree and a member of sterculiaceae family (Opeke, 2005) is an important commodity crop in West Africa and other tropical regions of the world (Famaye, 2012). It is native to tropical Africa with its centre of diversity in West Africa especially Cote d'Ivoire and Ghana (Opeke, 2005). Among about 40 Cola species in West Africa, the *Cola nitida* and *Cola acuminata* are the species of real economic importance (Quarco, 1973; Daramola, 1978). They are important economic crops in the forest areas of West and Central Africa, Caribbean Islands, Mauritius, Sri Lanka and Malaysia (Eijinatten, 1969). Although *Cola nitida* is of more economic importance in Nigeria especially in the north, *Cola acuminata* has its origin and is consumed mainly among the Yoruba tribe of Western part of Africa.

Nigeria is the leading world producer of kola nut. It is estimated that Nigeria currently produces 70% of the world's kola nuts with an annual production of 200,000 metric tonnes of fresh nut (Asogwa, 2012), although only 10% of this amount is exported; the rest is consumed locally.

Kola has numerous socio-economic as well as nutritional importance. Kola nut is an important article of trade in West Africa and in the trans-Saharan trade routes for many centuries (Egbe and Sobamiwa, 1989), a masticatory and herbal stimulant (Herbal Extracts Plus, 2011),and raw material in the manufacture of kola chocolate and kola wine in Cocoa Research Institute of Nigeria (CRIN) (Famuyiwa, 1987). Besides, kola testa has been suggested as a possible fertilizer ingredient (Olubamiwa, 2002). .

In spite of the immense benefits of kola, some debilitating factors have been limiting its production in Nigeria. Among these constraints are poor agronomic practices, ageing kola farms (Adebiyi et al., 2011), and poor soil fertility (Asogwa 2011). It has also been reported that Nigeria soils are largely deficient in major essential soil nutrients; hence multiple nutritional deficiencies and lower yields are common occurrence (Agboola and Sobulo, 1981)

The assessment of agronomic practices among farmers in Osun State (S/W Nigeria) revealed that only 8.8% of the farmers carried out soil improvement especially fertilizer application (Adebiyi et al., 2011). The major constraints to the use of fertilizers among farmers include high cost and poor availability; hence the need to formulate alternative source of soil manuring which is the basis of the current study.

Although there has been dearth of research information on the use of kola testa to improve soil fertility for kola production, recent studies have shown that the by-products of some tree crops have been used especially as organic fertilizers. Adejobi, et al. (2011) reported that Cocoa Pod Husk Ash enhanced the vegetative growth of cocoa and cashew seedlings. Similarly, Obatolu (1995) reported the use of cocoa pod husk as fertilizer for coffee and maize production.

Objective

The objective of the current study is to evaluate the combined effect of kola testa based organic manure and NPK fertilizer on soil, leaf chemical composition and growth performance of kola in the nursery.

Methodology

The current trial was carried out in Cocoa Research Institute of Nigeria (CRIN) Ibadan, South-West of Nigeria (Lat. 07 10'E and Long. 03 52'E) between 2010 and 2011. The site was located in the humid tropical rain forest belt of Nigeria where rainfall ranges between 1200mm-1500mm and annual average temperature is 30.1 ^{0}c

Pre-planting, Soil Sampling and Analysis: The top soil to be used for this trial was collected from Cocoa Research Institute of Nigeria HQ, Ibadan at a depth of 0-15cm. The soil was thoroughly mixed, dried and sieved with a 2mm mesh screen and was analyzed for physical and chemical properties. Soil pH (1:1 soil/water) was determined with pH meter; while organic matter was determined by Wet Oxidation method (Waikley and

Black, 1934). Soil P was extracted by the Bray PI and measured by the Murphy blue colouration and determined on a Spectronic 20 at 882µm (Murphy and Riley, 1962). Soil K, Ca and Mg were extracted with IMNH4 OAC. P, Total N and Mg were determined with flame photometer, atomic absorption spectrophotometer and Microkjedahl methods respectively (AOAC, 1970)

Collection, Processing and Chemical Analysis of Kola Testa (KT): Kola testa was obtained from the Crop Processing Unit of CRIN Ibadan. It was sun dried for weeks and blended into powder. Two (2) grams of blended KT was analyzed using the methods mentioned above.

Pre-nursery and Nursery Establishment: In July 2010 disease free kola nuts (*Cola nitida*) were obtained from CRIN Ibadan. The nuts were planted in a wooden box filled with sawdust and watered. The nuts germinated and were allowed to grow in the pre-nursery for 8 months. During this period, the germinated seedlings were watered and weeds were controlled manually.

In March 2011, Polythene pots (25cmx13cm) were filled with sieved top soil and the germinated kola seedlings were transplanted from the pre-nursery seed box into the soil filled polythene bags and heavily watered. The bags were arranged in three rows. In May 2011 the treatments were imposed on the kola seedlings. A combination of six levels each of blended kola testa (KT) and NPK fertilizer were applied as follows: zero KT+400kg NPK ha^{-1} (K_0N_5); 5t KT ha^{-1}+400kg NPK ha^{-1} (K_1N_5); 10t KT ha^{-1}+300kg NPK ha^{-1} (K_2N_4); 15t KT ha^{-1}+200kgNPK ha^{-1} (K_3N_3); 20t KT ha^{-1}+100kgNPK ha^{-1} (K_4N_2); 25tKT ha^{-1}+50kg NPK ha^{-1} (K_5N_1); 25tKT ha^{-1}+zero NPK (K_5N_0) and zero KT and zero NPK (K_0N_0) (control). These eight treatments were randomly applied to the kola plants using ring method

Manual weeding was carried out on 4WAT (weeks after transplanting), 8 WAT, 12 WAT and 16 WAT. Water was randomly applied at three days interval between March and May before the rain became steady. Insecticide DDVP1000EC was applied at 5ml/l of water at 14 WAT, 18 WAT and 22 WAT to control leaf miners, caterpillars and white fly infestations.

At 8 WAT, 12 WAT, 16 WAT, 20 WAT and 24 WAT, the following morphological data were collected from the kola plants: Number of Leaves, Leaf Area, Plant Height, Stem Girth and Number of Branches. At 24 WAT, the seedlings were carefully uprooted from the poly bags. Their shoot and root weights were taken with Metler sensitive weighing Balance. They were later oven-dried and their dry weights were taken with Metler sensitive weighing Balance. At the same time (24 WAT) Soil samples were collected from the poly bags, sieved and analyzed.

Statistical Analysis: All data collected were analyzed using Analysis of Variance (ANOVA) software package and significant means were separated using Duncan Multiple Range Test (DMRT).

Results and Discussion

The initial physical and chemical properties of the soils are presented in Table 1. Based on the established critical levels for the soil in South-Western Nigeria, the soil was acidic and low in Organic matter (Agboola and Corey, 1973). The soil nitrogen was more than 0.15% which is considered optimal for most crops (Sobulo and Osiname, 1981); while the available P was less than 10mg/kg which is considered as adequate for crop production (Agboola, 1982). The exchangeable K value was equivalent to 0.2cmol/kg (0.18cmol/kg) as the critical level. Moreover, the levels of Ca and Mg were very low indicating poor soil fertility. The soil is sandy loam, belonging to Onigambari series: an Alfisol.

The result of the chemical analysis of the organic manure (Kola testa) used in the current study (table 2) indicated that kola testa contains the following nutrients: Nitrogen (6.27%); Phosphorus (22.32mg/kg); Potassium (7.20mg/kg); Calcium (33.00mg/kg); Magnesium (3.66mg/kg) and Sodium (16.00mg/kg).

Table 3 showed marked effects of the application of KT, NPK and their combinations on the vegetative performance of kola seedlings relative to control. Kola seedlings grown with 10t ha^{-1}+300kg ha^{-1}NPK (K_2N_4) significantly ($P<0.05$) produced the highest number of leaves, leaf area, number of branches while K_4N_2 produced the highest plant height and shoot length. The higher vegetative growth engendered by K_2N_4 is attributable to the fact that KT increased the soil pH (table 5) owing to its high calcium content (table 2) and probably made the N readily available for uptake by kola seedlings as low Ca content in the soil is an index of high soil acidity. This is consistent with McFarland (2001) who reported that the availability of fertilizer nutrients such as N, P and K is generally reduced as pH decreases. Similarly, Aduayi (1980) had reported that nutrients are made available by high soil pH. The combination of KT and NPK especially K_2N_4 and K_4N_2 which enhanced higher vegetative performance of kola seedlings than sole application of KT and NPK attests to the synergistic relationship that exists between them and their resultant complimentary effect in enhancing vegetative growth of kola seedlings. The current result is consistent with the findings of Ayeni (2010) who reported that cocoa pod ash (an organic fertilizer) combined with NPK fertilizer significantly ($P<0.05$) gave the highest fruit yield of tomato. Similarly, Makinde (2010) found out that vegetative growth of crops was engendered by organic manure especially Kola Pod Husk and Cocoa Pod Husk and NPK fertilizer.

In a similar trend, application of KT, NPK and their combinations are significantly different in their effects on the dry matter accumulation of kola seedlings relative to control. (Table4). It is noteworthy that the treatment (K_2N_4) that enhanced the highest leaf area also brought about the highest fresh and dry root weight and fresh and dry shoot weight of kola seedlings. This trend corroborated the result reported by Adejobi (2011) who observed that the combination of Organo-Mineral Fertilizer and Cocoa Pod Husk Ash that precipitated the highest vegetative growth also engendered the highest growth yield This implies that photo-assimilate accumulation is a function of leaf area of plants. Watson (1952) had earlier postulated that dry matter accumulation and yield were associated with increase in mean leaf area and difference in dry matter accumulation must arise mainly from variation in leaf area. Table 4 apparently reveals that K_2N_4 enhanced root fresh weight, root dry weight, shoot fresh weight and shoot dry weight of 28.08g, 9.12g, 51.55g and 19.08g respectively which is significantly higher than the effect of other treatments and control. In the same vein, Makinde (2010) found out that the mixture of Kola Pod Husk and NPK fertilizer enhanced the growth and yield of *Amaranthus cruentus.*

Table 5 revealed that kola testa, NPK fertilizer and their combinations have significant effects on the soil chemical composition. Integrated application of KT and NPK and sole application of KT increased the soil pH significantly relative to sole application of NPK and control. K_4N_2 and K_5N_1 with the highest KT content produced the highest soil pH of 6.30 and 6.28 respectively. This result underscores the pertinence of KT in reducing soil acidity and its negative consequence. The possible explanation to this is that KT contains high calcium (table 2) which is a liming material as its addition to the soil markedly reduced high soil acidity. This result in agreement with the findings of Moyin-Jesu et al. (2008, 2010) who observed that organic materials especially wood ash, oil palm bunch and poultry manure increased soil pH compared to NPK fertilizer. Application of K_1N_5 with the highest NPK and lowest KT engendered the highest soil N. The sole NPK application enhanced almost the least soil N probably because of its volatility in NPK.

The sole KT (K_5N_0) and its integration with NPK engendered higher soil and leaf K relative to control. This corroborates the findings of Ayodele (1988) and Olubamiwa (2002) who suggested kola testa as a possible fertilizer owing to its high K content. The combinations of KT and NPK has been found in the current study to increase soil P, K, Mg and Ca relative control with K_4N_2 causing significantly ($P<0.05$) the highest soil P & Mg while Ca caused the highest soil Ca. This is in consonance with Adejobi (2011) who reported that organic manure especially goat dung and Cocoa Pod Husk Ash resulted in improved soil nutrients. Similarly, Ayeni (2008, 2010) reported increased soil OM, N, P, K, Ca, Mg, Zn, Cu and Fe when Cocoa Pod Husk Ash or poultry manure was integrated with NPK rather than its sole application.

It is apparent in Table 6 that KT, NPK and their combinations increased nutrient uptake in the kola leaf compared to control. Expectedly, sole application of NPK significantly ($P<0.05$) produced the highest leaf N and the control has the least leaf N. However, the various combinations of KT with NPK increased leaf N significantly ($P<0.05$) relative to control. This is consistent with the result of Moyin-Jesu (2010) who found out that NPK15-15-15 produced the highest leaf N compared to poultry manure, wood ash, pig manure and control treatments. The enhancement of leaf N by NPK fertilizer is probably as a result of its higher nitrogen content relative to KT. Nevertheless, varying degree of integration of KT with NPK engendered significantly ($P<0.05$) higher leaf N, P, K, Mg, Ca and Na compared to the control. This is an indication that the presence of KT enhanced the uptake of these plant nutrients from the soil. However, integration of KT and NPK especially K_3N_3 and K_5N_1 caused significantly ($P<0.05$) the highest leaf P and Mg & Ca respectively. This observation is consistent with Moyin-Jesu (2008, 2010) who reported that integrated organic matter with NPK increased the leaf K, Ca, and Mg relative to control. In the same vein, Adejobi *et al* (2011) found out that the combinations of organic manure with urea enhanced the highest leaf Mg and Ca of coffee. The explanation that could be adduced to this is that the presence of NPK enhanced the mineralization of plant nutrients thus enhancing their uptake by plants.

Table1: Physio-chemical characteristics of the soils of the experimental site before planting kola seedlings.

Soil Properties	Values
Physical Properties	
Sand	683.02g kg^{-1}
Silt	177.86g kg^{-1}
Clay	138.09g kg^{-1}
Textural Class	Sand- loam
Chemical Properties	
Soil pH (H_2O) 1:1	5.26
Organic Matter	0.53%
Organic Carbon	2.73g kg^{-1}
Total Nitrogen	0.04g/100g
Available Phosphorus	2.00mg kg^{-1}
Exchangeable Bases	
K^+	0.18cmol kg^{-1}
Ca^{2+}	0.9cmol kg^{-1}
Mg^{2+}	2.90cmol kg^{-1}
Mn^{2+}	0.09cmol kg^{-1}
Exchangeable Acidity	
Al^{3+}	0.53cmol kg^{-1}
H^+	0.42cmol kg^{-1}
ECEC	46.6cmol kg^{-1}
Base Saturation	82%

Table 2: Chemical analysis of the organic manure used for the experiment

Treatment	N %	P mg/kg	K mg/kg	Mg mg/kg	Ca mg/kg	Na mg/kg
KT	6.27	22.32	7.20	3.66	33.00	16.00

KT: Kola Testa

Table 3: The Growth parameters of kola seedlings between 4-24 weeks after transplanting from pre-nursery under KT and NPK fertilizer

Treatments	Number of Leaves	Leaf Area (cm^2)	Number of branches	Plant height (cm)	Stem Girth (cm)	Shoot length (cm)	Root length (cm)
K_0N_5	13.45b	25.65ab	3.95a	27.59b	0.66ab	28.30b	30.87b
K_1N_5	11.83b	30.56ab	3.34ab	32.79ab	0.82ab	36.13ab	44.00ab
K_2N_4	31.78a	47.63a	4.72a	37.64a	0.96a	42.50ab	43.33ab
K_3N_3	11.50b	32.17ab	1.72bc	37.19a	0.65ab	46.83ab	45.40ab
K_4N_2	17.11b	35.87ab	2.11bc	43.26a	0.78ab	54.30a	46.23ab
K_5N_1	8.00b	36.07ab	1.83bc	37.20a	0.76ab	45.63ab	45.47ab
K_5N_0	7.90b	24.90ab	1.78bc	25.60b	0.65ab	28.50b	34.73ab
K_0N_0	11.50b	34.19ab	1.61c	16.23c	0.60b	17.33c	47.43a

K_0N_5: 400kg ha^{-1} NPK; K_1N_5: 5t ha^{-1} Kola Testa + 400kg ha^{-1} NPK;
K_2N_4: 10t ha^{-1} Kola Testa +300kg ha^{-1} NPK; K_3N_3: 15t ha^{-1} Kola Testa +200kg ha^{-1}NPK;
K_4N_2: 20t ha^{-1} Kola Testa +100kg ha^{-1} NPK; K_5N_1: 25t ha^{-1} Kola Testa + 50kg ha^{-1} NPK
K_5N_0: 25t ha^{-1} Kola Testa; K_0N_0: CONTROL
Treatment means within each column followed by the same letter are not significantly different from each other using Duncan Multiple Range Test at 5% level

Table 4: The yield parameters of kola seedlings between 4-24 weeks after transplanting from pre-nursery under KT and NPK fertilizer.

Treatments	Root fresh weight (g)	Shoot fresh weight (g)	Root dry weight (g)	Shoot dry weight (g)
K_ON_5	8.91b	11.69b	3.06b	4.75b
K_1N_5	14.34ab	17.08b	5.21ab	6.76b
K_2N_4	28.08a	51.55a	9.12a	19.08a
K_3N_3	11.41b	16.23b	3.49b	5.52b
K_4N_2	15.47ab	32.80ab	5.11ab	11.37ab
K_5N_1	10.36b	13.67b	3.43b	4.31b
K_5N_0	5.48b	7.56b	1.92b	2.82b
K_0N_0(Control)	16.58ab	8.83b	5.69ab	4.68b

K_0N_5: 400kg ha^{-1} NPK; K_1N_5: 5t ha^{-1} Kola Testa + 400kg ha^{-1} NPK;
K_2N_4: 10t ha^{-1} Kola Testa +300kg ha^{-1} NPK; K_3N_3: 15t ha^{-1} Kola Testa +200kg ha^{-1}NPK;
K_4N_2: 20t ha^{-1} Kola Testa +100kg ha^{-1} NPK; K_5N_1: 25t ha^{-1} Kola Testa + 50kg ha^{-1} NPK
K_5N_0: 25t ha^{-1} Kola Testa; K_0N_0: CONTROL
Treatment means within each column followed by the same letter are not significantly different from each other using Duncan Multiple Range Test at 5% level

Table 5: The soil chemical composition after the experiment under different levels of KT and NPK

Treatments	Soil pH (H_2O) 1:1	Organic Carbon (g/kg)	Organic Matter (%)	N (%)	P mg/kg	K mg/kg	Mg Mg/kg	Ca mg/kg	Na mg/kg
K_ON_5	5.60abc	1.93d	3.54ef	0.19cd	26.51abc	0.29b	1.52b	4.63b	0.47e
K_1N_5	5.76c	3.00a	5.15a	0.31a	27.90ab	0.34b	1.51b	4.47cd	0.57b
K_2N_4	5.64c	2.17c	3.82de	0.20cd	25.60bc	0.28b	1.22c	4.17e	0.52cd
K_3N_3	6.07abc	2.97a	4.66b	0.26b	26.93abc	0.32b	1.73ab	4.76a	0.55bc
K_4N_2	6.30a	2.18c	3.50f	0.20cd	29.40a	0.29b	1.78a	4.02f	0.48de
K_5N_1	6.28ab	2.27c	3.59ef	0.18d	27.76ab	0.32b	1.57ab	4.55c	0.56bc
K_5N_0	5.94abc	2.60b	4.25c	0.23bc	27.94ab	0.42a	1.76a	4.40d	0.62a
K_0N_0(Control)	5.87bc	2.19c	3.91d	0.17d	23.58c	0.17c	1.72ab	3.22g	0.42f

K_0N_5: 400kg ha^{-1} NPK; K_1N_5: 5t ha^{-1} Kola Testa + 400kg ha^{-1} NPK;
K_2N_4: 10t ha^{-1} Kola Testa +300kg ha^{-1} NPK; K_3N_3: 15t ha^{-1} Kola Testa +200kg ha^{-1}NPK;
K_4N_2: 20t ha^{-1} Kola Testa +100kg ha^{-1} NPK; K_5N_1: 25t ha^{-1} Kola Testa + 50kg ha^{-1} NPK
K_5N_0: 25t ha^{-1} Kola Testa; K_0N_0: CONTROL
Treatment means within each column followed by the same letter are not significantly different from each other using Duncan Multiple Range Test at 5% level.

Table 6: The leaf chemical composition after the experiment under different levels of KT and NPK

Treatments	N (%)	P mg/kg	K mg/kg	Mg mg/kg	Ca mg/kg	Na mg/kg
K_ON_5	4.38a	22.97c	7.63ab	3.60a	9.52a	3.93a
K_1N_5	3.53b	19.42d	5.50b	2.84ab	6.56ab	2.43b
K_2N_4	3.15bc	20.92cd	6.73ab	2.78ab	5.55ab	2.24b
K_3N_3	3.30bc	27.44a	7.63ab	2.94ab	6.02ab	1.91b
K_4N_2	2.70c	20.92cd	7.43ab	2.77ab	7.32ab	2.01b
K_5N_1	2.97bc	26.47ab	6.89ab	3.74a	8.68a	1.96b
K_5N_0	2.58c	23.33bc	8.30a	2.46ab	6.86ab	2.37b
K_0N_0(Control)	2.64c	18.49d	5.42b	1.49b	4.20b	1.26c

K_0N_5: 400kg ha^{-1} NPK; K_1N_5: 5t ha^{-1} Kola Testa + 400kg ha^{-1} NPK;
K_2N_4: 10t ha^{-1} Kola Testa +300kg ha^{-1} NPK; K_3N_3: 15t ha^{-1} Kola Testa +200kg ha^{-1}NPK;
K_4N_2: 20t ha^{-1} Kola Testa +100kg ha^{-1} NPK; K_5N_1: 25t ha^{-1} Kola Testa + 50kg ha^{-1} NPK
K_5N_0: 25t ha^{-1} Kola Testa; K_0N_0: CONTROL
Treatment means within each column followed by the same letter are not significantly different from each other using Duncan Multiple Range Test at 5% level.

Conclusion and Recommendation

It is logical to infer from the results of the current experiment that the application of combination of kola and NPK fertilizer could enhance the growth and yield of kola, soil and leaf chemical composition thus reducing the over dependence of farmers on mineral fertilizer especially NPK. Therefore the combination of kola testa and NPK fertilizer especially 10t ha^{-1} Kola Testa +300kg ha^{-1} NPK and 20t ha^{-1} Kola Testa +100kg ha^{-1} NPK are recommended for use by kola farmers.

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Experimental Title: Evaluation of some physiological activities and quality indicators in fresh and cured *Cola nitida* (vent**)**

Investigators: Ugioro, O, Oduwole O, Adeniyi , Azeez , Mokwunye, F.C

Introduction

Cola nitida (the kola nut) also known as *cola*, goro nut, cola seed is an important commercial and economic crop for many West African countries (Lovejoy, 1980) and Central Africa (Van Eijnatten, 1969). There are about twenty five species of the genus cola but only five or six species produce edible seeds commonly called 'nuts'.

These are *Cola nitida* (vent), *Cola acuminata* Schott and Endl., *Cola vertillata* Thorn, *C. anomala* and *C. ballay* (Russell, 1955). However, only two species; *C. nitida* and *acuminata* are cultivated as plantation crops (Quarcoo, 1973; Daramola, 1978).
Kola nuts are extremely popular due to their high caffeine content. Kola nuts have a bitter taste and contain between 1–1.5% caffeine by weight (Clayton, 2002). They are also a source of antioxidants and contain small amounts of theobromine, d-catechin, L-epicatechin, kolatin, phlobaphens, antioxidant pigment, betaine and protein. Kola extract is popular ingredient in fat loss supplements. It suppresses hunger, aids digestion of food and acts as a diuretic.

Justification
The high demand for kola nuts in the domestic and international markets for use in the food and pharmaceutical industries necessitates an accurate and efficient chemical and biochemical analytical methods which can characterize and quantify the native constituents in fresh and cured kola nuts for quality determination. Due to the high rate of consumption of Kola nuts in the country both by the young and elderly and considering the medicinal importance and the health implications of its consumption, this work is therefore aimed at investigating the proximate, mineral, anti-nutrient, phytochemicals, and dietary fibre compositions of different colours and sizes of kola nuts with a view to ascertaining if their mineral content could help to replicate the deficiency of some of these minerals in the body in order to meet the human daily dietary intakes of these minerals for effective growth and development.

Broad objective
The general objective is to determine the effect of physiological changes, minerals, proximate and anti-nutrient taking place in the kola nut with respect to various ways of preservation and length of storage.

Specific objectives
- Quantitatively analyze the sample for nutritional components with respect to length of storage
- Qualitative and quantitative phyto-chemical screening of the sample
- To investigate the variation of some physiological parameters over time
- To evaluate their cost effectiveness and applicability to farmers
- To find out new ways of storing kola nuts vis- a- vis effects on proximate content, phyto-chemical, minerals and anti-nutrient on the sample
- Evaluate the effect of storage mold contamination on nutritional and chemical constituent of kola nuts.

Materials and Methods
The study Area: This study will be carried out in Cocoa Research Institute of Nigeria (CRIN) Headquarters, Idi-Ayunre, Ibadan

Collection of samples: *Cola nitida* nuts samples will be collected from Ogunmakin, Sagamu, wares houses in Ogun and Olode, Ife-wara ware houses in Osun States.

Preservative materials, methods and length of storage of nuts: The preservation materials are as follows: Chemical known as phostocin, Botanicals which include: *Alchornia cordifolia* (local name: Esin) (family: Euphorbiaceae), *Azadirachta indica (local name:* Dongoyaro) (family Malvaceae) and *Tectonia grandis* as well as the control will be used for the experiment. Fresh leaves of the selected botanicals will be assay in 72 in four locations baskets. The kola nuts will be preserved for a period of one year. Physiological and biochemical changes of the nuts will be determined at two (2) months interval for a period of twelve (12) months as follows: 0, 2, 4, 6, 8, 10, and 12.

Effect of stored nut weight and colour on physiological and biochemical parameters: The nuts will be classified into sizes as follows: 1-10g, 11-20g and >20g above and colours such as red, pink and white. The different colours will be classified into each of the class stored with some selected botanicals, phostocin and the control.

The physiological parameters to be taken include the following:
Quantitative Screening of phytochemicals: Chemical tests will be carried out on the aqueous extract and on the powdered samples using standard procedures to identify the constituents as described by Sofowara (1993), Trease and Evans (1989) and Harborne (1973). Alkaloids, tannin, saponin, anthraquinone, steroids, flavonoid, terpeniods will be determined using the methods above.

Nutritional property analyses: The proximate composition, anti-nutrients, mineral elements and dietary fibre will be analyzed for the dried plant sample according to the method described by the Association of Official Analytical Chemists (AOAC, 1984) while the fat content will be analyzed by the gravimetric solvent extraction method as described by James (1995).

Caffeine determination: Caffeine content will be determined according to Irgolic et al., (1982) methods.

Mycoflora Evaluation: Mycoflora incidence in the collected kola nut samples in study location will be assay. The nut samples will cut into small piece of about 3mm in diameter, surface sterilized in sodium hypochlorite and inoculated on potato dextrose agar (PDA) and incubated. Colony growth will be observed and pure culture of associated moulds will be obtain and documented.
Statistical analysis: The average data obtain for the physiological and growth parameters for the experiments will be analyzed using ANOVA with an F-test. The treatment means will be compared using a Duncan Multiple Range Test at the 5% probability level (Gomez and Gomez, 1984)

RESEARCH BUDGET

S/n	Activity	Item	No. Require	Unit Price	Total Cost	%Total Cost
1	Collection of sample	Kola nut	2,500	30	75000	1,414827391
2	Purchase of basket	Basket	18 in 4 location=72	200	14,400	0.271646859
3	Collection of botanicals and chemical	*A .cordifiolia, A. indica*, and *T. grandis and* phostoxin	4	350	1,400	0.026410111
4	Analysis of Physiological parameters	Saponin Tannin Alkaloid Terpenoid, Flavonoid, Anthraquinone, Steriods	525 in 4 location =2100	500	1,050,000	19.80758347
5	Mineral determination	Na, K, Ca, Mg, P, Zn, Cu and Mn	600 in 4 location=2400	500	1,200,000	22.63723826
6	Proximate determination	Crude protein, crude fibre, moisture, carbohydrate, organic matter, organic carbon and crude fat	600 in 4 location= 2400	500	1,200,000	22.63723826
7	Anti-nutrient determination	Phytates, Oxalates and Trypsin inhibitors	225 in 4 location=900	500	450,000	8.488964346
8	Biochemical determination	Caffeine, Theobromine and koalin	225 in 4 location=900	500	450,000	8.488964346
9	Administering of questionnaire	Questionnaires	225 in 4 location=900	250	225,000	4.244482173
10	Potato Dextrose Agar (Lab M, 500g)		2x4=8	18,500	148,000	2.791926052
11	Disposable Petridish		2x4=8	20,000	160,000	3.01298434
12	Sodium hypochlorite (2.5L)		2x4=8	4,500	36,000	0.679117147
13	Lactic acid		1x4=4	4,500	18,000	0.339558573

14	Non-Absorbent cotton wool		3x4=12	600	7,200	0.135823429
15	Parafilm		1x4=4	13,500	54,000	1.018675722
16	Transport	Driver	1	12000 x4days =48000	48,000	0.90548953
17	Travelling	Fuelling and car maintenance	110/liter	20,000	20,000.00	0.377287348
18	Three Research Scientist	Ugioro, O., Adebawole, L.A., Taiwo. N	3	36,000 in 3 night =144,000.00	144,000.00	2.716468591
	Total				5,301,000	

COFFEE PROGRAMME

Experimental Title: Evaluation of pests and diseases in coffee agro-ecological zones of Nigeria in a changing climate and their control using IPM

Investigators: Okeniyi, M. O., Famuyiwa, B. S., Mokwunye, I.

Introduction

Changes in mean temperature and precipitation patterns influence pest and pathogens incidence and distribution. Climate change is therefore likely to modify the crop disease spectrum in some regions and turn pathogens or pests, considered unimportant today, into potential new threats in the future. Evidence on the measured effects of climate change on crops and their associated pests and pathogens on coffee needs to be documented. It is essential to better understand such complex interactions and to achieve a more mechanistic inclusion of pest and diseases (P and D) effects in crop models and early warning systems. Taking up this challenge is the crucial step forward towards more realistic predictions of crop production and to allow a more efficient assistance in the development of robust adaptation strategies and food security policies.

To date, 80 species of coffee have been described of which only two are of economic importance, *viz. Coffea arabica* (Arabica coffee) and *C. canephora* (Robusta coffee) (Campos and Villain, 2005). The production of *C. Arabica* accounts for 75% of world exports and is produced in 60 countries, with the highest production in South and Central America and in East and Central Africa. Brazil, however, produces more than 40% of the world's Arabica coffee. *Coffea canephora* is produced mostly in West Africa and South Asia, with Vietnam being the main Robusta coffee producer accounting for 40% of the world's production (Marsh, 2007). The first coffee trees were introduced to Vietnam in 1857, while the first coffee plantations were established in church communities in the provinces of Ninh Binh and Quang Binh in 1888 (Doan *et al.*, 2000). Plant-parasitic nematodes are a major limiting factor in coffee producing areas worldwide (Campos and Villain, 2005). *Meloidogyne* (root-knot nematodes) and *Pratylenchus* (root lesion nematodes) are the predominant genera and are widely distributed in coffee plantations, causing great economic losses to both farmers and industry (Villain, 1991; Bertrand *et al.*, 1995; Campos and Villain, 2005). Many other genera, however, have also been found associated with coffee trees worldwide (Campos and Villain, 2005).

Objective: The objective of the study is to evaluate the pest and diseases of coffee in a changing climate.

Methodology

Survey methodology

Administration of structured Questionnaire: One hundred and twenty were administered in three selected LGA. They are Yagba East LG- Igbagun and Isao; Ijumu LGA- Iyamoye and Iyara; and Kabba/Bunnu LGA- Kabba and Aiyegunle. Twenty farmers were selected and questionnaire administered.

Sample collection and Analysis: Sampling was done in the wet season in August.
Each sample of 1.0 to 1.5 kg consisting of 4 -10 cores was taken from the top 25 - 30cm of soil with a soil auger. Sample was taken from coffee trees with little or no ground cover.

Nematode extraction and Identification: From each field sample, nematodes were extracted from both the soil and roots of plant using the appropriate methodology for extraction and identification.

Pathogenecity Test: Pathogenecity test will be carried out on the identified nematodes to determine those that are pathogenic to cocoa seedlings.

Results and Discussion

Nematodes recorded from soil samples were predominantly endoparasitic species, *viz*. *R. reniformis*, *Meloidogyne* spp., *P. coffeae* and *R. arabocoffeae*. Other endoparasitic nematodes were present at low densities and low frequency levels *viz. P. brachyurus.* Ectoparasitic species identified from soil samples were mainly represented by *Xiphinema diffusum*, *Helicotylenchus dihystera* and *Macroposthonia magnifica.* Other ectoparasites found were *Macroposthonia rustica*, *Diphterophora perplexans*, *Discocriconemella limitanea*, *Helicotylenchus cavenessis*, *H. rotundicauda*, *H. coffeae*, *Hemicriconemoides mangiferae*, *Hoplolaimus chambus*, *Longidorus* sp., *Xiphinema brasiliense* and *X. elongatum.*
Our survey yielded an extensive list of both endoparasitic and ectoparasitic plant nematodes as parasites of coffee. The root lesion nematodes were represented by two species, *viz. P. coffeae* and *P. brachyurus*. *Pratylenchus* species are among the most commonly observed and destructive nematodes on coffee (Lordello, 1986; Wrigley, 1988; Campos and Villain, 2005). *Pratylenchus coffeae*, initially described on coffee in Java by Zimmermann (1898), is still the most widely reported species of root lesion nematodes in coffee worldwide. Both, *P. brachyurus* and *P. coffeae* are parasitic on coffee and although generally less harmful than *M. incognita*, they can cause important yield losses (Kumar and Samuel, 1990). Other species of the genus *Pratylenchus* that parasitize coffee are *P. goodeyi, P. loosi*, *P. panamaensis*, *P. pratensis*, *P. vulnus* and *P. zeae* (Siddiqi *et al*., 1991; Golden *et al*., 1992; Campos & Villain, 2005). *Pratylenchus brachyurus* is the only root-lesion species known to infect coffee in South America (Lordello, 1972). The species has been found in many regions in Brazil and to date is the most widely distributed root lesion nematode in this country (Campos and Lima, 1986). Root-knot nematodes are more widely distributed throughout the world in coffee plantations than any other major group of parasitic nematodes. To date, 17 species of *Meloidogyne* are reported on this crop (Campos and Villain, 2005).

Conclusion and Recommendation

The data from the structured questionnaire is being analyzed and the pathogenicity test is yet to be done due to limited funding.

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Experimental Title: The use of trap plants for the control of *Cephonodes Hylas* (Lepidoptera: Sphingidae) on *Coffea Canephora*

Investigators: Okelana, F. A., Oyedokun, A.V.,Anikwe J.C and Azeez, O. M.

Introduction

The two major coffee species cultivated in commercial quantities in Nigeria are the highland coffee, *Coffee Arabica* L. and the lowland coffee, *Coffee canephora* Pierre (Daramola and Famuyiwa, 1974). Though coffee is regarded as a minor cash crop in Nigeria, its contribution and the prospect of foreign exchange earnings for the country cannot be over-emphasised (Idowu, 1980).

Amongst the hundreds of noxious insects attacking coffee, the Oriental bee-hawk moth *Cephonodes hylas* L. (Lepidoptera; Sphingidae) is currently one of the most important defoliating pests of robusta coffee in Nigeria (Omole, 1982). Also, *Cephonodes hylas* (L.) (Lepidoptera: Sphingidae) causes quantitative damage to coffee plants, being the major defoliator insect pest of lowland coffee (*Coffea canephora* Pierre ex.Froehner) in Nigeria. The larval stages of *C. hylas* is the economic stage that feed massively on coffee leaves, tender shoot tips and new flushes, thereby stripping the coffee plants of their photosynthetic parts, which results into an immediate and direct yield reduction of coffee. In situations of severe infestations, it may result in loss of such plants (Okelana, 2001).

Over the years in Nigeria, control of robusta coffee insect pests, especially the foliar pests, has been mostly by the application of insecticides with its attendant health and environmental hazards, and to less extent use of mechanical and cultural means. There have been cases of pests becoming tolerant or resistant to pesticides, resulting in the use of double and triple application rates (Stoll, 2000). However, there is limited information on the use of host plant of pests as means of trap in controlling insect pest attack.

The use of trap plants in insect management is a novel approach in sustainable coffee production in Nigeria. This study therefore monitored the incidence of the pest on identified host plants in the field, study the biology of *C. hylas* on the host plants and determine the phytochemical constituents of the selected plants with a view to selecting those suitable for use as trap plants for *C. hylas* in a coffee orchard as an alternative method of control. This approach is environment-friendly and when fully exploited can be adapted for sustainable insect pest management.

Objectives:

- To monitor the incidence *C. hylas* on identified host plants in the field
- To study the biology of *C. hylas* on the host plants
- To determine the phytochemical constituents of the selected plants with a view to selecting those suitable for use as trap plants for *C. hylas* in a coffee orchard as an alternative method of control.

Materials and Methods

Seven different species of plants belonging to the Rubiaceae family were used in this study. Stands of *Coffea canephora, Gardinia ellis, Variegated Gardinia, Ixora brachipoda, Ixora foliosa, Ixora coccinea* (yellow) and *Ixora coccinea* (red) were planted in plots adjacent to Senior Staff Quarters, CRIN Headquarters, Idi-Ayunre, Ibadan. This experiment was laid out in a completely randomized design of 28 plots having a design of seven treatments and four replicates. The plot (10m x 8m) was established in May, 2009 and water was supplied through irrigation during the dry season while other agronomic activities were carried out as at when due. Observations were made fortnightly for eggs and larvae of *C. hylas* and/or damage symptoms of the pest on the host plants. Shoots of any of these plants on which egg or larva of the pest was found were excised, inserted into water in a Kilner jar and placed separately in polyvinyl-netted and wooden-framed cages (with bottom made of wood) of dimension 45x45x30 cm in the laboratory under ambient temperature 24.5-28.5^{0}C and relative humidity of 69-80%. Eggs of the moth were then placed on the shoot of such plants and reared with a view to determining those on which the insect would complete its development. Also, leaves of coffee and other rubiacea plants from the established plot were collected, rinsed and air-dried in the Entomology Laboratory at CRIN Headquarters, Ibadan for about a week. The air-dried samples were ground separately into powdery form with an electric blender (Binatone) and were analyzed for proximate, some vitamins, some mineral elements, and some secondary metabolites constituents of the plant samples following the standard analytical procedures (AOAC, 1990). The data from the analysis were subjected to ANOVA and significant means were separated using Tukey's Studentized Range (HSD).

Results and Discussion

Table 1 showed that only eggs of the moth were seen on *I. coccinea* (yellow), *I. brachipoda* and Variegated gardenia while eggs and larvae were found on *Gardenia ellis, I. coccinea* (red-flowered variety) and *I. foliosa*. Significantly higher number of eggs was recorded on *I. brachipoda* relative to other host plants while the lowest value was recorded on *G. ellis*. Therefore, out of the host plants, *C. hylas* completed its development in *G. ellis*. Consequently, *G. ellis* was found to be the true host. Thus, all other hosts of *C. hylas* discovered were fortuitous. The presence or absence of host plants in the coffee ecosystem may therefore be very useful in formulating management strategies for *C. hylas*. For example, attack of coffee by *C. hylas* could be reduced by eliminating *G. ellis* from the vicinity of coffee plantations as advocated by Le Pelley (1978).

Plants	Egg	I-Instar	2-Instar	3-Instar	4-Instar	5-Instar	6-Instar
I.brachipoda	3.4a	0c	0c	0d	0c	0c	0b
C.canephora	2.8c	2.9ab	2.8b	2.6c	3.2b	4.7a	0b
I. foliosa	3bc	2.8ab	2.8b	3.6a	5.2a	0c	b
I. coccinea (red)	3.2ab	2.75b	3.6a	3.15b	3.2b	0c	0b
Gardinia ellis	2.5d	3a	2.9b	2.5c	3b	3b	5.7a
I. coccinea (yellow)	3.3a	0c	0c	0d	0c	0c	0b
V. gardenia	3bc	0c	0c	0d	0c	0c	0b

Means with the same letters in the same column are not significantly different (p=0.05) following Turkey's Studentized Range (HSD).

There were no significant difference (P<0.05) in the developmental period of the moth on both Coffee and *G. ellis*. However, larval development often passed through six instars on *G. ellis* in comparison to five instars on coffee. The fifth instar larval and pupal periods were significantly longer than *G. ellis* while the entire (1^{st}-5^{th}/6^{th}) larval period was longer on *G. ellis* than on coffee (Table 2).

Table 2: Mean duration (Days ± S.E.)(range in parenthesis) of developmental stages (Egg-Adult) of *C. hylas* reared on robusta coffee and *Gardenia ellis* in the Laboratory

	DURATION (DAYS)		
Developmental stage	*Coffea canephora*	*Gardeniaellis*	"t" Test Value
	DURATION (DAYS)		
Developmental stage	Coffea canephora	Gardenia ellis	"t" Test Value
Egg*	2.8 ± 0.29 (1-4)	2.5 ± 0.22 (1-3)	2.65 NS
1st- Instar Larva	2.9 ± 0.10 (2-3)	3.0 ± 0.15 (2-4)	2.95 NS
2nd –Instar Larva	2.8 ± 0.13 (2-3)	2.9 ± 0.10 (2-3)	2.85 NS
3rd - Instar Larva	2.6 ± 0.16 (2-3)	2.5 ± 0.22 (1-3)	2.55 NS
4th – Instar Larva	0.7 ± 0.26 (3-6)	3.0 ± 0.0 (0)	3.8#
5th – Instar Larva	n.a	5.7 ± 0.21 (5-7)	
6th – Instar Larva	16.2 ± 0.33(15-18)	18.6 ± 0.48 (16-21)	17.40#
1st- 5th/6th Instar Larva			
Pre-pupa	2.1 ± 0.10 (2-3)	2.5 ± 0.17 (2-3)	2.30 NS
Pupa	15.1 ± 0.18 (14-16)	13.7 ± 0.00 (13-15)	14.40#
Egg-Adult	36.2 ± 0.61 (33-40)	37.0 ± 0.47 (34-39)	36.60 NS

▪ Field – collected eggs n.a – Not applicable
** Values are means of 10 replicates #- Significant P < 0.05
NS Not significant NS Not significant

Table 3 shows that *C. hylas* did not complete its development on the red flowered, *I. coccinea* and *I. foliosa* under laboratory conditions. Mortality however occurred at the 4^{th} larval instar. Since C. hylas was not able to complete its development on any of the *Ixora* species, these plants especially the two Ixora coccinea and *I. foliosa* could be used as traps for *C. hylas* by planting the beautiful flowering shrubs in and around coffee plantations thereby reducing attack of coffee by pest.

Table 3: Duration on percent mortality of developmental stages of C. hylas on host plants in the laboratory

Plants	Egg	1-Instar	2-Instar	3-Instar	4-Instar
I.brachipoda	0a	0a	0b	0c	0c
C.canephora	0a	0a	0b	0c	0c
I. foliosa	0a	0a	0b	20b	83.33a
I. coccinea (red)	0a	0a	10a	30a	60b
Gardinia ellis	0a	0a	0b	0c	0c
I. coccinea(yellow)	0a	0a	0b	0c	0c
V. gardenia	0a	0a	0b	0c	0c

The same Means with letters in the same column are not significantly different (p=0.05) following Turkey's Studentized Range (HSD).

Table 4 showed the mineral constituents of some of the plants from rubiacea family, including coffee. Each plant sample was analyzed for fourteen mineral elements which include Al, Zn, Cr, Co, Ca, Mn, Cd, Fe, Cu, Ni, Pb, Mg, K and Na. There were significant (p = 0.05) variations in the Al content of the analyzed plant materials which ranged between 2.17 ± 0.02 (mg/L) in *Coffea canephora* and 14.60 ± 0.12 (mg/L) in *Izora coccinea* (yellow). *Gardenia ellis* and *C. canephora* had lowest Al contents but there were significant differences (p = 0.05) between the values. This closer range of mineral constituents of *C. canephora* and *G. ellis* suggests why *G. ellis* was reported to be true alternate host of *C. hylas* (Okelana, 2000). The low Al, Zn, Ca and Cu values with high K value of *C. canephora* suggests its suitability as the main host of *C. hylas* which favourably combine with other mineral elements to make the plant the most susceptible host of *C. hylas*. Similarly, *C. canephora* had significantly (p = 0.05) lowest Zn, Ca, and Cu contents which were 1.10 ± 0.00 (mg/L), 100.59 ± 0.31 (mg/L) and 1.13 ± 0.00 (mg/L) respectively. However, Variegated Gardenia recorded significantly higher (P = 0.05) Co, Ca, Mn, Fe, Ni, and Mg contents than other rubiacea plants analyzed while *C. canephora* had the highest content of Potassium. Although, mineral requirements of insects are not well – known, Na, K, Ca, Mg, chlorides and phosphates are thought to be essential minerals for insect biological functions, whereas only trace amount of Fe and Ca are required for growth and development (Nation, 2001). Potassium content of *C. canephora* (1062.03± 3.28 mg/L) was significantly higher (P = 0.05) than other selected plants from the Rubiacea family and this makes coffee a readily preferred host. This corroborates Nation, (2001) that many phytophagous insects need quite large amount of potassium and only trace amount of sodium for their biological functions.

Table 4: Mineral elements of *Coffea canephora* and some other Rubiacea plants Mean ± SE

Plant	**Al** (mg/L)	**Zn** (mg/L)	**Cr** (mg/L)	**Co** (mg/L)	**Ca** (mg/L)	**Mn** (mg/L)	**Cd** (mg/L)	**Fe** (mg/L)	**Cu** (mg/L)	**Ni** (mg/L)	**Pb** (mg/L)	**Mg** (mg/L)	**K** (mg/L)	**Na** (mg/L)
Gardinia ellis	2.98 ± 0.10**b**	2.25 ± 0.12 **b**	0.26 ± 0.02 **d**	0.19 ± 0.00 **d**	199.37± 0.02**f**	4.73 ± 0.00 **e**	0.53 ± 0.00 **c**	8.21 ± 0.01 **c**	1.64 ± 0.00 **d**	0.17 ± 0.04 **a**	0.70 ± 0.05 **b**	469.10± 6.51**d**	401.80±0 .43 **c**	17.36± 0.19**b**
Izora brachipoda	6.59 ± 0.01**d**	3.44± 0.22d**e**	0.07 ± 0.01 **a**	0.16 ± 0.00 **b**	149.38± 1.89**d**	3.14± 0.01 **b**	0.03 ± 0.00**ab**	8.25 ± 0.08 **c**	2.89 ± 0.03 **e**	0.14 ± 0.01 **a**	0.51 ± 0.05**ab**	324.48± 0.17**b**	301.29±0 .19 **a**	21.48± 0.25**d**
Variegated Gardinia	10.01 ±0.03**f**	3.97 ± 0.09 **e**	0.25 ± 0.00 **d**	0.27 ± 0.00 **f**	276.37± 0.23 **g**	5.80 ± 0.01 **f**	0.05 ± 0.00 **b**	11.34± 0.05 **e**	1.33 ± 0.03 **b**	0.33 ± 0.04 **b**	0.69 ± 0.02 **b**	514.86± 1.88**e**	401.87±0 .89 **c**	20.77± 0.33**d**
Izora foliosa	8.84 ± 0.01 **e**	5.17 ± 0.15 **f**	0.23 ± 0.00 **d**	0.16 ± 0.00 **b**	135.67± 0.38 **c**	1.48 ± 0.01 **a**	0.04 ± 0.00**ab**	11.58± 0.01 **e**	3.52 ± 0.01 **f**	0.12 ± 0.02 **a**	0.36 ± 0.08 **a**	314.62± 6.06**b**	342.25±0 .12 **b**	15.54± 0.24**a**
Coffea canephora	2.17 ± 0.02 **a**	1.10 ± 0.00 **a**	0.13 ± 0.00 **b**	0.21 ± 0.00 **e**	100.59± 0.31 **a**	3.26 ± 0.01 **c**	0.02 ± 0.01 **a**	5.75 ± 0.07 **b**	1.13 ± 0.00 **a**	0.19 ± 0.01 **a**	0.36 ± 0.06 **a**	312.29± 3.91**b**	1062.03± 3.28 **d**	19.34± 0.24**c**
Izora coccinea (yellow)	14.60 ±0.12**g**	3.07 ± 0.01**cd**	0.21 ± 0.01**cd**	0.17 ± 0.00 **c**	170.53± 0.78 **e**	3.65± 0.01 **d**	0.04 ± 0.01**ab**	1.32 ± 0.05 **a**	1.32 ± 0.01 **b**	0.21 ± 0.01**ab**	0.37 ± 0.04 **a**	239.31± 1.02**a**	301.22± 0.12 **a**	34.26± 0.15**e**
Izora coccinea (red)	5.69 ± 0.04 **c**	2.75 ± 0.12**bc**	0.15 ± 0.00**bc**	0.15 ± 0.00 **a**	126.36± 0.02 **b**	3.62 ± 0.02 **d**	0.02 ± 0.01 **a**	8.67 ± 0.09 **d**	1.45 ± 0.01 **c**	0.15 ± 0.05 **a**	0.47 ± 0.06**ab**	360.89± 0.17**c**	342.63± 0.13 **b**	19.60± 0.19**c**

Means with the same letter in the same column are not significantly different (p = 0.05) following the Tukey's Studentized Range (HSD)

Table 5 showed the proximate composition of coffee and other rubiacea plants. There were no significant differences (p = 0.05) in the percentage protein composition of the plants analyzed including *C. canephora* , the percentage protein content ranged between 14.95 in *I. brachipoda* and 17.42 in *Variegated Gardenia*. There were significant variations (p = 0.05) in the percentage crude fat of the plants samples which was between 3.79 % in *I. brachipoda* and 5.86 % in *G. ellis*. Consequently, sufficient crude fat is not made available for the insect pest to support its complete development and growth. This is in agreement with the report of Bracken, 1982 that poor adult emergence and wing deformities were attributed to low level of certain fatty acid (e.g linolenic, c18:3) needed by pests which may not be synthesized by insects. There was no significant differences (p = 0.05) in the percentage ash, dry matter and moisture contents of all the plant samples but *I. coccinea* and *Variegated Gardenia* had the lowest crude fibre contents. Percentage carbohydrate was between 37.76% in *G.ellis* and 41.52% in *I. brachipoda*. The lower percentage of moisture and crude fibre contents in *G. ellis* accounted for poor development and growth of *C. hylas*. This corroborates the findings of Scriber, 1997 and Slanskey, 1990 that low level of water can slow growth, and divert absorbed nutrients away from the synthesis of biomass for the production of metabolic water. Therefore, significantly higher percentage of moisture and dry matter are readily available food for *C. hylas*, provided it is engendered by the host plants.

Table 5: The proximate values of *Coffea robusta* and other rubiacea plants as potential trap plants of *C. hylas*

Plant	C.Protein(%)	C.Fat(%)	C.Fibre(%)	T.Ash(%)	D.Matter(%)	Moisture(%)	CH(%)
Gardinia ellis	16.78 a	5.86 d	17.89 b	12.36 a	90.65 a	9.35 a	37.76 a
Izora brachipoda	14.95 a	3.79 a	18.21 b	11.74 a	90.21 a	9.79 a	41.52 c
Variegated Gardinia	17.42 a	5.65 d	15.94 a	13.38 a	90.73 a	9.27 a	38.34ab
Izora foliosa	15.37 a	4.38 b	17.21 ab	12.04 a	90.36 a	9.64 a	41.36 bc
Coffea robusta	16.13 a	4.96 c	16.87 ab	11.94 a	90.48 a	9.52 a	40.58 abc
Izora coccinea(yellow)	15.89 a	5.78 d	16.97 ab	12.26 a	90.13 a	9.87 a	39.23 abc
Izora coccinea(red)	17.06 a	5.49 cd	15.82 a	13.22 a	90.57 a	9.43 a	38.98 abc

Means with the same letter in the same column are not significantly different (p = 0.05) following Tukey's Studentized Range (HSD)

The percentage anti-nutrient and/or secondary metabolites in the selected Rubiacea plants are shown in Table 8. The percentage Saponin significantly varied (p = 0.05) in all the plant samples, which ranged between 1.59% in *I. coccinea* (yellow) and 1.87% in *I. brachipoda*. There were no significant differences in the percentage Tannin and Oxalate composition of the selected Rubiacea plants. However, the percentage Phenol content of *C. canephora* was significantly higher (p = 0.05) than other plant materials analyzed. The higher phenol percentage in *C. canephora* might have been the factor responsible for preference of the plant by *C. hylas*. Phenol was present in all the plant samples analyzed, suggesting that phenol - a chemical attractant - in the selected Rubiacea plants might be stimulating phagostimulatory responses in *C. hylas* larvae which found at different life stages on the analyzed plant samples. This supports (Nation, 2001) that chemical attractants, deterrents and/or phagostimulants are factors determining acceptance or rejection of potential foods by insects.

Table 8: Anti-nutrients Phenol

Plants	Saponin (%)	Tannin(%)	Oxalate(%)	Phenols(%)
Gardinia ellis	1.64 ab	0.015 a	0.34 a	1.37 c
Izora brachipoda	1.87 c	0.024 a	0.47 ab	1.44 d
Variegated Gardinia	1.58 a	0.018 a	0.31 a	1.28 ab
Ixora foliosa	1.76 abc	0.021 a	0.28 a	1.33 cd
Coffea robusta	1.81 bc	0.029 a	0.43 ab	1.56 e
Izora coccinea(yellow)	1.59 a	0.016 a	0.39 ab	1.31 bc
Izora cocoinea(red)	1.72 abc	0.026 a	0.45 ab	1.25 a

Means with the same letters in the same column are not significantly different (p=0.05) following Tukey's Studentized Range (HSD.

There was a positive relationship between oxalate content and egg laids and negative relationship with instar larva of C. hylas. Therefore, oxalate is likely to be responsible for resistance to C. hylas observed in the host plants (Table 9). High saponin and tannin contents in *I. brachypoda*, *I. coccinea* (yellow) and Variegated gardenia is likely to have inhibited the activity and survival of C. hylas that could have led to the damage. This is corroborated the report of Hubrecht et al. (1989) that saponin content in *Securidaca longepedunculata* plant caused high larval and nymphal mortality and also reduced fecundity of adult *Spodoptera frugiperda*. Oxalate content in *I. brachypoda*, *I. coccinea* (yellow) and Variegated gardenia is significantly positive with eggs laid and negative to instar larva. This implies that increase in saponin contents of the plants increases the number of eggs laid and completely inhibited the emergence or survival of the moths.

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Experimental Title: Identification of good quality clones of coffee in three coffee producing states in Nigeria

Investigators: Anagbogu C.

Introduction

Quality improvement of *Coffea canephora* which accounts to 70% of coffee produced in Nigeria will help in enhancing its productivity. Coffee production in Nigeria had served as a source of income for rural farmers; however abolition of marketing board has led to decline in the production of coffee due to scarcity of information about marketing of the commodity. Improved cup qualities in Nigeria Coffee would be a linkage to prosperous marketer with a specific preference to consumers demand. To make coffee production more sustainable in Nigeria, improved quality coffee plantations must be established. This study was aimed to obtain a coffee cultivation location for selection of quality coffee and subsequent establishment of coffee quality plantation.

Ten locations were mapped with ArcGIS 10.1 software to determine their altitude. The altitude of cultivated areas ranges from 133m to 522m above sea level, and Iyamoye in Kogi state has the highest (552m) altitude as compared to other two locations. This location may habour genotypes of coffee with high quality traits since high elevation improves the quality of the bean and potential cupping quality. These genotypes will further be analyzed for biochemical precursors of coffee cup quality.

This study is designed to identify coffee farms with potential to harbor good quality coffee traits and identify farmers producing them in order to help linking them to coffee market. It is also aimed at increasing our institute coffee gene pool through introduction of genotypes collected from the farmers' field and College of Agriculture Akure.

Objectives

* To obtain a comprehensive farmers database for easy identification of farmers cultivating high quality coffee.
* To isolation high quality RNA for gene expression analysis

Summary

Comprehensive farmers database for easy identification of farmers cultivating high quality coffee: The biodata such as farmers' name, phone numbers, state, local government has been generated and the coffee farms map for the two states (Kogi and Ekiti) developed with GIS, also the altitute, size and location of the coffee farm has been produced

The geographical map of coffee farms in the two states (Kogi and Ekiti) has been generated and the altitudes of those areas recorded. The information on the coffee farmers such as names, phone numbers and gender has been produced. Also information on the farm size and location were generated.

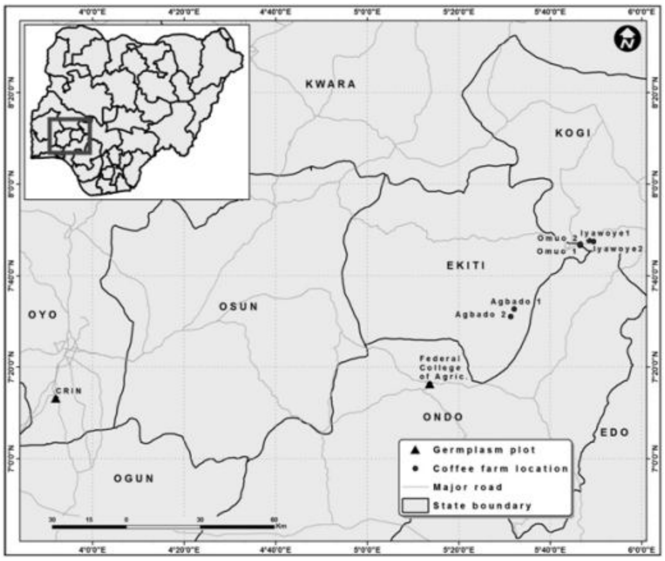

Fig 1: Map of coffee (C. canehora) farmers' field in Nigeria

Table 1: The latitude, longitude and altitude of coffee producing locations

Location	Latitude	Longitude	Altitude
AGBADO 1	7.5449449	5.5352401	207
AGBADO 2	7.5174732	5.5218614	381
AKURE North	7.271845	5.2275437	357
CRIN	7.2192851	3.8659008	133
ISE-Ekiti	7.3985756	5.4006514	407
Iyawoye1	7.7938429	5.8075505	429
Iyawoye2	7.7904024	5.8243691	522
Iyawoye3	6.4160156	3.4277344	522
OMUO 1	7.7770255	5.7748171	506
OMUO 2	7.7812977	5.7762922	508

Isolation of high quality RNA for gene expression analysis: Ribonucleic Acid (RNA) were extracted from coffee samples gotten from farmers field (Kogi and Ekiti states) and from instutute's coffee germplasm. This was done with Qiagen RNA extraction kit (RNeasy) for microextraction. The purity of the samples were obtained on the nanodrop and quality assessed using agarose gel electrophoresis.

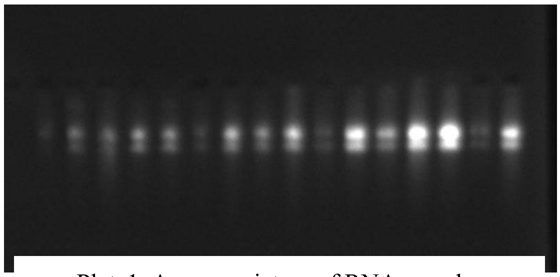

Plate1: Agarose picture of RNA samples

Conclusion

Selection of those genotypes of Robusta coffee that can be produced at different altitudes and location will be useful in improving cup quality in Robusta coffee. These coffee genotypes grown at 522m above sea level may harbor genes responsible for high quality traits. The genetic analysis from gene expression will help in detecting the level at which those genes encoding high quality trait in coffee are expressed. This will help in deducing the best improvement method for quality in coffee produced in Nigeria.

CASHEW PROGRAMME

Experimental Title: Training of farmers and extension agents on Good Agricultural Practices (GAP) in the management of cashew farms in Nigeria.

Investigators: Uwagboe, E. O., Ibiremo, O. S, Adeyemi, E.A., Shittu, T. R., Iloyanomon C.I., Agbongiarhuoyi, A. E., Igbinadolor, R.O., Adebiyi. S., Mokwunye, I. U., Famuyiwa, B.S., Adeniyi D. O., Olasupo, F.O., Nduka B. A.

Introduction

Cashew (*Anacardium occidentale L*) is a native of central and south America, Cashew has his main centre of its variation in Brazil (Opeke 1987). It was introduced to Nigeria in the 15^{th} 16^{th} century by the Portuguese traders (Ohler 1979). Presently, more than 50% of the Cashew production in the world comes from south Asia and South Africa, especially India and Tanzania (Okpeke 2005). Cashew is a hardy crop that can grow virtually in all ecological zones in Nigeria, these are Kogi, Oyo, Kwara, Abia, Osun, Imo, Ekiti, Ondo, Edo, Plateau, Kaduna, Lagos, Enugu, Benue, Ogun, Anambra, Taraba, Ebonyi, Niger, Cross-River, Akwa-ibom, Sokoto, FCT, Nassarawa, and Kebbi States.

Some of the constraints militating against cashew production include, inadequate availability of good planting material, Prevalence of Powdery Mildew Disease (PMD), Plant damage from sucking pests and mealy-bugs affect both yield and quality of cashew, inefficient extension network and inadequate farmer training, low nut quality and low farmer profitability and lack of by-products usage (Uwagboe, 2010)

There have been reports on the decline in cashew production in Nigeria due to farmers' non adoption of improved methods of cashew production practices and low value addition on cashew produce; farmers sell raw cashew nuts without processing. There was need to train farmers on good agricultural practices to improve their management practices in order to increase their production and income.

Objectives

(1) Cashew soil requirements and fertilizer management for optimum productivity.
(2) Nursery practices for sustainable cashew cultivation.
(3) Agronomic practices for sustainable cashew production in Nigeria
(4) Field guide for insect pest management in cashew plantation.
(5) Nigeria cashew diseases management and control
(6) Cashew harvesting, post-harvest handling and processing in relation to good agricultural practices (GAP).
(7) Trust building for participatory rural approach among cashew farmers in Ogbomoso, Oyo state
(8) marketing and farm records for sustainable cashew production in Nigeria,

Methodology

Training of trainers' method was adopted for the project. These trainers will in turn train farmers based on the knowledge acquired from the training. Random sampling was used to select 31 farmers from the five Ogbomoso Local Government Areas through ADP Zonal headquarter. Also, 11 Extension agents were trained with the farmers.

Trainers were trained with the Audio Visual Units such as projector and power point presentation and training manuals were distributed to the farmers and Extension agents.

Description of the training: The two days training programme took place between 20th and 21^{st}, February 2014. The team arrived ADP, Ogbomoso zonal office at about 10:30am and we were welcome by the Zonal Extension Officer, Mr Adegoke who led the team to Igbo-Ile, the venue of the training. The participants in attendance were farmers from the 5 Ogbomoso Local Government Areas of Oyo state and ADP Extension agents. An opening prayer and a brief introduction of resource persons to the high table was done, followed immediately with a technical session and a published training manual on good agricultural practices (GAP) in the management of cashew farms in Nigeria edited by Dr Ibiremo,O. S. were distributed among participants.

Results and Discussions

First to speak were soil scientists, Dr Ibiremo, O. S. and Mrs IIoyanomon, C. I. on *cashew soil requirements and fertilizer management for optimum productivity.*

Participants' questions and responses from scientists

Question 1 Where are the laboratories for soil testing?

Answer. There are laboratories owned by government and private organizations. We have analytical laboratories in the universities (Federal and State) e.g University of Ibadan or LAUTECH Ogbomoso and Research institutes (National and International) e.g Cocoa Research Institute of Nigeria Ibadan and IITA Ibadan.

Question 2. Is soil testing free?

Answer. No but can be subsidized through government intervention.

Question 3. When trees are already fruiting can fertilizer be applied?

Answer. Fertilizer should be applied prior to flowering so that the effect could be seen and this should be done in May or June for first split application and the second dose in August or September of the year before flowering.

Question 4.That disease affect plant through fertilizer usage?

Answer. No

Question 5. The farmers were told that fertilizer on

cashew plant causes sickness like cancer?
Answer. This claim has no basis. There is no empirical evidence to substantiate this claim. I can say that it is a misleading information.

The second to speak was a breeder Mr Olasupo, who delivered his lecture on *nursery practices for sustainable cashew cultivation.*

Participants responses

- Which month can nursery practices start?
- Where did cashew originate from?
- Which variety is recommended for nursery planting?

Scientist response

1. Cashew nursery can start between March and April in Nigeria
2. Cashew is believed to originate from Brazil (center of origin)
3. Any variety can be used depending on the choice of the farmer or scientist, but varieties with medium to bigger nut sizes may be preferable.

Mrs Adeyemi and Nduka took the floor on *agronomic practices for sustainable cashew production in Nigeria***,** no responses was recorded because it was well understood.
Mrs Mokwunye trained the participants on *field guide for insect pest management in cashew plantation.*
Participants responses

- Tailor ant are destroying their farms and the speaker (Mrs Mokwunye) said they should be happy that tailor ants are in their farm. Why?
- How can kerosene be used as a control measure for insect control

Reply

- Tailor ants are natural enemies of pests and so cannot be destroying their cashew crops
- The use of coal and kerosene in a ratio of 1:2 is a prophylactic treatment.

Last to speak for the first day was Mr Adeniyi a pathologist on **Nigeria cashew diseases management and control**
Participants' response

- A farmer saw a disease on his farm and sprayed but after 4years the disease came back. Why?

Scientist response

- Research is still on and they will be informed when it is concluded

Practical on the field which includes use of soil auger for soil sample collection and insects attack symptoms on cashew apple.
DAY 2
The programme started at 9.45am with an opening prayer from Mrs Jokotoye, R.O. (a trainee) and a brief introduction was given by Mr Adebiyi, S. and the ZEO ADP, after which the first speaker Dr Igbinadolor trained on **cashew harvesting, post-harvest handling and processing in relation to good agricultural practices (GAP).**

Participants' response

- Cashew apple is given out to pigs
- Is it proper to spread nuts on the ground?
- How much is the machine for juice processing?
- That the roughages of the apple is dry on the ground before feeding it to animal and
- Company like Funman should collaborate with CRIN in training farmers on processing and a processing company should be sited in Ogbomoso.
  Answer: It is not proper to spread nuts on the ground due to contamination
  The cost of the juice processing machine will be confirmed from the Institute and will be sent to the participants through phone

The second speaker from extension Mr Agbongiarhuoyi used interactive method on *trust building for participatory rural approach among cashew farmers in Ogbomoso, Oyo state.*
Response

- The participants were very impressed with the training and promised that they will unite to form a co-operative society in order to tackle the problem of middlemen.

Lastly Mr Shittu spoke on *marketing and farm records for sustainable cashew production in Nigeria*, after which was lunch break, a vote of thanks and closing prayer was done and everybody proceeded for group photograph.

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Experimental Title - Evaluation of pruning degree on cashew productivity and yield in two geographical locations
Investigators: Nduka B.A**,** Adeyemi E.A, Ibiremo, S.O and Ogunwolu, S. O

Introduction
Cashew nut production in Nigeria has long been undertaken on a small/medium scale. It can grow to be quite old having overlapping canopies, with most trees of the same age widely differ in form and productivity for reasons not fully understood. Unlike many trees, however, as they get older they sprawl with its branches

touching the ground while its extensive root system allows it to tolerate a wide range of moisture levels and soil types. There are some constraints to cashew production, however. Some of these constraints have to do with positive than negative environmental impact associated with their cultivation. This is because cashew tends not to be cultivated in plantations that require clearing large areas of land, without having its branches removed. In general, however, there are a number of important, practical ways that cashew production, could be made more efficient and profitable. These include among others, increasing yields by pruning existing trees.

Justification
Pruning in cashew plantation has been reported as a good cultural practice that impact positively on the tree health and crop yield. However, if this practice is not properly done it will impact negatively on the plantation. It becomes imperative therefore to investigate in the appropriate level of pruning that will yield desire result.

Objectives
* To achieve good canopy structures of the trees
* To enhance crop yield of old cashew trees and
* To reduce incidence of insect pests and diseases in cashew plantation

Methodology
Location: This study will be undertaken in an existing plot. The experimental site will be at CRIN head quarters and its substation at Ochaja.
Design: The experimental design will be RCBD having 7 treatments (2 tree per treatment), replicated three times. Pruning treatment will be of three levels (one quarter, three quarter and half of the tree branches and no punning i.e control). Two periods (July, Oct) of pruning will be considered in this experiment and if needed upon results of soil test, fertilizer will be incorporated.
Total number of forty two trees per location
Data collection: Soil and leaf samples will be collected prior to starting and at the end of experiments, analysed for some of its physical and chemical properties, measurement of plant/ leaf rejuvenation, canopy structure and yield per tree and on survival count.

Experimental Title: Antifungal potential of indigenous phyto-extracts against *Lasiodiplodia theobromae*on cashew
Investigator: Adeniyi, D. O.
Introduction
Anacardiumoccidentale L. is a crop with high potential for foreign exchange and source of raw materials for Nigeria and other tropical countries (Olunloyo, 1975). Cashew can be grown on almost all soil types from laterite and up to an elevation of 600-700m including wastelands of low fertility. The delicately flavored nut used as meal snacks readily found in local markets and the apple juice use as drinks and in making wine and vinegar are characterized of cashew.A common and wide spread disease of cashew in Nigeria is the inflorescent dieback which is expressed as a withering of the petals accompany by progressive die back of the small peduncle from the tip downwards to the floral shoots which is characteristically caused by *Lasiodiplodia theobromae.* Copper-base chemical fungicides has being the major control measure for protection against this pathogen, however the hazards to the environment and man alongside the phytotoxicity effects caused by chemicals have necessitated recent research studies to assay the efficacy of phytoextracts in combating this disease.Some plant extract are hatching inhibitors, alter sporulation and vegetative growth (Abdel-Raouf, 2001). The use of botanicals in crop protection has now gained a popular ground in the world of agriculture as an alternative to the use of toxic, persistent and synthetic compounds. Several researches have been conducted on the use of botanicals and several promising biocidal properties have been identified (Lale, 1995; Owolade*et al*., 2000). Most of these plants have also been used *in vitro* and *in vivo* in the control of various plant diseases and pest.

Objective: To investigate the efficacy of plant extracts to inhibit growth of *Lasiodiplodia theobromae*

Materials and Methods
Isolation of pathogen: Floral shoot of cashew showing typical symptoms of inflorescent dieback were collected from the cashew experimental plot in Cocoa Research Institute of Nigeria, Ibadan. The diseased samples were collected in sterile polythene nylon, made airtight and transferred to the laboratory. The *Lasiodiplodia theobromae* was cultured from the diseased inflorescent sample following routine laboratory procedures for isolation.
Preparation of Phyto-extracts: Leaves of *Red Acalypha, Chromolaenaodorata, Azadirachtaindica*and pod of *Tetrapleuratetraptera*were collected from the wild, dried and milled separately. The efficacy of the phytoextracts were assayed *in-vitro* against *L. theobromae* in percentages (10, 20, 40 and 80%) by weighing 10g, 20g, 40g and 80g of milled samples separately into 100ml sterile distilled water in separate flasks. These were vigorously agitated and left to stand for 48 hours on the bench. The samples mixtures were filtered using sterile whatman filter paper and the filtrates use as extracts were sterilized in the autoclave at 121°C for 15 minutes.
Assay of Phytoextracts: Two milliliters (2ml) of the of the extracts was ascetically added to about 20ml of the sterilized and cooled potato dextrose agar (PDA) in the petridish, gently agitated and allowed to solidify, after which a 5mm mycelia disc from a 7-day culture of *L. theobromae* was placed face down on the extract amended PDA and incubated at room temperature. Measurement of

the mycelia extension was made when the growth of *L. theobromae* covered in the control plate. Each of the treatment was replicated in triplicates and the petridish without phytoextracts serve as control.

Results and Discussion

Considering this as a preliminary step in this investigation, four plant species were screened *in-vitro* for their antifungal characteristics against *L. theobromae.* These plants were selected based on literatures and random choice from the local flora. The screening revealed that Red acalypha has the least mycelia growth of 40.33m at 20% extract concentration which differ significantly from other extract concentration and control. *C. odorata*and *A. indica*also have their least mycelia growth 31.83m and 36.50m respectively at 20% extract concentration and differ significantly from other treatments and the control. The least effective extracts concentration across plant materials are 40% Red *acalypha*(59.33m), 10% *C. odorata*(50.50m), 20% *T. tetraptera*(42.33m) and 80% *A. indica*(table 1). Exploitation of naturally available chemicals from plants, which retards the reproduction and growth of plant pathogenic fungi, would be a more realistic and ecologically sound method for integrated plant disease management and will have a prominent role in the development of future commercial pesticides for crop protection strategies, with special reference to the management of plant diseases (Varma and Dubey, 1999; Gottlieb *et. al.,* 2002). Many workers have reported antifungal activities of different plant species and stressed the importance of plants as possible sources of natural fungicides (Tewari 1995, Lakshmanan 1990, Singh *et al.* 1993, Ogbebor and Adekunle 2005, Ogbebor*et al.* 2007).

Tabe 1: Inhibitory effects of phytoextracts on mycelia mat extension of *L. theobromae*

Phytoextracts Conc.	Red Acalypha	Chromolaenaodorata	Tetrapleuratetraptera	Azadirachtaindica
	Mycelia Growth of *L. theobromae* (m)			
10%	49.33bc	50.50b	21.33cd	45.0bc
20%	40.33c	31.83c	42.33b	36.50c
40%	59.33b	36.67bc	39.50bc	48.33bc
80%	49.0bc	37.83bc	9.83d	57.50b
0% (Control)	85.0a	85.0a	85.0a	85.0a

Means followed by the same letter in each column are not statistically different (P = 0.05)

The ban of some active ingredients usage on crops and environmental contamination problems create opening into research of new control strategies in cashew production in Nigeria. The need to minimize the pesticide residues in the marketable products such as cashew nuts has saddled the researchers and chemical companies to develop safer chemical compounds. Therefore, biologically active plant derived pesticides are expected to play an increasing significant role in crop protection strategies (Yanar*et. al.*, 2011).

The percent growth inhibition of the phytoextracts against mycelia growth of *L. theobromae* shows 80% *T. tetraptera*has the highest growth inhibition of 88.44% and the least mycelia growth of*L. theobromae* (9.83m) and differ significantly from other extract concentrations and the control and followed by 10% extract concentration of the same plant species (74.91% and 21.33m in diameter) and the least effective phytoextracts against *L. theobromae* was 40% Red *acalypha* with 59.33m mycelia growth of *L. theobromae* and its percent growth inhibition of 30.20%.

Table 2: Comparison of treatments concentrations and growth inhibition of phytoextracts against *L. theobromae*

Plants spp.	Extract Conc. (%)	Mycelia Growth (m)	Percent Growth Inhibition(%)
Red Acalypha	10%	49.33bcd	41.96
	20%	40.33cd	52.55
	40%	59.33b	30.2
	80%	49bcd	42.35
C. odorata	10%	50.50bcd	40.59
	20%	31.83de	62.55
	40%	36.67de	56.86
	80%	37.83de	55.49
T. tetraptera	10%	21.33ef	74.91
	20%	42.33bcd	50.2
	40%	39.50cde	53.53
	80%	9.83f	88.44
A. indica	10%	45.0bcd	47.06
	20%	36.50de	57.06
	40%	48.33bcd	43.14
	80%	57.50bc	32.35
Control	0%	85.0a	0

Means followed by the same letter in each column are not statistically different (P = 0.05)

This result is in agreement with previous studies showing the antifungal activity of leaf extract of *C. odorata*to *L. theobromae* (Adejumo, 2000b). Adejumo and Otuonye (2002) also reported that *C. odorata*at 5%, 7.5% and 10% reduced the incidence of the inflorescent blight disease. Ilondu (2011) reported the fungicidal effect of *C. odorata*and *C. papaya* against *Botryodiplodia theobromae* at 10, 20 and 30% leaf extracts concentrations. The presence of antifungal active principles in the leaves of selected botanicals was demonstrated in this study. This was shown by their ability to inhibit the growth of the tested pathogen in culture. There was slight decrease in the incidence of *B. theobromae* to 1.5, 1.0 and 0.5% in seeds treated with *C. odorata*leaf extract for 1, 6 and 24 hours respectively. However, seeds soaked for 3 hours showed no *B. theobromae* infection (Adjei, 2011).

Water and ethanol extracts of *A. indica*and *C. odorata*proved to be *fungitoxic*on *B. theobromae* when used to inhibit its growth in culture. The availability of active principles in the extracting solvent is determined by the factors like age of plant and method of extraction (Okigbo and Ajalie, 2005; Okigbo and Omodamiro, 2006).

Conclusion

The results of this laboratory evaluation of these plant extracts against *L. theobromae* will fulfill the pre-requisite criteria for the *in-vivo* trial to combat inflorescent dieback disease.

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TEA PROGRAMME

Experimental Title: Green tea processing in Nigeria and its economic implications

Introduction:

Tea is the most consumed drink after water, due to its refreshing and mildly stimulating effects (Harbowy and Balentine, 1997). Tea has been known for its various usage; ranging from antidote to various ailments (Higdon and Frei, 2003, Nakagawa et al, 2004), anticancer (Hong *et al*, 2000), anti-inflammatory (Dora et al, 2003), antibacterial, antiviral (Fassina *et al.,* 2003), antifibrotic, hypolipidemic (Yeh *et al*., 2003) or cardioproptective agent. Green tea has been shown to protect the brain (Hong et al., 2000, Suzuki et al, 2004) and heart from ischemia-reperfusion. In Nigeria, the [production of black tea is done on the Mambilla Highland at about 145cm above mean sea level where the raw material (fresh tea leaves) for the black tea processing is found. The processing factory, located on the Mambilla Highland, Nigeria (Nigeria Beverage Production Company) relies on tea leaves supplied by farmers to process their black tea. The quantity of fresh tea leaves supplied by framers outweighed the quantity the processing capacity of the old fashioned Lawrie tea processor available at the Company; resulting into underutilization of available fresh tea leaves supplied by farmers. This leads to wastages and frustrations for tea farmers whose hope is on the tea factory. Since supply of tea leaves tea is no more lucrative, farmers sought for alternative way of living by converting their tea farms to other crops like maize and vegetables. Other farmers who could not do this started to produce black tea through local and unhygienic method of pounding, fermentation and drying in the Sun. Despite this unhygienic way of producing green tea, farmers were still selling the black tea to other neighboring countries like Sudan, Niger and Cameroun. This development resulted in an unhealthy rivalry between the farmers and the tea factory as regulatory agents are invited to prosecute the farmers who could not afford the state to art machines like CTC to manufacture their teas and who could not form a cooperative to procure such expensive equipment like the CTC machine to produce their tea. This development necessitated the shift from the regular black tea to green tea, the technology of which is simpler than black tea and requires limited use of big machines.

Objectives:

1. This study examined the local processing Technology of the Chinese for a viable production process and its economic viability.
2. Evaluate the production and economic analyses of green tea production in Mambilla Plateau of Nigeria.

Methodology

Materials and Methods

Green tea samples used in this study were processed in triplicates. The tea samples were obtained from the highland of Mambilla, Taraba State, Nigeria. The fresh tea leaves used in the green tea production were plucked from vegetative propagated (VP) tea fields at the Cocoa Research Institute of Nigeria (CRIN) substation, Kusuku, Mambilla located around 1450m above mean sea level, latitude 16^{o}N and longitude 37 56^{o}E. The plants were grown under recommended agronomic conditions. The tea were plucked at the tea plantation and processed by the miniature green tea processing facilities. The plucked tealeaves were withered shortly followed by fixing to inactivate the activities of the polyphenol oxidase enzyme using the Chinese methods of Pan fixing. The pan-fixed leaves were later rolled and dried using Sunlight. The green tea produced were later packaged in paper board boxes and reserved for Analysis.

In carrying out the economic evaluation of green tea, data on variable and fixed cost as well as expected revenues were collected the fixed cost appears to be small and this is due to the fact that the technology employed is a very simple one that requires no high capital overlay. From this cost items, a stream of discounted cost and benefit were calculated base on the opportunity cost of capital or discount rate of 21% and 32%. The results were subjected to investment decision model such as net present value (NPV), Benefit- cost Ratio (BCR) and internal rate of returns (IRR).

Result:

The study on the economic viability of the production of green tea revealed that it is a profitable investment and worthwhile embarking upon by would- be investor.

Experimental Title: Natural rubber/organoclay nanocomposite's from tea (*Camellia sinensis*) seed oil derivatives

Investigator: Yahaya, L.E

Introduction: Polymer nanocomposites have attracted much attention in recent times. This is because of their improved mechanical, thermal, as well as flame retardant properties at very low dosage loading of fillers (Okada and Usuki 1995). Clays have been used as filler in polymer reinforcement, but for better improvement in compatibility of polymer and organoclay layers, which consequently leads to increased interlayer space, the clay for name composite need to be organo-modified. These organoclays serves as rain forcing materials in various polymer applications such as plastics polypropylene, polystyrene etc.

Organo-modification involved the use of conventional modifies which is petroleum based which are rather uneconomical. Tea seed oil derivatives this serve as an alternative source of modifier, which can be employed in this respect.

Objectives: To develop polymer nanocomposite's from tea (*Camellia sinensis*) Seed oil derivatives.

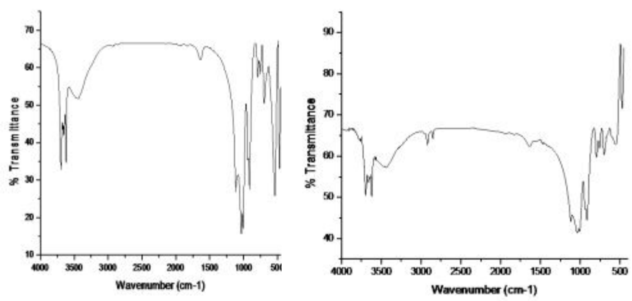
Methodology: Tea seed oil derivative was prepared by reacting known volume of TSO with 20% NaOH in an ice bath with constant agitation for 12hrs. The pH of the resulting solution was maintained at 8-9. This was then oven-dried and powdered. Known weight of this was treated with kaolin and hydrazine under vigorous agitation at 20^{o}C. The mixture was homogenized and freeze-dried. The nanocomposite was then prepared according to the method of Yahaya et al 2009 using the recipe in table 1.

Table 1: Composition of Natural Rubbermixes

Ingredient	UTK	UTK
Natural Rubber	100	100
Zinc oxide	5	5
Stearic oxide	2	2
UTK	5	-
MTK (TSO-modified)	-	5
MBT	2	2
Sulphur	2	2

Results and Discussion

FTIR Spectroscopy: The FTIR spectra of unmodified and TSO-Na modified kaolin are depicted in figures 1 and 2.The unmodified kaolin spectrum shows a band at 3620cm-1 and 3695cm-1 which are characteristics of inner hydroxyls and vibrations of outer surface hydroxyls respectively (Dai, 1999, Huang, 2001), but for modified sample, there is the occurrence of bands at 2846cm-1 and 2919cm-1 showing the occurrence of intercalation of TSO-Na on kaolin surfaces. This intercalation process decreases the electrostatic attraction between the lamellae by causing an increase in the dielectric constant when the compound penetrates between the layers.



a b

Figure. 1 - FTIR Spectrum of (a) unmodified Kaolin and (b) modified kaolin

Table 2 -Mechanical Properties of TSO-Na Modified Kaolin NR Vulcanizate

Parameters	UTK	MTK[a]
Modulus at 300% (Mpa)	4.21	5.93
Tensile Strength (Mpa)	10.11	18.18
Tear Strength (KN/m)	23.81	26.49
Elongation at break (%)	396	480

[a]Results are mean standard deviation of triplicate determinations

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Experimental Title: Developing a functional food from green tea powder and chocolate and evaluation of its Physical, *chemical*, total phenolic content and organoleptic properties**.**

Investigators: Aroyeun S.O., Jayeola, C.O.

Introduction

Chocolate and green Tea contain antioxidants that may be used as health promoting agents. Tea and tea products mainly contain tea polyphenols, which are natural antioxidants and have been demonstrated to show antioxidative, anti-carcinogenic and anti-microbial properties by many researchers [1][2]. These health benefits of teas, in particular green tea, are gaining increased attention in recent years. Green tea contains the most abundant tea polyphenols, namely tea catechins. The major nutraceutical compounds in green teas are tea catechins, which are flavonols. Flavanols are a class of flavonoids which are polyphenols. Green tea is rich in flavanols (300–400 mg/g) which are of interest to human health [3]. Tea catechins have the most effective antioxidant activity compared to other tea polyphenols. The major green tea catechins are (−)-epigallocatechin gallate (EGCG), (−)-epicatechin gallate (ECG), (−)-epigallocatechin (EGC) and (−)-epicatechin (EC). These epicatechins can change to their epimers that are non epicatechins, i.e. (−)-gallocatechin gallate (GCG), (−)-catechin gallate (CG), (−)-gallocatechin (GC) and (±)-catechin C) (Fig. 1). EGCG is the most abundant and active catechin and it is usually used as a quality indicator [4][5][6]. In addition, green tea contains other polyphenols such as gallic acid, quercetin, kaempferol, myricetin and their glycosides, but at lower concentration than EGCG [3][7].

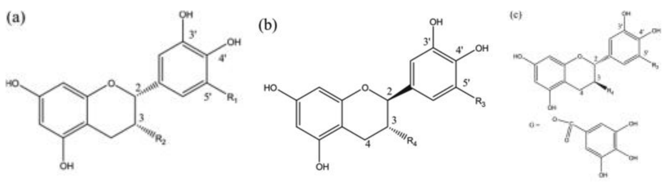

Fig. 1. General chemical structures of green tea catechins: (a) epi catechins; (b) non-epicatechins and (c) (+)-catechin

Tea catechins are an efficient free radical scavenger due to their one electron reduction potential. A lower reduction potential has a tendency to lose electron or hydrogen [8].The rate of reaction with free radicals and the stability of the resulting antioxidant radicals contribute to the reactivity of antioxidant. [9] reported the scavenging ability of tea catechins on superoxide anions (O^{2-}), singlet oxygen , the free radicals generated from 2,2P-azobis (2-amidinopropane) hydrochloride (AAPH) and 1,1-diphenyl-2-picrylhydrazyl (DPPH) radicals. They suggested that the scavenging ability of EGCG and GCG was higher than that of EGC, GC, EC and C due to their gallate group.

They are nowadays utilized in a wide range of applications, such as food, beverage, cosmetics toiletries etc. [10]. The consumption of green tea in the form of hot beverages is common in China and Japan and the incorporation of it either in the form of powder or in the form of extracts in foods are available in the literature. [11] reported the effect of green tea extract in soy bread and observed that green tea fortified soy bread was similar to the regular soy bread in some physical properties. In the food industry, both chocolate and green tea are popular choices for health benefits and also their reasonable price compared to other dietary supplements such as Ginseng and Ginko leaves. Chocolate and green tea have been associated with antioxidant properties which is also linked to prevention of cancer, cardiovascular disease and as antiobesic effects [12]. Catechin and polyphenol compounds in green tea are excellent antioxidants that are enhanced by the presence of metals [13]. Studies have shown that 2gramms of green tea have equivalent antioxidant activity of 109-147mg epigallocatechin gallate (EGCG), 14muM for Catechin and 22muM for vitamin C [14] . Although the popularity of green tea and chocolate is growing in the United States, there are no records in the literature where the two were combined. The objectives of this work , however, is to create a novel food product incorporating the combination of chocolate and green tea and determine the chemical and organoleptic qualities of the newly developed product.

2.0. Materials and Methods

Fresh tea leaves were harvested from the Mambilla Highland, Taraba State, Nigeria Green Tea was processed using the Chinese method viz: Plucking , withering, Fixing, Rolling and Drying. Ingredients of Chocolate were mixed together during Conching and the weight was taken. The incorporation of green tea was based on different combination such as 10:90, 20:80, 30:70, 40:60, 50:50 (w/w) of the green tea powder and chocolate, the flow chart of chocolate processing is shown below in Fig 1 and the Recipe for the production of chocolate was shown in table 1.

2.1. Colour Analysis

For each sample, colour was determined with the portable Minolta Chromameter CR (Minolta, Osaka, Japan). The Lab values follow the Hunter Lab color scale

2.2 Total Phenol determination

2.2.1. Extraction procedure- Known weight of the green tea chocolate was ground and transferred into a test tube and mixed with 10ml of 80% methanol. Suspension was vortexed and centrifuged for 10minutes. The mixture was sonicated for 5 minutes, then shaken at 120rpm at 70^{O}C for 2hours. It was then centrifuged for 10minutes. Supernatants were collected and filtered.

2.2.2. Folin-Dennis Ciocalteau procedure- Total phenolic content was estimated by the Folin-Ciocalteau colorimetric method based on the procedure of Singleton and Rossi, 1965 using Gallic acid as a standard phenolic compound. 100 µl of the filtered extracts were mixed with 400µl of 80% methanol and 2.5ml of 0.2N Folin Ciocalteau phenol reagent. After 5 minutes, 2ml of 7.5% sodium carbonate was added. The absorbance of the resulting blue-coloured solution from yellow solution was measured at 765nm spectrophotometrically after 30 minutes in the dark at room temperature. Quantitative measurements were performed based on a standard curve of Gallic acid [17] The total phenolic content was expressed as Gallic acid equivalents (GAE) in mg/g dry material

2.2.3 Chelating effect on ferrous ions: The ferrous ion chelating activity of the green tea chocolates was assessed as described by [18]

2.3. Proximate Analysis:

2.3.1. Moisture content : The moisture content of chocolate was determined by drying the samples in an oven at 105 C until a constant weight was obtained (AOAC, 1990).

2.3.2 Crude Protein: Crude protein content was calculated by converting the nitrogen content, determined by Kjedahl's method (6.25 x N)

2.**3.3. Crude Fat**: This was determined by the method described by the AOAC (1990), using the Soxhlet methods

2.3.4 Total Ash: content was determined by dry ashing in a furnace at 525^{o}C for 24 h.

2.4. Caffeine determination: This was done in accordance with [20] . Tannin Analysis was carried out using the method of [11]

2.5. Sensory Analysis: The sensory Analysis was carried out in accordance with standard methods

Table 1: Recipe used in Green Tea Production in this study

Samples %	Tea	Nibs	Milk	Sugar	Cocoa Butter	Lecithin
10%	2.8	25.96	20.77	47.3	2.5	0.51
	11 .25g	101.25	81.00	184.5	10	2.0
20%	5.77%	23.08	20.77	47.30	2.5	0.51
	22.5g	90	81.0	184.5	10	2.0
30%	8.65%	20.19	20.77	47.3	2.5	0.51
	33.75g	78.75	81.0	184.5	10	2.0
40%	11.56%	17.31	20.77	47.30	2.5	0.51
	45.10g	67.50	81.0	184.5	10	2.0
50%	14.42%	14.42	20.77	47.3	2.5	0.51
	56.25g	56.25	81.0	184.5	10	2.0

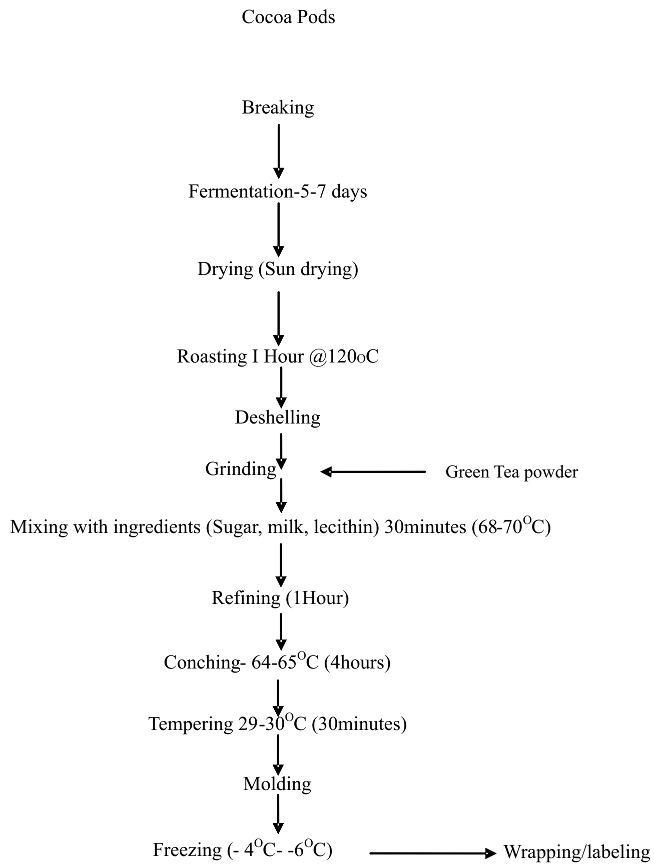

Fig 1. Flow Chart for Green Tea Chocolate Production

Statistical Analysis: Samples were analyzed in triplicates. Means were separated using ANOVA.

3.0 Results and Discussion

From the univariate statistical analyses, all chemical properties measured varied significantly ($p < 0.05$) among the chocolate samples. Some of the results were shown in Tables 1–4 while the summary has been displayed in the boxplots (Figs. 1). This is directly reflected from the smaller thickness of the boxes and deviation from the means (depicted by the protruding bars) of the former compared to the latter. According to Table 1, the proximate chemical composition of the chocolates such as the crude protein, crude fibre, total ash, moisture content, sucrose and crude fat differed significantly (p < 0.0-5) with increase in the levels of the green tea added. The average protein of the control chocolate was 8.05 whereas that of chocolate supplemented with green tea varied accordingly. The protein values varied from 7.24 for 10%, 7.65% for 20%, 7.93% for 30%, 8.27% for 40% and 8.39% for 50% green tea supplementation respectively. The % crude fibre for the control chocolate was 1.17% and for other supplemented levels, it varied from 0.93% for 10% green tea addition, 1.03 for 20% addition, 1.14 (30%) 1.18 (40%) and 1.23 (50:50). The percentage total ash of the control was 2.43% and increased significantly and consistently from 2.28 at 10% level of inclusion to 2.55 at the 50% green tea supplementation. The sucrose levels of the control was 48.3% and the sucrose decreased significantly and steadily from 10% green tea inclusion to the 50% level. This an expected trend , however, as green tea is bitter and the reduction in sucrose level is an indication of the significant impact of the bitterness on the reduction in sweetness of the chocolate. As for the % crude fat, the control chocolate had the highest % amount while the samples in which green tea has been supplemented increased steadily and significantly with increased amount of green tea powder. The chocolate containing the least inclusion seemed to have the lowest amount of crude fat and rose steadily with increase in the green tea supplementation. Although at these levels the effect on the crude fat of the chocolate was not significant while the significance was observed only at 50% green tea inclusion. This might be due to the fat content in green tea which reflected in the crude fat of the chocolate. All the crude fibre increased significantly ($p<0.05$) on increasing the green tea in the chocolate. It was found that at 10% inclusion of green tea, there were increases of 9.7%, 9.6%, 4.4% and 3.2% in crude fibre as compared to the control. This may be due to higher contents of dietary fibre in the green tea. This result is in agreement with the work of [9]].

3.1 Polyphenols and Tannin: The control chocolate had 162.39mg/100g gallic acid equivalent and it increased significantly ($p<0.05$) with rise in green tea powder in the recipe (Table 2). The maximum increase of 28.4% in polyphenol over the control chocolate was found in 50% green tea inclusion while an increase of 12.45% of the polyphenol was found in chocolate with green tea supplemented at 40%. There was no significant effect of green tea addition on the polyphenol profile of the chocolate at 10%, 20% and 30% respectively. This in effect confirmed that chocolate itself contains polyphenols which made the addition of green tea powder to be insignificant on the polyphenol of the chocolate. However, no report is found in the literature on which of the two samples i.e. green tea or chocolate has the higher polyphenols content.

It was only established that both of them are polyphenolic products. This study also established that at the organoleptic threshold of 10%, green tea supplement, there was no significant difference in the polypenol content of the chocolate. It became significant at higher level of inclusion, i.e. 40-50% at which the taste of the chocolate and the overall acceptability and colour and sweetness became impaired. The polyphenol contents of chocolate at these two levels had earlier been reported by [12] who reported that the beneficial effect of tea derived primarily from ingredients such as antioxidant substances (polyphenols). This means that the possibility of 40% and 50% Green tea powder addition in chocolate recipe can cause an increase in the beneficial effect of chocolate consumption , because, there is a synergy of polypehnol between green tea and chocolate. The tannin increased as green tea powder increased but it was not significant until at 40-50% when it became significant. In our study, it was also observed that % tannin of all the examined green tea chocolates and the control were lower.

3.2 Caffeine: The caffeine content in table 2 increased with increase in green tea powder in the chocolate. Up to 30% inclusion, the green tea did not have any significant effect on the chocolate ($p<0.05$). Caffeine is a major component of tea, coffee, kola and cocoa [14] . Although it is a stimulant, excess of it can cause impairment of the mechanical properties of growing bone in early life. According to table 2, the 20.8% increase in caffeine levels of the control chocolate over the 10% supplementation is desirable for low caffeine consumers. Since the sensory threshold of the chocolate remains at 10%, the reduction of the caffeine level is a welcome development. This has also been supported by [21], who reported that it is practically impossible to avoid caffeine as it is present in various foods and beverages and over the counter medications [14] . On balance, it is better to reduce the daily intake of caffeine.

3.3 Iron chelators: The ability to chelate transition metals can be considered as an important antioxidant mode of action. In fact, the chelation and deactivation of transition metals prevent these species from participating in hydroperoxidation and decomposition reaction [15]. Green tea inclusion at 20%, 30%, 40% and 50% were showing significantly better chelating properties than the control samples and the 10% samples at 1.76, 1.69, 1.67, 1.65 mg/100mg respectively (table 2). Since ferrous ions were the most effective prooxidants and are commonly found in vegetables, the high ferrous ions chelating abilities of the 20%,30%, 40% and 50% of green tea in chocolate would be beneficial. The iron chelating ability as found in this study increased with high contents of green tea and in the order 50%>40%>30%>20%>control>10%. In fact, the chelating effect of green tea on the chocolate in the listed order were stronger when compared to vitamin C, BHT, and BHA [15] . These data revealed that our chocolate products with green tea demonstrate an interesting capacity for iron binding. In fact, numerous other studies indicated that plant extracts enriched in phenolic compounds are capable of complexing with and stabilizing Transition metal ions rendering them unable to participate in metal-catalyzed initiation and hydroperoxide decomposition reactions [16]

3.4. Colour: According to table 3, Changes in colour parameters L* of chocolate with green tea is a function of aesthetic value. The L* value reduced significantly from 10% to the 50% green tea powder inclusion in the order Control > 10%>20%>30%>40%>50% representing 58.54, 57.77%, 52.4%, 51.0% 48.9% and 42.32% in values. Different trend was observed in a* value and the b* values without any significant difference. Lower L* value indicated increasing darkness and lower b* value suggested decreasing yellowness. This result was in agreement with [1] who reported that the addition of green tea extract to soy bread increased the darkness of the crumbs and the bread faded from bright yellow to medium brown. This result is not in agreement with [6] who reported an increase in L* values of commercially packaged dark chocolate. The difference in our study and [6] was directly related to the formation of large white spots on the surface of the chocolate known as fat bloom which is not present in our samples.

3.5 Sensory of evaluations: The effect of green tea supplementation on the sensory characteristics of chocolate are presented in table 4. With increase in the levels of green tea in the formulation, the sensory scores for colour, taste, sweetness, flavor and overall acceptability of the chocolate decreased sharply. Replacement of cocoa nibs with green tea powders up to 20-50% impaired the taste of the chocolate. Control samples had the highest scores of 7.68 in taste, which decreased significantly from 7.45 to 4.10 due to the bitter taste of the green tea. The colour of the control samples was scored highest when compared to other chocolate samples where green tea powder were incorporated. The dullness of the chocolate increased with addition of green tea powder in the chocolate mix. The texture of the chocolate in terms of smoothness decreased according to the green tea percentage inclusion meaning that the higher the green tea powder the lower is the smoothness or the higher is the roughness The control samples had maximum overall acceptability whereas chocolate containing 40 to 50% were found to be unacceptable to the panelists. The overall acceptability scores for control was 8.58 on a 9 point hedonic scale. Chocolates made from blends containing 10% level of green tea powder did not differ significantly from the control sample in Taste, odour, flavor and overall acceptability ($p<0.05$). Similar observation with supplementation of soy flour [20], bajol grain flour and wheat flour have also been reported. [1] [11] also reported similar work on the effect of green tea extract in soy bread physical properties and total phenolic content. For the overall acceptability, ratings, it was concluded that green tea powder could be incorporated into chocolate to 10% without necessarily affecting their sensory quality.

Table 1: Proximate Analysis of Chocolate formulated with different levels of green tea powder

Table 2: Polypenols Profiles of Green Tea Chocolate

Samples	Iron Chelating agent mg/100g	Tannin(%)	Caffeine (%)	Total Polyphenol mgGAE/100g
10%	1.84	0.0021	0.053	118.46
20%	1.76	0.0029	0.062	124.84
30%	1.69	0.0035	0.069	151.65
40%	1.73	0.0043	0.074	185.49
50%	1.65	0.0051	0.081	226.68
Control	1.79	0.0039	0.067	162.39

a, b, c, d-Means along same column with different superscripts are significantly different at $p<0.05$

Table 3: Colour Analysis of Green Tea Chocolate

Samples	L*	A	b
10%	57.77	2.68	20.22
20%	52.4	2.76	18.64
30%	51.00	2.84	18.22
40%	48,9	2.88	17.40
50%	42.32	3.42	16.35
Control	58.54	2.66	22.54

Samples	% Crude Protein	% Crude Fibre	% Total Ash	% Moisture Content	% Sucrose	% Crude Fat
10%	7.24	0.93	2.28	2.15	49.18	31.28
20%	7.65	1.03	2.41	2.06	48.25	33.42
30%	7.93	1.14	2.37	2.02	46.13	35.84
40%	8.27	1.19	2.49	1.24	45.74	37.52
50%	8.39	1.23	2.55	1.15	43.25	39.34
Control	8.05	1.17	2.43	1.41	48.36	38.12

a,b,c, along the same column with different superscripts are significantly different at p<0.05nn

Table 4: Sensory evaluations of Green Tea Chocolate

Chocolates	Colour	Taste	Smoothness	Sweetness	Overall Acceptability
GTC_a	5.21c	4.10c	4.23d	4.40d	4.20d
GTC_b	5.23c	5.46b	4.62d	4.62d	4.81d
GTC_c	5,34c	5.41b	5.11c	5.12c	5.63c
GTC_d	6.21b	5.42b	5.44b	6.32b	6.11b
GTC_e	7.62ab	7.45a	7.62a	7.45ab	7.52ab
GTC_f	8.42a	7.68a	8.26a	8.22a	8.58a

GTC_a- 50% Green tea: Cocoa (w/w); GTC_b-40%; GTC_c- 30%; GTC_d, 20%, GTC_e- 10%; GTC_f- 0 %

a, b, c and d – Means along the same vertical columns with different alphabets are significantly different at $p<0.05$ than those reported in the literature [13] .Decreased tannin concentrations are significantly useful for iron absorption and improved digestion [11] .

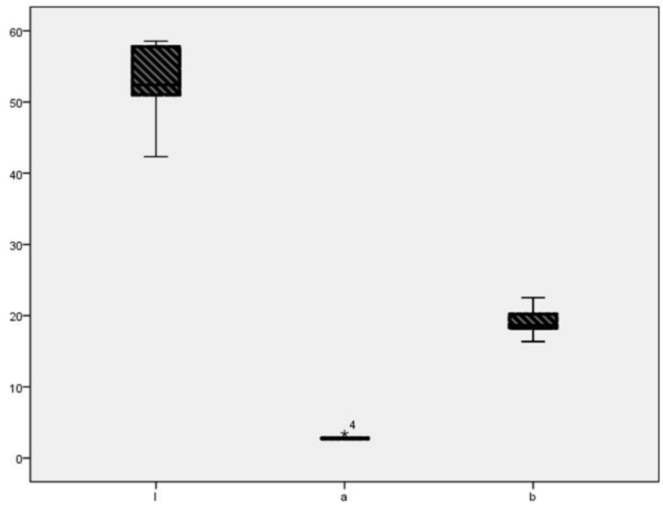

Fig 2: Box plot showing the variation in colour parameters of chocolate

Conclusion

In conclusion, replacement of cocoa nibs with green tea powders up to 20-50% impaired the taste and the colour of the chocolate

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PLANNING AND TRAINING DEPARTMENT

(Dongo L.N.)

Introduction

The Planning and Training department is one of the five technical departments of the Cocoa Research Institute of Nigeria that is responsible for developing research and training policies of the institute for efficient management of resources. The department liaises with Human Resources Department to ensure compliance of the policies.

The department is responsible for collating capacity building activities and recommending staff to participate in relevant field of training and learning that may enhance their productivity. This is achieved through collation of the work plans of the institute, define their fiscal implication and mainstream them into available funds. The department coordinates knowledge sharing from trained personnel through seminars and also organises workshops for different stakeholders of the institute's mandate crops. It liaises with other technical departments to develop training modules for use in such workshops.

Part of the roles of the department is to plan and implement institutes activities such as the production of hybrid pods for free distribution to farmers under CocTA and the 50th anniversary celebration of the institute. It is involved in the coordination and monitoring of both externally and internally funded research projects including the screening of agrochemicals for recommendation to cocoa farmers. The department anchors the placement of students from various tertiary institutions on industrial attachment to the institute. Also, the planning and monitoring of major events in the institute is an important responsibility of the department.

RESEARCH SCIENTISTS CURRENTLY ON TRAINING

LIST OF RESEARCH OFFICERS ON TRAINING FROM JANUARY TO DECEMBER, 2013.

S/N	NAME	DESIGNATION	CONRAISS	PROPOSED COURSE OF **STUDY**	NAME OF INSTITUTION	DATE OF COMMENCEMENT
1	Mrs.Ugioro Osasogie	Research Officer I	08	Ph. D (Plant Physiology)	University of Agric, Abeokuta, Ogun State	2010
2	Mr Oduwaye O. F	Research Officer I	08	Ph.D (Pathology)	Univeristy of Agric. Abeokuta, Ogun State	2010
3	Mr Kolawole Oluwaseun	Research Officer I	08	Ph.D (Microbiology)	University of Ibadan, Ibadan.	2008/2009
4	Mr. Adeniyi D. O	Research Officer I	08	Ph.D (Plant Breeding)	University of Agriculture, Abeokuta Ogun State	2012
5	Mr. Olaniyi Olayinka O.	Research Officer I	08	Ph.D (Plant Breeding)	University of Agric. Abeokuta, Ogun State.	2012
6	Adeosun A. Seun (Mr.)	Research .Officer I	08	PhD (Crop Physiology)	University of Ibadan, Ibadan.	20/12/2013
7	Nduka Beatrice Abanwu	Research Officer I	08	PhD (Crop Soil & Pest Mgt.)	Federal University of Technology (FUTA), Akure.	2012/2013

PROGRAMME ANALYST CURRENTLY ON TRAINING AS AT DECEMBER, 2013

S/N	NAME	DESIGNATION	CONRAISS	PROPOSED COURSE OF STUDY	NAME OF INSTITUTION	DATE OF COMMENCEMENT
1	Mr. Ibe Osita	Programme Analyst I	08	Ph.D (Physics, lower atmospheric physics)	University of Ibadan, Ibadan.	2011/2012

The table below shows the list of Non-Research Staff on part-time/weekend training as at 31 December, 2013

NON-RESEARCH SCIENTISTS CURRENTLY ON TRAINING FROM JANUARY TO DECEMBER, 2013

S/N	NAME	DESIGNATION	CONRAISS	PROPOSED COURSE OF STUDY	NAME OF INSTITUTION	DATE OF COMMENCEMENT
1	Mr. Adewoye G. Adebowale	Higher Science Lab. Tech	07	M.Sc (Environmental science) Environmental Toxicology)	Olabisi Onabanjo University, Ago - Iwoye	2011/2012
2	Mr. A. O. Orimogunje	Agric Supt	06	M.Sc (Agric Extension and Rural Development)	University of Ibadan, Ibadan.	2010/2011
3	Mrs. Arowosafe F. F	Snr. Clerical Officer	05	ND (Public Admin)	The Polytechnic, Ibadan, Akure Study Centre	2010
4	Mrs. Ogundare O.A	Snr. Agric Field Overseer	04	ND (Agric Technology)	Federal College of Agriculture, Moor Plantation Ibadan	

5	Mr. Robert V. O	Clerical Officer II	03	Bachelor of Law	National Open University of Nigeria Sango, Ibadan	2012
6	Miss Ganiyu B. Omolaja	Clerical Officer II	03	OND(Office Tech. and Management)	The Polytechnic,, Ibadan	2011/2012
7	Mr. Ganiyu Ibrahim	AgricField Attd. III	01	ND (Computer Sci.)	The Polytechnic, Ibadan	2010
8	Mr. Oghenegueke Gift	Agric Field Attd. III	01	ND (Agric Tech.)	The Federal College of Agriculture Moor Plantation, Ibadan	2011
9	Miss Alhassan Gloria E.	Agric.Field Attd. III	01	ND(Business Admin.and Management)	Gateway (ICT) Polytechnic, Igbesa,Ogun State	2011/2012
10	Adesina Motunrayo C.	Agric Field Atted. III	01	ND (Accountancy)	The Polytechnic, Ibadan	2010
11.	IdI Mohammed (Mr.)	PAS	11	MSc. (Agric. Techno)	FUTA, Akure	2013
12.	Adegboye Jibola (Mrs.)	HAS	07	MSc. (Crop Mgt.)	FUTA, Akure	2013
13.	Ibhrahim Wasiu Adewale (Mr.)	AEO	05	B.Sc. (Accounting)	LAUTECH, Ogbomoso	2013
14.	Olagunjui Rasaki (Mr.)	AFA II	02	ND (Agric. Technology)	Federal College of Agricultural, Moor Plantation, Ibadan	2013
15	Baoku F.A. (Mrs.)	Matron I CRIN, Ibadan	11	B.Sc. (Nursing	LAUTECH, Ogbomoso	2013
16	Mrs. Oduola A. O.	Prin. Nurses Sister II	07	MSc. Social Work (Health Option)	University of Ibadan, Ibadan.	2013

CONFERENCES/SEMINARS

The underlisted Scientists attended Conferences in the course of the year

S/N	NAMES/DESIGNATION	CONRAISS	CONFERENCE	DATE	VENUE	SPONSORING BODY
1.	Mr. Kolawole Oluwaseun Research Officer I	08	6th Annual Conference of the Mycological Society of Nigeria NAU 2013	Mon 10 – Thursday 13 May, 2013	The Chike Okoli centre, Nnamdi Azikwe University, Akwa Anambra State	Self sponsroship
2.	Adewale Babasola A. Senior Research Officer	09	Second International Conference/Workshop on Giant African Land Snail	2013	Federal University of Agricultural, Abeokuta, Ogun State.	"
3.	Mrs. Mokwunye, I. U. Senior Research Officer	09	A monitoring Porgramme of the African Women in Agriculture Research and Development (AWARD)	18 – 22 March, 2013	Kenya	"
4.	Mrs. Mokwunye, I. U. Senior Research Officer	09	The African Women in Agricultural Research and Development (AWARD) Science Skill course.	26 June – 02 July, 2013	Uganda	"
5.	Iloyanomon C. I. (Mrs.)	11	Competing Claims on Natural Resources	4t – 5t March, 2013	Netherland	"

The underlisted Scientists attended Seminars in the course of the year

S/N	NAMES/DESIGNATION	CONRAISS	SEMINAR	DATE	HOST ORGANISATION	SPONSORING BODY
1	Dr. O. S. Ibiremo (Asst. Director)	14	Presentation of Proposals on Cocoa and Cashew	17September, 2013	OLAM NIG. PLC, Lagos	OLAM NIG. Plc., Lagos
2	Dr. R. R. Ipinmoroti (Asst. Director)	14	Presentation of Proposals on Cocoa and Cashew	17September, 2013	OLAM NIG. PLC, Lagos	OLAM NIG. Plc., Lagos
3	Mr. F. Olasupo Research Officer I	08	Presentation of Proposals on Cocoa and Cashew	17September, 2013	OLAM NIG. PLC, Lagos	OLAM NIG. Plc., Lagos

OFFICERS ON IN-SERVICE TRAINING IN THE COURSE OF THE YEAR

S/N	NAMES/DESIGNATION	CONRAISS	CONFERENCE	DATE	VENUE	SPONSORING BODY
1.	Onifade A. O. *(Principal Accountant)*	11	ASCON STRATEGIC MANAGEMENT	April 12 -26	Lagos	CRIN
2.	Onifade A. O. *(Principal Accountant)*	11	Office of Accountant-General for the Federation	June 24 -28	Akure	CRIN
3.	Shitu Abu *(Senior Accountant)*	09	Office of Accountant – General for the Federation	June 24 -28	Akure	CRIN
4.	Onifade A. O. *(Principal Accountant)*	11	ASCON – Advanced Financial Management	July 15-19	Lagos	CRIN
5.	Shitu Abu *(Senior Accountant)*	09	ICAN - MCPE	Nov. 6 - 7	Lagos	CRIN
6.	Adeyemo A. A. *(Higher Executive Officer)*	07	ICAN - MCPE	Nov. 6 - 7	Lagos	CRIN
7.	Onifade A. O. *(Principal Accountant)*	11	ICAN - MCPE	Nov. 6 - 7	Lagos	CRIN
8.	Sorinolu O. O. *(Principal Accountant)*	11	ANAN-MCPD	Dec. 2 - 5	Osogbo	CRIN
9.	Adeyemi A. R. E. *(Principal Accountant)*	11	ANAN-MCPD	Dec. 2 - 5	Osogbo	CRIN
10.	Areologbe Amos *(Accountant II)*	07	ANAN-MCPD	Dec. 2 - 5	Osogbo	CRIN
11.	Gbadamosi O. A. *(Asst. Chief Executive Officer)*	12	ANAN-MCPD	Dec. 2 - 5	Osogbo	CRIN
12.	Fabowale K. M. *(Chief Accountant)*	13	ASCON	April 12 -26	Lagos	CRIN
13.	Fabowale K. M. *(Chief Accountant)*	13	OAGF	June 24 -28	Akure	CRIN
14.	Fabowale K. M. *(Chief Accountant)*	13	ANAN-MCPD	Dec. 2 – 5	Osogbo	CRIN
15.	Onigbinde O. O. *(Principal Accountant)*	11	ASCON	June 23 –29	Lagos	CRIN
16.	Onigbinde O. O. *(Principal Accountant)*	11	ANAN-MCPD	Dec. 2 – 5	Osogbo	CRIN
17.	Kuforiji E. O. *(Senior Accountant)*	09	ACAN-MCPD	June 12-13	Lagos	CRIN
18.	Kuforiji E. O. *(Senior Accountant)*	09	ASCON	June 23 -29	Lagos	CRIN
19	Gidiga J. O. (Higher Executive Officer	07	ICAN-MCPE	June 12 -13	Lagos	CRIN
20.	Adejoro M. O. *(Principal Admin. Officer)*	11	ASCON	Nov. 2 - 15	Lagos	CRIN
	Olukotun , O. S.					

21.	*(Principal Admin. Officer)*	11	ASCON	June 23 –29	Lagos	CRIN
22	Engnr Bakare E.O		COREN	20-21-Aug	Abuja	CRIN
23	Dr Famaye		ASCON	15-19 July	Lagos	CRIN
24	Prof Akoroda		ASCON	15-19 July	Lagos	CRIN
25	Dr O.Olubamiwa		ASCON	15-19 July	Lagos	CRIN
26	Dr O.A Fademi		ASCON	15-19 July	Lagos	CRIN
27	Mr J.O Babafemi		ASCON	15-19 July	Lagos	CRIN
28	Dr (Mrs) L.N Dongo		ASCON	15-19 July	Lagos	CRIN
29	Dr O.O Oduwole		ASCON	15-19 July	Lagos	CRIN
30	Mr O.O Fagbami		ASCON	15-19 July	Lagos	CRIN

Partnerships Establishment of Clonal Seed Garden by CRIN for Multi- Trex farm at Afonja village, Ibadan.

This project on establishing 10000 clonal materials for Multi-Trex Integrated Foods Ltd commenced February 2013. The project is jointly handled by CRIN and Multi-Trex staff. The clonal seed garden is located at Afonja village, Oyo state. Currently, the following activities have been executed.

- Construction of temporary propagation shed by Multi trex.
- Pre-germination of 1,000 Cocoa F3 Amazon pods by CRIN
- Potting of 17, 000 sprouted cocoa beans
- Brushing and clearing of land by Multi Trex
- Field layout of 5 hectares of land by CRIN.
- Digging of holes for plantain suckers (temporary shade) by Multi Trex.
- Planting of 2500 plantain suckers by CRIN.
- Budding on 10,195 root stocks by CRIN.
- Routine activities (on- going) by CRIN.

The seedlings will be ready for transplanting into the field in May, 2014.

World Cocoa Foundation-Africa Cocoa Initiative (WCF-ACI) project on Fingerprinting of cocoa germplasm and establishment of 15ha Seed garden and 10ha bud wood garden for Improved Cocoa Productivity through Better Planting Materials.

This project is financed by the World Cocoa Foundation-Africa Cocoa Initiative (WCF-ACI) and is being executed by CRIN in collaboration with IITA.

The whole aim of the project is to improve cocoa productivity through better planting materials identified by fingerprinting analysis. One thousand leaf samples were collected from breeders plot at CRIN headquarters in Ibadan and another 1000 leaf samples from the cocoa seed gardens situated at Ondo and Cross River States. In all, 2000 leaf samples were collected and submitted to IITA for DNA extraction and subsequent fingerprinting analysis at K-Biosciences, UK to determine the true to type of the genotypes. The promising genotypes will be used to establish seed and budwood gardens in some cocoa producing states of Nigeria. Currently, the Institute is awaiting the results of this analysis so as to proceed to the next step which will involve establishment of 15 ha seed garden and 10 ha budwood garden in selected communities in five cocoa producing states namely Ondo, Cross River, Osun, Ogun and Edo states. Each of the state will have 3ha of Cocoa Seed Garden and 2ha of bud wood garden. The gardens will be in three sites within each state with two of the three sites having one hectare of Seed garden and a hectare of bud wood garden, while the third site will be for seed garden only.

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Integrated Management of Cocoa Pests and Pathogens in Africa: Controlling Indigenous Pests and Diseases and Preventing the Introduction of Exogenous Ones (CFC/ICCO/43)

This project is to be to be financed by CFC/ICCO and the collaborating institutions. There are five research institutes within West and Central Africa involved in this project. They are CRIN (Nigeria), CRIG (Ghana), Centre National de Recherche Agronomique (CNRA), Cote d'Ivoire; Institut Togolais de Recherche Agronomique (ITRA), Togo and Institute of Agricultural Research for Development (IRAD), Cameroon.

The specific objectives of the project are:

i. Management of endogenous cocoa pests and diseases (Black pod, CSSVD, Mirids, Sing Bugs, Stem Borers and poarasitic plants) and significantly reduce their impact on cocoa production;

ii. Setting up early warning systems, emergency programmes and national plans for the prevention and management of all cocoa pests and pathogens including exogenous diseases (witches' broom, frostry pod and cocoa pod borer);

iii. To strengthen in-country and regional capacity for improved pest surveillance by disseminating information on the prevention, early detection, eradication and continued management of existing and invasive cocoa pests and pathogens.

1. The project is expected to effectively deliver the following specific outputs:

- **Demonstrate and train farmers on efficient and sustainable IPM techniques to reduce the spread of pests & diseases effective cocoa harvest;**
- Produce and distribute technical manuals **and information tools (including posters, leaflets and DVDs)** on IPM to farmers and plant health inspectors;
- **Train** staff at ports, land borders and airports on ways to recognize specific pests **and set in place effective quarantine measures to prevent the spreading of pest & diseases.**
- Develop national and regional early warning systems

and procedures for the on time detection of pests and pathogens and the necessary emergency actions and plans for their eradication or control.

- Hold two regional workshops one in Abidjan and one in Accra to raise awareness on the incidence, severity and damage caused by indigenous cocoa pests and disease.

2. The project is a five year duration project commencing May 2014. It will involve establishment of on farm field trials in Osun and Oyo states.

West Africa Agricultural Productivity Programme (WAAPP)

WAAPP is a World Bank assisted programme with the development objective to strengthen the National Agricultural Research System (NARS) in Nigeria as well as contribute to technology development, dissemination and adoption to boost agricultural productivity. It is in line with this objective that Cocoa Research Institute of Nigeria (CRIN) initiated WAAPP projects in adopted villages and schools. The villages are Aba-Agbo and Olubi while the adopted schools are Prospect High School, Abanla in Oyo state and Mamu community Comprehensive High School, Mamu in Ogun state. The projects proposed for the villages and schools include establishments of fish pond, poultry, maize and new cocoa varieties.

The objectives of these projects were to establish demonstration plots for the farmers and students to facilitate adoption. The proposed budget for the projects was **N17,279,240 while** N2,000,000 was released in November 2012 to the institute. The fund has been utilized for the construction of 3 poultry pens out of the 4 that was proposed. Fund is still being expected for the stocking of the poultry pens, construction of fish pond, establishment of maize and new cocoa varieties farm.

FARMING SYSTEMS RESEARCH & EXTENSION (FSR&E) DEPARTMENT

(Orisajo, S.B.)

[A] STAFF STRENGTH

The department is made up of a total of 41 staff from Extension, Economics, Statistics, Farming Systems Research Sections and Marketing Unit. The details are given below:

Office of the Director (FSR&E)

1. Dr. E.O. Aigbekaen, (Director)
2. Dr. Samuel B. Orisajo (Acting Head, FSR&E)
3. Mrs Olugbesan, A.R. (Senior Confidential Secretary)
4. Mrs Oyebanjo, T.O. (Clerical Officer)

Office of the Assistant Director (FSR&E)

1. Dr. O. O. Oduwole (Assistant Director)
2. Mrs. Babatunde, M.O. (Secretarial Assistant)

Extension Section

1. Uwagboe, E.O. (Principal Research Officer)
2. Agbongiarhuoyi, A.E. (Principal Research Officer)
3. Adebiyi, S. (Senior Research Officer)
4. Ndagi, I. (Senior Research Officer)
5. Famuyiwa, B.S. (Senior Research Officer)
6. Abdulkarim, I.F. (Research Officer 1)
7. Williams, O.A. (Mrs) (Research Officer 1)
8. Ogbechie, M.O. (Chief Secretarial Assistant)
9. Ogunleye, B.O. (Senior Clerical Officer)

Economics Section

1. Shittu, T.R. (Principal Research Officer)
2. Oluyole, K.A. (Principal Research Officer)
3. Lawal, J.O. (Mrs) (Principal Research Officer)
4. Obatolu, B.O. (Principal Research Officer)
5. Taiwo, O. (Research Officer 1)
6. Yahaya, A.T. (Mrs) (Research Officer 1)
7. Otitoloju, Omosalewa (Miss) (Secretarial Assistant)

Statistics Section

1. Emaku, L.A. (Principal Statistician)
2. Abulele, Isi (Statistician II)
3. Ogunbosoye, B.B. (Statistician II)
4. Bello, B.O. (Statistician II)
5. Ayere, C. (Statistician II)
6. Busari, L.A. (Mrs) (Assistant Chief Statistical Officer)
7. Pelemo, A.A. (Principal Statistical Officer I)
8. Otuonye, T.C. (Mrs) (Principal Statistical Officer II)
9. Suleiman, A.S. (Mrs) (Higher Executive Officer - Mathematics)
10. Okonche, J. (Mrs) (Clerical Assistant)
11. Onifade W.O. (Agric. Field Attendant III)

Farming System Section

1. Adeyemi, E.A. (Mrs) (Principal Research Officer)
2. Oloyede, A.A. (Principal Research Officer)
3. Iyadunni Kolawole (Agric. Superintendent)

Marketing Unit

1. Olumini, O.M. (Mrs) (Principal Executive Officer I)
2. Olayinka, O.S. (Principal Executive Officer II)
3. Imasogie, Michael (Higher Executive Officer)
4. Ezebuiro Promise (Higher Executive Officer)
5. Akhidime, M.O. (Higher Executive Officer)
6. Osho, V.O. (Secretarial Assistant)

[B] FUNCTIONS

Farming System Research and Extension (FSR&E) Department makes use of an interdisciplinary, integrative, problem-oriented and farmer-centered approach in the conduct of our research. Our main function borders on generation of appropriate technologies for studying existing farming systems and involving the technology users - usually the small farmers in the planning and evaluation process. To improve a farm system, it must be studied and understood. FSR&E uses an interactive stepwise process that has three actors - the researchers, extension agents and farmers - in the conduct of the four

basic functions:
1. Characterization which involves an understanding of the structural and functional relationships of current farming systems in specific geographical areas and an identification of the endogenous and exogenous constraints to achieving farmers' goals;

2. Design of technological alternatives which involves an x-ante evaluation and selection of strategic interventions, components, inputs and/or practices that results in a well defined and effective agenda for follow-up research with respect to farm monitoring, component experimentation and/or technology testing;
3. Testing which involves evaluation, on farmers' fields and under partial or exclusive farmer management, of the assumptions, decisions and expected performance of the technological alternatives as designed in the previous phase;
4. Diffusion which usually refers to the dissemination of tested innovations to credit and extension personnel or to small groups of farmers, usually through intensive assistance.

[C] ACHIEVEMENT/PROGRESS

Adopted Villages

1. Organization and registration of farmers' cooperative society at Aba-Agbo village for better accessibility to funds, inputs etc.
2. Establishment of hybrid cocoa variety at Aba-Agbo with operations from nursery to field planting through participatory approach.
3. Revenue generation from intercrops in the plot which serves as additional income to farmers.
4. Construction of poultry pen for 120 birds (layers) in Aba-Agbo. However, it is yet to be stocked under CRIN/WAAPP project. It is on-going.
5. Maintenance of CRIN/ARCN plantain plot for cocoa demonstration in Olubi village in Oyo State.

Figure 1. Agbeloba Farmers' Multipurpose Cooperative Society, Aba –Agbo, Oyo State.

Figure 2. On-farm cocoa hybrid nursery established in Aba-Agbo village

Figure 3. Poultry pen with battery cage at Aba-Agbo, Oyo State.

Figure 4. Plantain – pepper intercrop established at Olubi village

Adopted Schools

6. Maintenance of CRIN/ARCN cocoa demonstration plot in Mamu Community Comprehensive High School, Mamu in Ogun State.
7. Construction of poultry pen for 120 birds (layers) in Prospect High School Abanla and Mamu Community Comprehensive High School, Mamu in Ogun State. However, it is yet to be stocked under CRIN/WAAPP project. It is on-going.
8. Organization of Young Farmers Clubs in adopted schools.

Figure 5. Poultry pen with battery cage at Prospect High School, Abanla, Oyo State

Figure 6. Young Farmers' Club at Prospect High School, Abanla, Oyo State.

Farmers' Training

9. Training manual on nursery establishment and management practices in cocoa was prepared by the FSR Division, while the FADU staff and cocoa farmers were trained on the subject matter of the training manual.

Meteorological Station

10. Establishment of automatic weather station for meteorological observations in CRIN Headquarters.
11. Generation of meteorological data and development of data bank till date.

Economic and Statistical Analyses

12. Socio-economic analysis of farmers' farm productivity on regular basis.
13. Determination of effective hectarage of our mandate crops at the Headquarters.
14. Monitoring of farm gate prices (market statistics) which are made available to all CRIN products end-users.
15. Data analyses and interpretation to scientists from other disciplines and outsider.

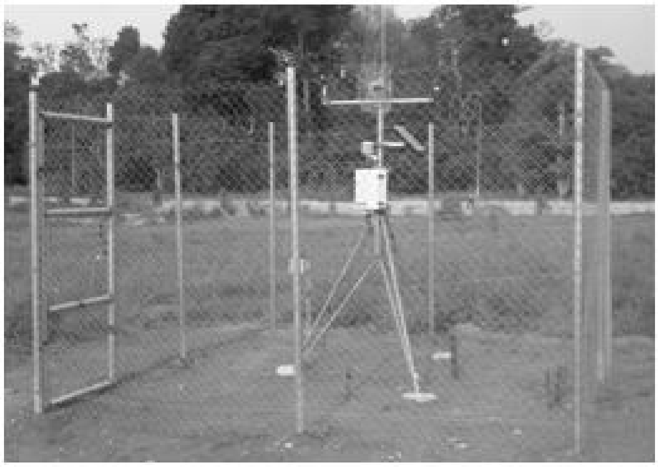

Figure 7. Modern Meteorological Station in Statistics Section at CRIN

Marketing

16. Total revenue of Four million, Nine hundred and twenty-eight thousand, Nine hundred and eighty Naira (₦ 9, 928,980.00) was made from the sales of CRIN products. The details are in pages 10 – 17.

Research

The following research works were carried out during the year:

1. Competitiveness and comparative advantage of cocoa production management systems in Nigeria. a policy analysis approach. Oluyole, K.A., Taiwo, O., Uwagboe, E.O., Ogunlade, M.O. (Completed).
2. Evaluation of the activities of cocoa buying agents in Nigeria. Oluyole, K.A., Taiwo, O.O., Shittu, T.R., Lawal, J.O. and Yahaya A.T. (Completed).
3. Economic analysis of the input use efficiency among cocoa farmers, South-West, Nigeria. Taiwo O., Oluyole K., Shitu. T.R Yahaya, A.T. (Completed).
4. Integrated soil fertility management for small holder cocoa farms using combination of cocoa pod husk based compost and mineral fertilizers in South Western Nigeria. Moses Ogunlade, Samuel Orisajo and Kayode Oluyole (On-going).
5. Training of Cashew farmers on Good Agricultural practices in Nigeria. E.O Uwagboe *et al*. (On-going).
6. Assessment of factors associated with low yield of Cashew among farmers in growing areas of Nigeria. A.E. Agbongiarhuoyi *et al*. (On-going).

Workshops, Conferences and Reports

Mr. Uwagboe, E.O., Adebiyi, S. and Abdulkarim, I.F. participated in Research Extension Farmers Input Linkage System (REFILS) zonal workshop in IAR&T Ibadan from 1st-5th July, 2013.

Dr. B.S. Famuyiwa and Mr. A.E. Agbongiarhuoyi participated in West Africa Agricultural Productivity Programme WAAPP training in Ibadan from 6th – 10th May, 2013.

Mr. Uwagboe, E.O. led some members of extension section at the Exhibition in Christ Anglican Church in Mapo, Ibadan in 7th – 8th June, 2013.

Mr. I. Ndagi participated in the National Agricultural Council meeting in Abeokuta.

Mr. A.E. Agbongiarhuoyi participated in Agricultural Extension Society of Nigeria (AESON) conference in Nassarawa State. A paper titled 'Effect of Tea Production on farmers household in Taraba State Nigeria: implication for Agricultural Transformation' was presented from 5th - 9th May 2013.

Dr. B.S. Famuyiwa participated in Child –in-Agriculture Programme (CIAP). Paper presented: perception of Young farmers club (YFC) in CRIN adopted Schools on farming: Implication for Agricultural Transformation Agenda in Nigeria.

Mr. A.E. Agbongiarhuoyi attended a short course on climate change governance adaptation and mitigation as institutional change processes from 2 September, 13 September 2013 in Wageningen, Netherlands.

Dr. B.S. Famuyiwa and Mr. A.E. Agbongiarhuoyi participated in the 22nd Annual Nigerian Rural Sociological congress in University of Uyo from 2nd – 4th October, 2013. Papers presented are: i. Farmers perceived effect of Climate Change on Cocoa production in Kwara State of Nigeria.

ii. Farmers socio-economic characteristics on knowledge of environmental hazard associated with cocoa farming operations in Nigeria.

Dr. Famuyiwa and Dr. Aroyeun participated in 2nd National Stakeholders forum on making Agricultural research works for end-users in Abuja. Paper presented: The Cocoa Research Institute of Nigeria experiences in linkage to End-user Achievements Challengers and prospects 17th October 2013. It was organized by Agricultural Policy Research Network.

Dr. O.O. Oduwole coordinated CRIN Kola team on 3rd International Conference in Africa's Indigenous Stimulants and Agricultural Produce (ICAS) held at IITA on 22-23 October, 2013.

Dr. O.O. Oduwole attended workshop on strategic management at ASCON 15 -19 July, 2013.

Dr. Moses Ogunlade and Dr. Samuel Orisajo attended the Soil Fertility Workshop organized by the World Cocoa Foundation – African Cocoa Initiative from February 26 to 28, 2013 in Côte d'Ivoire.

Awards

Dr. Moses Ogunlade and Dr. Samuel Orisajo were recipients of the World Cocoa Foundation – Cocoa Livelihoods Program (WCF CLP) Challenge Grant 2013 on Integrated Soil Fertility Management for small holder cocoa farms.

[D] FUTURE EXPECTATIONS

1. Recruitment of Biometrician and provision of Statistical Packages for analyses.
2. Adequate funding for farming system, extension and economic research; farm visits and monitoring of farm gate prices of CRIN mandate crops.
3. Provision of Inverter for the Department.
4. Recruitment or redeployment of Pathologists, Breeders and Soil Scientists into the Farming Systems Research Division to complement the efforts of the present two agronomists.
5. Provision of adequate electricity supply to ERLS building occupied by Extension and Economics Division.
6. Provision of Outside Broadcasting (OB) Van for farmers' Outreach.
7. Provision of GIS laboratory.
8. Provision of running imprest to run the sections and divisions in the department.
9. Provision of departmental vehicle for collection of marketing statistics on all mandate crops on regular basis.
10. Provision of new furniture for the staff in the department.

REPORT OF SALES FROM JANUARY – DECEMBER, 2013

Months	Amounts (₦ : K)
January	244,850:00
February	615,020:00
May	555,180:00
June	922,370:00
July	1,413,460:00
August	377,250:00
September	462,790:00
October	128,650:00
November	143,200:00
December	66,210: 00
Total	4,928,980:00

MTHS	Cocoa Beans		Cocoa Seedlings		Kola Seedlings		Banana		Plantain	
	Qty	**Amount ₦**	**Qty**	**Amount ₦**	**Qty**	**Amount ₦**	**Qty**	**Amount ₦**	**Qty**	**Amount ₦**
JAN	-	-	560	39,200	5 7	500 490	80	8,000	28	11,200
FEB	2000kg	500,000	-	-	-	-	35	3,500	35	14,000
MARCH	-	-	-	-	-	-	-	-	-	-
APRIL	-	-	-	-	-	-	-	-	-	-
MAY	,000kg	240,000	1,350	94,500	-	-	-	-	-	-
JUNE	-	-	4,525	316,750	13 25	91 0 2,500	-	-	-	-
JULY	1000kg	220,000	250 2,359 -	8,750 165,560 487,000	530 10	37,100 1,000	-	-	-	-
AUG	-	-	350	24,500	100	7,000	-	-	24	9,600
SEPT	-	-		208,420	6	420	-	-	8	3,200
OCT	1kg	150	527 10	36,900 400	-	-	-	-	52	20,800
NOV	-	-	-	-	-	-	43	4,300	15	6,000
DEC	-	-	-	-	-	-	-	-	3	1,500
TOTAL	**4,001kg**	**960,150**	**9,931**	**1,381,550**	**696**	**49,920**	**158**	**15,800**	**165**	**66,300**

MONTHS	Cassava		Dried Plantain		Firewood		Access Fee		Cashew Seedlings		Profit On Bread	
	Qty	**Amount ₦**	**Qty**	**Amount ₦**	**Qty**	**Amount ₦**	**Qty**	**Amount ₦**	**Qty**	**Amount ₦**	**Qty**	**Amount ₦**
JAN	-	-	-	-	-	-	-	-	-	-	-	-
FEB	2 bags	1,400	-	-	-	-	-	-	-	-	-	-
MARCH	-	-	-	-	-	-	-	-	-	-	-	-
APRIL	-	-	-	-	-	-	-	-	-	-	-	-
MAY	7 bags	4,900	123.5kg	24,700	½ load	750	2 trips	1,000	-	-	-	-
JUNE	10 bags	6,000	-	-	½ load	750	1 trips	500	3	240	-	760
JULY	-	-	-	-	½ load	750	-	-	-	-	-	2,960
AUG	-	-	-	-	-	-	-	-	-	-	-	-
SEPTEMBER	-	-	-	-	-	-	-	-	-	-	-	-
OCTOBER	-	-	-	-	-	-	-	-	-	-	-	-
NO	-	-	-	-	-	-	-	-	-	-	-	-
DECEM	-	-	-	-	-	-	-	-	-	-	-	-
TOTAL	**19 bags**	**12,300**	**123.5kg**	**24,700**	**1½ load**	**2,250**	**3 trips**	**1,500**	**3**	**240**		**3,720**

MONTHS	PALM FRUITS		COFFEE BERRIES		CASHEW NUTS		GARI CHOCO		CASHEWSEEDLINGS	
	Quantity	Amount ₦	Quantity	Amount ₦	Quantity	Amount ₦	Quantity	Amount ₦	Quantity	Amount ₦
JANUARY	5	1,000	1kg	300	2kg	600	1	300	20	6,000
FEBRUARY	-	-	-	-	200kg	60,000	-	-	-	-
MARCH	-	-	-	-	-	-	-	-	-	-
APRIL	-	-	-		-	-	-	-	-	-
MAY	-	-	-	-	-	-	-	-	-	-
JUNE	-	-	-	-	-	-	-	-	-	-
JULY	-	-	-	-	-	-	-	-	-	-
AUGUTS	-	-	-	-	79 Roasted Cashew	7,900	-	-	-	-
SEPTEMBER	-	-	-	-	-	-	-	-	-	-
OCTOBER	-	-	-	-	-	-	-	-	-	-
NOVEMBER	-	-	-	-	-	-	-	-	-	-
DECEMBER	-	-	-	-	-	-	-	-	-	-
TOTAL	**5**	**1,000**	**1Kg**	**300**	**79 pack/ 202kg**	**68,500**	**1**	**300**	**20**	**6,000**

MONTHS	BLACK SOAP		COCOA POWDER		WINE		CHOCOLATE		PLANTAIN SUCKER	
	Quantity	Amount ₦	Quantity	Amount ₦	Quantity	Amount ₦	Quantity	Amount ₦	Quantity	Amount ₦
JAN	43	4,300	10	9,000	15	7,500	-	-	-	-
FEB	-	-	-	-	-	-	34	1,700	-	-
MARCH	-	-	-	-	-	-	-	-	-	-
APRIL	-	-	-	-	-	-	-	-	-	-
MAY	6	600	8 26	7,200 11,700	-	-	99	4,950	100	5,000
JUNE	-	-	62 97	55,800 43,650	3 4	1,800 2,000	-	-	260 10	13,000 500
JULY	15	1,500	39 75	35,100 33,750	7	4,200	-	-	15	750
AUG	9	900	17 3	7,650 2,700	7	4,200	60	3,000	-	-
SEPT	4	400	17 51	15,300 22,950	4	2,400	50	2,500	-	-
OCT	-	-	18 9	8,100 8,100	-	-	-	-	-	-
NOV	3	300	47 25	21,150 20,700	8	4,800	-	-	-	-
DEC	2	200	39 7	17,550 7,200	11	6,600	-		-	-
DECEMBER	9	3,150	59.5 30.5	13,090 6,100	-	-	-		-	
TOTAL	**219**	**76,650**	**934**	**200,800**	**286**	**8020**	**-**		**2,850**	
TOTAL	**82**	**8,200**	**530**	**327,600**	**59**	**33,500**	**243**	**12,150**	**360**	**19,250**

MONTHS	REGISTRATION ON LOGS		COCOA PODS		COFFEE SEEDLINGS		CREAM	
	Quantity	Amount ₦	Quantity	Amount ₦	Quantity	Amount ₦	Quantity	Amount ₦
JANUARY	-	-	-	-	-	-	14	1,400
FEBRUARY	-	-	-	-	-	-	-	-
MARCH	-	-	-	-	-	-	-	-
APRIL	-	-	-	-	-	-	-	-
MAY	-	-	-	-	-	-	-	-
JUNE	15	150,000	15	600	-	-	21	2,100
JULY	-	-	-	-	52	1,040	-	-
AUGUST	-	-	-	-	-	-	-	-
SEPTEMBER	-	-	-	-	4	140	-	-
OCTOBER	-	-	-	-	-	-	-	-
NOVEMBER	-	-	20	700	-	-	-	-
DECEMBER	-	-	-	-	-	-	-	-
TOTAL	**15**	**150,000**	**35**	**1,300**	**56**	**1,180**	**35**	**3,500**

MONTHS	AGRIC SERVICE COCOA BREAD		AGRIC SERVICE LIQUID SOAP		PALM KERNEL		AGRIC SERVICE PLANTAIN		KOLANUT		WATER	
	Qty	Amount ₦	Qty	Amount - ₦	Qty	Amount ₦	Qty	Amount ₦	Qty	Amount ₦	Qty	Amount ₦
JANUARY	-	150,060	25	5,000	-	-	-	-	-	-	-	-
FEBRUARY	-	21,100	5	1,000	-	-	-	-	-	-	-	-
MARCH	-	-	-	-	-	-	-	-	-	-	-	-
APRIL	-	-	-	-	-	-	-	-	-	-	-	-
MAY	-	125,680	17	3,400	-	-	-	-	-	-	-	-
JUNE	-	305,060	8 40	1,600 6,000	-	-	-	-	-	-	-	-
JULY	-	359,880	2 2	400 300	-	-	-	-	-	-	-	-
AUGUST	-	249,850	6	900	30kg	1,800	12	6,000	-	-	-	-
SEPTEMBER		145,650	1	200	-	-	13	6,500	-	-	-	-
OCTOBER	-	23,250	-	-	-	-	-	-	½	1,800	-	-
NOVEMBER	-	40,000	2	400	-	-	51	22,800	-	-	-	-
DECEMBER	-	-	-	-	-	-	19	7,600	½	1,500	4 trips	1,720
TOTAL	-	1,420,530	144	19,200	30kg	1,800	95	42,900	1basket	3,300	4 trips	1,720

CROP PROCESSING AND UTILIZATION PROGRAMME (Jayeola, C.O)

The End Uses Research Department (EUR), of the Cocoa Research Institute of Nigeria (CRIN) researches into developing and perfecting several technologies into which CRIN mandate crops can be processed in order to ensure increased profit to the farmers, adding value to the crops as well as prospect towards industrialization. This department ensures that no component of CRIN mandate crops is wasted. The five mandate crops to which technologies have been developed include cocoa, cashew, kolanut, coffee and tea. The Acting Head of the Department is Dr (Mrs) C.O. Jayeola.

The department is made of two divisions:

1.) Crop Processing and Utilization
2.) Fabrication and Design

CROP PROCESSING AND UTILIZATION

This division comprises of specialized units through which value is added to CRIN mandate crops. This division is headed by Dr S.O. Aroyeun.

Chocolate unit: This unit engages in daily production of chocolate though at a laboratory scale with less than 40 bars per day. Chocolate is a cocoa product formulated with milk, sugar, cocoa butter and roasted cocoa bean. This recipe gives milk chocolate. Substituting the part of the cocoa base with kola powder, coffee powder, cashew or Tea gives flavoured chocolate respectively. New researches on chocolate also take place here.

Winery: This is a laboratory where wine production takes place. Wine is a product of fermentation of sugar. It involves contact between yeast, a sugar source and water in a cooled fermentation vat. The yeast breaks down sugar into alcohol and carbon dioxide. When fermentation is complete, the wine is racked, aged and bottled. The level of alcohol in the wine is determined by the amount of sugar used. Substituting part of the sugar base with cocoa bean or cocoa sweating, Kolanut, Cashew apple, Coffee or Tea leave infusions give cocoa, kola cashew coffee or tea flavoured wine respectively. Most research work on wine takes place here.

Soap unit: This unit specializes in soap production; it involves new researches in soap and cream production. Soap is a product of saponification of ester in the presence of potash. Cocoa Pod Husk (CPH) and Kola Pod Husk (KPH) are rich in potash when incenerated and are therefore used for soap making. CRIN Black Soap is made by a special process which makes it different from the local black soap in terms of colour and odour.

Bakery: The bakery unit is a commercialized aspect under Agricultural and by-product services, originated from crop processing division. Cocoa bread is a product of fortification of wheat flour with cocoa powder. It is formulated by substituting a part of the wheat flour base with cocoa powder in a normal bread recipe. The inclusion increased the flavour of this bread tremendously.

Beverage unit: This unit involve the production of CRIN vita, cocoa curstard and cocoa - cola beverage that were been produced during exhibitions and cocoa powder that is produce under CRIN ventures.

FABRICATION AND DESIGN

This division deals with fabrication of equipment that is needed in the value chain of CRIN mandate crops; this division is headed by Engr. Mofolasayo

The Design and Fabrication division was created to develop appropriate technology for the field and post harvest handling of the institutes mandate crops. Some research work which has been undertaken by the unit includes the determination of relevant engineering properties of Cocoa, Coffee and kola necessary as design parameters for design and fabrication activities. Other works include:

- The development of 400kg/batch fermentation equipment
- Development of small scale solar dryer for cocoa
- Development of a laboratory coffee pulping machine
- Design and fabrication of cashew apple harvesting device

SCIENTISTS AWAY FROM DEPARTMENT IN 2013

The only Director in this department, Dr O.Olubamiwa is presently on sabbatical leave. Dr L.E. Yahaya has been transferred to Owena as the Head of Station (HOS) and Dr R.O. Igbinadolor is presently the Head of Station at CRIN, Uhomorrha.

ON-GOING RESEARCH ACTIVITIES IN EUR DEPARTMENT IN 2013

1. Cocoa pod for animal feed (Adebowale *et al*)
2. Fermentation of cocoa conducted with a defined microbial cocktail. Effect on the yield of sweating and cocoa beans quality (Igbinadolor *et al*)
3. Production of flavor characteristic of chocolate made from different fermentation process in 14 cocoa producing states (Ajao, Aroyeun, Jayeola, Yahaya,Mokunye, Ogunwolu, Ogunjobi, Igbinadolor)
4. Formulation of value added cocoa butter soap from low grade cocoa been (Ajao, Yahaya, Jayeola, Aroyeun)
5. Development, evaluation and promotion of consumption of thermo-resistant dark chocolate for the tropics (Ogunwolu *et al*)
6. Promotion and evaluation of cocoa powder intake in schools (Jayeola, all CPU Scientists, Williams, Lawal, Famuyiwa)
7. Adaptation and Evaluation of a small scale solar dryer in cocoa growing ecologies in Nigeria: case study CRIN (Mofolasayo *et al.*)
8. Development of alternative labour saving strategies for cocoa production (Mofolasayo, Shitu, Ayegboyin, Otuonye)
9. Pilot demonstration of cashew juice production in selected cashew production in selected cashew producing states in Oyo state (Mokwunye *et al*)
10. Poverty alleviation and increased food consumption through enhanced cashew processing in Nigeria (Yahaya L.E *et al*)
(11. Assessment of the effect of postharvest handlings on cashew nut and kernel quality Mokwunye *et al*)
12. Fermentation of wasted apple and baggasse to ethanol and other industrial chemicals. (Igbinadolor,R.O. *et al*)
13. Impact of wet and dry process on the composition and cup quality characteristics of green Robusta coffee in Nigeria (Ogunjobi MAK *et al*)

STAFF STRENGTH IN EUR DEPARTMENT

Crop Processing and Utilization

199	JAYEOLA	Christianah Olayinka	PhD
208	AROYEUN	Shamsideen Olusegun	PhD
137	OGUNWOLU	Semiu Olalekan	PhD
216	YAHAYA	Lateef Eugene	PhD
243	AJAO	Aliu Adebayo	MSc
249	IGBINADOLOR	Richard Osaretno	PhD
276	OGUNJOBI	Moruf A. Kehinde	MSc
266	MOKWUNYE	Francis chukwuka	MSc
1221	ADEBOWALE	Babasola A	MSc
227	ALAGBE	Oluremi Omolola	BSc
259	OBATOYE	Ayodeji Olanre	HND, PGD
267	IJOMA	Julian, Nwakaego	BSc
369	AGBOLA	Olufemi Omotunde	HND, B. TECH
394	ONYEMACHI	Onyinyechi Fidelia	BSc
412	BOLARINDE	Oluwafemi Joel	HND
457	ENE	Amaka Perpetua	BSc
120	FABAYO	Patricia Ifeanyi	PITMANS III
1321	AMUSAN	Latifat Adebola	NCE BLAT II/TRADE TEST
1570	OGUNLUSI	Olayemi Ruth	NCE/GD II
1580	OLUTADE		GRADE II/NECO

FABRICATION AND DESIGN DIVISION

PF no.	Surname (Block letters)	Other names (spell out each)	Major Relevant Qualifications
320	MOFOLASAYO	Adewale Sunday	B ENG, MSc, COREN, LAGUI ENGINEERING
335	MUHAMMED BASHIR	Omotolani Wosilat	HND AGRIC ENG
362	ADESOKAN	Mutairu Abiola	HND AGRIC ENG
386	BAMIGBOSE	Adetayo Akanji	HND MECH ENG


CRIN
Bread
Cocoa powder , flou
For: Agricultural Services and By-Products Limited.
directorcrin@yahoo.com


CRIN
Cocoa Powder


GREEN TEA
BODY
PURIFIER &
Stimulant
Net Wt. 100g

Small scale sola drier

400g batch fermentation tray

RECENT ACTIVITIES IN END USES RESEARCH DEPARTMENT

(1) Cocoa drink feeding in secondary School

Cocoa school feeding that was sponsored under the approved project of CRIN was led by Dr (Mrs) C. O. Jayeola with other Sceintists from CPU, Extension and Economics in early February, 2014 had been concluded. There had been confession from the students, teachers and parents on the positive effect recorded on the students that "cocoa drink had curbed sicknesses. Increased their intelligence and more importantly improved their attendance in schools." Parents and teachers are now soliciting for more and to include all other children and schools.

(1) Training

(a) Dr (Mrs) Jayeola, Ag. Head (EUR) attended three days National Training for Youth Empowerment in Agro Processing and Post Harvest Loss Prevention. Train the trainers in value addition organised by WAAPP in collaboration with NSPRI on 30th-3rd July, 2014 at NSPRI Headquarters, Klm 3 Asa Dam Road, Ilorin, Kwara State.

(b) Dr (Mrs) Jayeola, Ag. Head (EUR) attended workshop on Team Building and Leadership Skills organised by Leadership Development Studies Department of the Administrative Staff College of Nigeria (ASCON) Badagry, Lagos State and sponsored by CRIN Management between 11th – 15th August, 2014

(3) Transfer of Engr. Adeleke from Engineering section to Design and Fabrication Division

Engr. Adeleke S. A. from engineering Section after obtaining his conversion to Research Officer 1 was transferred to Design and Fabrication Division of End Uses Research Department on 24th July, 2014.

(4) Mr. Ajao, A. A. Voluntary Retirement

Mr Ajao, A. A. an Industrial Chemist and a Research Scientist with Crop Processing Division of End Uses Research Department voluntary retired from the Institute on 2nd September after serving the Institute for fourteen (14) years.

(5) Mr. Ogunjobi MAK Emergence as newly elected President of CRIN CICS

Mr. Ogunjobi MAK (Research Scientist) of the Crop Processing and Utilisation (CPU) Division emerged as the newly elected President of CRIN CI&CS on 11th September, 2014.

(6) Granting interview to the Nations Newspaper on CRIN Mandate Crops and by-products

The Ag. Head of End Uses Research Department, Dr (Mrs) Olayinka C. Jayeola granted interview with the Nations Newspapers on Saturday, September 20, 2014 explained that CRIN had done a lot in adding value to cocoa. She highlighted on the enormous potentials and products from cocoa. She said "Cocoa has a lot of tremendous use that can be exploited and harnessed for the betterment of the country and that two to three weeks training on any of CRIN products will make any interested unemployed graduates become an employer of labour.

ECONOMICS AND STATISTICS

Experimental Title: Evaluation of the activities of cocoa buying agents in Southwestern Nigeria
Investigators: Oluyole, K.A. and Taiwo, O.

Introduction

Cocoa belongs to the family Steruliacaea and genus Theobroma. It was discovered in 18th century at the Amazon basin and later spread to other tropical areas of South and Central America, and West Africa (Opeke 1987). Since the end of the first world war, West Africa has been the highest producer of cocoa. The crop was eventually introduced into Nigeria in 1887 (Ayorinde 1966). Nigeria was rated the second largest world producer of cocoa in the 1960s (Adegbola and Abe 1983), and, for a long time, the crop has been generating substantial foreign exchange earnings for the country. However, production has suffered a reduction in the recent years owing to a number of factors. Villalobos (1989) identified some of these factors as: low yield, inconsistent production patterns, disease incidence, pest attack and use of simple farm tools. In addition, Oduwole (2004) identified ageing cocoa farms as one of the factors responsible for the decline in cocoa production in south western Nigeria. He observed that many farms were over 40 years old and such farms constitute as much as 60% of the cocoa farms in Nigeria. In a study conducted by Daramola *et al*. (2003), it was found that most cocoa farms in Ondo and Osun states are very old with low productivity while farms in Cross River state are relatively younger and mostly in productive phase. Apart from these, cocoa marketing has been found to have substantial impact on production. This is because when there is good market drive for cocoa, farmers would be encouraged more to intensify their efforts to increase their production. Therefore, the issue of marketing in cocoa economy cannot be over-emphasized.

Before 1986, there was the existence of Cocoa Marketing Board. The board was characterized with monopoly for internal and external crop marketing and hence, the function was to arrange for the purchase, grading, export and marketing of cocoa (Njoku, 2000). Once the cocoa beans is bought from the farmers, it becomes the property of the marketing board and will be handled by the board in all the stages of the marketing chain. Prices were determined by the board and were fixed for the entire crop year (Oluyole and Usman, 2006). Fixing of price allowed the producers to be less vulnerable to fluctuations in world market prices. However, the price stabilization policy of the Cocoa Marketing Board denied the farmers the full benefits of the world price of cocoa. It was as a result of the inefficiencies of the Commodity Board system and also following structural changes in the Nigerian economy that the Marketing Board was abolished in 1986. The after -effects of the abolition was the liberalization by the federal government of the export pricing policy. This enabled the marketing of cocoa beans to be handled by private cocoa marchants while at the same time a new foreign exchange system (the Second Teir Foreign Exchange Market, SFEM) was introduced by the Federal Government as part of government Structural Adjustment Program (SAP). The new marketing system gave rise to free marketing operation such that many industries, firms and corporate bodies are freed to engage in domestic trading and exportation of cocoa beans. The prices are determined by the law of demand and supply in the international market. With this development, both internal and external cocoa marketing structures were fully privatized and there is competition in domestic marketing by allowing private Licensed Buying Agents (LBAs) to purchase cocoa from farmers. The LBAs in turn bag and sell the cocoa beans to the produce merchants who sell the beans to the industries or export it outside the country (Oluyole and Usman, 2006). Hence, Cocoa buying agents play a major role as middlemen in cocoa marketing in Nigeria. They facilitate the movement of cocoa beans from the farmers to the end-users thus sustaining the continual production of cocoa. Exporters as well as processors buy cocoa in most cases from LBAs while the local buying agents enter into farm gates to buy cocoa from the farmers. To get cocoa buy from the farmers has not been easy in most cases, rather, these LBAs would have to make a lot of sacrifices. Such sacrifices include spending additional cost in procuring encouragement packages such as chemicals, fertilizers and bags for farmers so that these farmers would continue to sell cocoa beans to them, giving out money in advance to farmers on agreed price which often ends up in most cases without money and the goods, quality and weight loss of cocoa in the course of storage (Oluyole and Usman, 2006). Therefore, with all these problems/responsibilities on licensed buying agents, how do they still break even in their businesses. It was therefore the objective of this study to assess the activities of cocoa buying agents as it affects cocoa business sustainability in Nigeria as well as to estimate the profitability level of cocoa buying agents.

Methodology

The study was carried out in Ogun and Oyo States. According to National Cocoa Development Committee (NCDC) classification, Ogun and Oyo States belong to medium cocoa producing States in Nigeria. Purposive random sampling technique was used to select a total of ninety-four cocoa buying agents from the two states. The buying agents surveyed include both the LBAs and the local buying agents. Structured questionnaire was used to elicit information from the respondents and the data retrieved from the information supplied were analysed using descriptive statistics as well as budgetary analysis. The descriptive statistics was used to analyse the socio-economic variables as well as the activities of the buying agents while the budgetary analysis was used to determine the profitability level of the buying agents.

Gross Margin (GM) = Total Revenue (TR) – Total Variable Cost (TVC)

Total Revenue = Total Output X Price

Results and Discussion

The result of the socio-economic analysis showed that 84.04% of the respondents were males while 15.06% were females. Results also showed that 79.79% of the respondents were aged 50 years and below showing that majority of the respondents are still in their active age. This is a good pointer to the sustainability of the business. All (100%) of the respondents had formal education and 70.21% had above primary school education. This is quite obvious because cocoa buying business requires a certain level of formal education before it can be easily carried out. Moreso, it requires handling considerable amount of cash and travelling outside one's immediate environment to source for the product. This can only be easily carried out if one is formally educated. Hence, education enhances the efficiency of the trade. Considering the categories of buyers among the respondents, the result of the analysis shows that 6.40% of the respondents are licensed buying agents while majority (93.60%) of the respondents are local buying agents. This is quite so because in most cases, local buying agents source for products for the licensed buying agents while the licensed buying agents are the financiers for the local buyers. As regards the sources of buying cocoa beans, 100% of the respondents sourced their cocoa beans from farmers while 2.12% source their beans from local buyers. This should be among the few numbers of licensed buying agents who only source their products from the local buyers only. The local buying agents are always numerous but in most cases always depend on the licensed buying agents as source of finance for their business. The result of the analysis also showed that 84.04% of the respondents claimed that they buy well dried but not sorted cocoa beans while 61.70% submitted that they buy not well dried cocoa beans from the farmers, they however claimed that such cocoa beans would eventually be properly dried up by them before it is sold to the exporter. According to the buyers, farmers sometimes decide to sell improperly dried cocoa beans because of their urgent need for money. All (100%) of the buying agents claimed that they assist farmers in boosting their production. All the respondents claimed that they assist the farmers by giving them loans, 74.47% claimed that they supply inputs such as chemicals and implements to the farmers while 70.21% of the respondents claimed that they give trainings to farmers on how to produce good quality cocoa beans. However, the buying agents claimed that for them to be effective on their business and moreso to be able to be rendering assistance to the farmers efficiently, government should come to their aid by way of giving them soft loans.

The budgetary analysis revealed that in 2013 cocoa production season, there was an average revenue per buying agent of N1,653,948.51 while the average variable cost was N1,236,587.23. Hence, the average gross margin per buying agent was N417,361.28 representing 33.75%. Cocoa buying agents in the study area are thus operating profitably. This is an encouragement in as much that profitability of an enterprise has been found to be a major ingredients which determines the retention of the practitioners (Oluyole and Adeogun, 2005).

Conclusion

From the findings in the study, it was observed that the activities of cocoa buying agents by way of assisting farmers such as provision of loans as well as sales of inputs on credit to farmers contributed to the sustainable cocoa production in Nigeria. However, as claimed by the farmers, this system often resulted in extorting the farmers by the buying agents. This is because having committed to the loan facility and the purchasing of inputs on credit from the buying agents, the agents would now seize the opportunity to buy their cocoa at a price below what is obtained in the market. The study also concluded that cocoa buying business is profitable.

The study recommends that government should assist cocoa buying agents by giving them soft loan to run their business. Also, cocoa farmers should be enlightened on the need to process their cocoa beans properly before it is sold to the buying agents as this will command more price.

Table 1. Socio-economic characteristics of cocoa buying agents

Variables	Frequency	Percentage
Age (years		
≤ 30	16	23.40
31-50	53	56.39
>50	25	20.21
Total	94	100.00
Gender		
Male	79	84.04
Female	15	65.9
Total	94	100.00
Educational level		
No formal education	0	0.00
Primary education	12	12.77
Secondary education	51	54.25
Tertiary education	31	32.98
Total	94	100.00
Marital status		
Single	15	15.96
Married	79	84.04
Total	94	100.00
Categories of buyer		
Licensed Buying Agents	6	6.40
Local Buying Agenta	88	93.60
Total	94	100.00

Source: Field survey, 2013

Table 2. Sources of buying cocoa beans

Sources	Frequency	Percentage
From the farmers	94	100.00
From local buyers	49	52.12
From LBAs	6	6.38

Source: Field survey, 2013

Table 3. The form in which cocoa beans is bought

Form of purchasing cocoa	Frequency	Percentage
Well dried and well sorted	25	26.59
Well dried but not sorted	79	84.04
Not well dried but later dry it up myself	58	61.70

Source: Field survey, 2013

Table 4. Areas in which buying agents assist farmers

Areas of assistance	Frequency	Percentage
Supplying of input to farmers	70	74.47
Giving loan to farmers	94	100.00
Assists farmers in obtaining loan from financial organisations	3	3.19
Giving trainings for the farmers	66	70.21

Source: Field survey, 2013

Table 5. Budgetary analysis result of cocoa buying agents

Item	N
Total variable cost	116,239,200.00
Average variable cost per buying agent	1,236,587.23
Total revenue	155,471,160.00
Average revenue per buying agent	1,653,948.51
Total gross margin	39,231,960.00
Average gross margin per buying agent	417,361.28

Source: Field survey, 2013

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EXTENSION PROGRAMME

Extension and Economics Division – (Shittu, T.R.)

A. **Staff strength**

Economics	9
Extension	9
Statistics	11
Total	**29**

B. **Functions**

1. Conduct of Economics investigation into all CRIN developed/generated technologies.
2. Conduct of Socio-Economics analysis of farms and farmers productivity.
3. Generation and Development of CRIN data bank for all CRIN relevant statistics e.g. Marketing statistics, Production statistic for our entire mandate crops for future references.
4. Statistical analysis and interpretation of results for other discipline.
5. Writing of feasibility report for CRIN developed products.
6. Geographic Information System (GIS) analysis for hectare determination of farms on CRIN mandate crops.
7. Impact assessment of CRIN extended technologies on farmers -farms productivity.
8. Extension of CRIN developed technologies to farmers.
9. Determination of adoption rate of CRIN technologies.
10. Establishment of adoption village/schools for CRIN mandate crops.
11. Partnership with tertiary institution in training of students on industrial attachment program.
12. Training of farmer on good agricultural practices (GAP).
3. Collection, collation, recording of yield from each experimental plot on the estate.
14. Conduct of visitors on excursion round the Institute.

C. **Achievements**

1. Establishment of automatic weather station for meteorological observations in CRIN Headquarters.
2. Establishment of adopted village in Mamu (Ogun State) and Aba-Agbo (Oyo State) for CRIN technology transfer.
3. Generation of meteorological data and development of data bank to date.
4. Monitoring of farm gate prices (collection of market statistics and are made available to all CRIN products end-users.
5. Data analysis and interpretation to scientists from other disciplines and outsider.
6. Organization of young farmers clubs in CRIN adopted schools.
7. Organization and formal registration of farmers into cooperatives for better accessibility to funds, input etc.
8. Socio-economics analysis of farmer's farm productivity on regular basis.
9. Determination of effective hectarage of our mandate crops in the headquarters.

OCHAJA SUBSTATION (Ogunwolu, S.O.)

STAFF STRENGTH

The staff strength of CRIN Ochaja as at 31 December, 2013 is 31.

The analysis is as follows:

Head of station/Research Officer	1
Agric. Superintendents	3
Higher Executive Officer (Accounts)	1
Foreman	1
Assistant Executive officer (Accounts)	1
Secretarial Assistant	1
Agric Field Overseer	2
Agric. Field Attendant	12
Watchman	6
Health Attendant	1
Driver	2

FIELD OPERATIONS

The maintenance of the existing research and commercial plots were carried out by weeding, pruning, and destruction of Analeptis damaged branches, destruction and insecticide application to the Termite colonies etc. Also, Maize and Cassava were planted within these new plantations, all for improving on the IGR of the Station.

Records were regularly taken on the following on-going research experiments set up by CRIN Research Scientists.

1. Cashew establishment under different shading plants - Mrs Adeyemi, E. A.
2. Assessment of Analeptis incident on cashew - Mrs Mokwunoye, I
3. Physiological effects of intercropping of Cashew with some arable crops - Mrs Nduka, A.
4. Physical and chemical characterization of different cashew nut sizes – Dr. Ogunwolu, S. O.

INFRASTRUCTURE

1. **Electricity:** Since the connection of CRIN, Ochaja station to National Electricity Grid in May 2012, the station has been enjoying the electricity supply until recently when the transformer was faulty.
2. **Construction of Cashew nut processing Factory:** The construction of a NAFDAC standard Cashew nut processing Factory was completed this year. It comprised of a big processing hall, raw materials room, finished product room, cloak room and two toilets.
3. **Fabrication of Cashew nut processing Machine:** A complete set of Cashew nut processing Machine were fabricated locally by ANACARDIUM ENGINEERS LTD and installed. The machines have the capacity of processing One Tonne of raw cashew nut per day. The machine was test-run and samples of the dried packed cashew nut kernel were taken to CRIN Headquarters. So far 280 packs of 100g/pack were supplied to Marketing unit, CRIN Headquarters, Ibadan for sale at the rate of N100/pack.
4. **Fabrication of Cashew Juice Steamer/ Pasteurizer :** A new cashew juice steamer/Pasteurizer was fabricated to improve the quality of Cashew juice produced in the Station.
5. **Drilling and Installation of water Bore-hole:** A productive water Bore-hole was drilled and installed with two 4, 000 Litres overhead Tank. The Bore-hole is already in use.

VEHICLES

We continue given adequate maintenance to the two Vehicles attached to the Station. However, it was discovered since last year that the Toyota Hilux (Diesel engine) engine has worn out and need to be changed. We therefore appeal to the Management to assist us in buying another engine into this Vehicle, because it is the only one that can enter our plots to convey our crops from the field, since there is no functional Tractor in the Station.

STAFF QUARTERS

Apart from the recently renovated quarter A1 all other quarters are very old with leaking roofs and no toilets except the newly constructed four room central toilet which is not adequate. Members of staff are living in these houses with their bad conditions.

I wish to suggest that the Management should allow the Station to retain the rents collected on these quarters for maintenance. The roofing of all the quarters in our Station (except Quarter A1) needs to be totally replaced. The station could be doing this gradually with the monthly rents collected.

INTERNALLY GENERATED REVENUE

The Cashew nuts harvested this year was stored for and used to test-run the newly installed Cashew nut Processing Machine, and the remaining used for the production of dried cashew kernel.

The analyses of the internally generated revenue for the year 2013 are as follows:

	₦
1. Maize	20, 000
2. Beans	7, 000
3. Lease on Farm Land	25, 000
4. Rent by cash	15, 500
5. Rent by deduction	147, 000
6. Proceed from Poultry project	55, 000
Total	**₦269, 500**

Constraints

The major constraint slowing down the research activities and field operations in the Station is short of workforce, especially fieldworkers. Also, the meagre overhead fund released to the station from Headquarters was not regular, this make the running of the Station difficult.

AJASSOR SUBSTATION (Ayegboyin, K.)

Background

Cocoa Research Institute of Nigeria, Ajassor Substation, was founded in the year 1965 as a Research Substation and Extension Centre to the CRIN, Ibadan in 1964. CRIN Ajassor is located along Ikom –Ajassor Road near the Cameroun border in Etung Local Government Area of Cross River State. It is bounded in the West by Ikom township, South by Effraya town, North by Ajassor plantations (Etigefe) and East by Mfum border town. Out of the five CRIN mandate crops, CRIN Ajassor substation is predominantly cultivated with Cocoa because of its soil preference for the crop but also with a handful of Kola, Coffee and Tea.

CRIN Ajassor Substation is the largest Substation with a landmark of about 768 hectares which only 88.01ha have been cultivated. Plantations and Estate Management (PEM) has a cumulative hectares of 56.86 ha effective plots, 23.7 ha of non-effective hectarage and 7.5 ha of 4 abandoned plots. This is exclusive of the ground cover with approximately 113,436m^2 of land area in which the Administrative block, PEM block, Ball park, Seedlings nets, Nursery Unit Post-Harvest Unit, a Mechanical Workshop. Rest House, a Staff Primary School (now under the control of Cross River State Government), a staff Clinic and Staff Residential Quarters are situated. Aside the main substation, there are two other experimental outpost planted with cocoa and cocoa/coffee in Kalime and Okonde, respectively.

Cocoa Research Institute of Nigeria, Ajassor Substation, engage in exclusive training programme and extension services through the dissemination of information of research findings to the farmers, cooperative societies, corporate organizations, local and state government in her immediate neighbourhood and its environs, such as Beneghe Ekiem, Mkpot, Insofang, Agbokum, Okuni, Etomi, Boki, Biakwanm, Obanliku, Eparabon, Abijain, Nsarum Obudu and host of others.

Staff Disposition: As at 31 December 2013, the staff strength across different sections and units stood at 41. Aside the Head of Station who was a Research Officer, the composition of staff members involved 5 staff in the Administration and Supply Section (1 Clerical Officer, 1 Nursing Officer, 1 Health Attendant, 1 Store Keeper and 1 Typist), 2 officers in the Finance and account Section (1 Accountant II and 1 Executive Officer), 3 persons under Transport and Engineering Section (3 Drivers/Mechanic and 1 Craftsman), 9 members in the Security Section with 4 beats while the Plantations s and Estate Management (PEM) Section, being the largest, had 18 personnel, 2 of which were women and 2 Agricultural Superintendents as their Supervisors. The details are in Table 1.

S/N	Name	Designation
1.	Dr Kayode Ayegboyin	Senior Res Officer (Head of Station)
2.	Mr Maroof A. Olayiwola	Principal Agric. Sup. 1.
3.	Mr Mohammed BabaNitsa	Senior Agric. Sup.
4.	Mr Sunday Adekojo	Accountant II
5.	Mrs Joy Takim Awunghe	Nursing Sister Superintendent
6.	Mrs Eunice Ojua	Assistant Executive Officer
7.	Mr Moses Bassey	Chief Driver/Mechanic
8.	Mrs Ekama B. Isong	Chief Clerical Officer (Admin)
9.	Mrs Rosemary O. Akpan	Chief Agric. Field Overseer
10.	Ms Esther Echi	Principal Health Assistant
11.	Mr Effiong N. Udoh	Foreman
12.	Mr Ezekiel Effiong	Senior Field Overseer
13.	Mr Edet R. Akpan	Asst. Chief Agric. Overseer
14.	Ms Pauline U. Ugi	Typist Grade II
15.	Mr James Okoi	Senior Craft man
16.	Mr Edit O. Okpokam	Assistant Chief Store keeper
17.	Mr Innocent Ugbashi	Agric. Field Overseer
18.	Mr Victor Echeng	Head Watchman
19.	Mr Godwin Ogbaji	Head watchman
20.	Mr Emeng Iloko	Head watchman
21.	Mr John Eno Emeng	Motor Driver/Mechanic
22.	Mr John E. Asiquo	Motor Driver/Mechanic
23.	Mr Ignatius Ajito	Head Watchman
24.	Mr Augustine Uzichu	Senior Watchman
25.	Mr Samuel Udoh James	Agric. Field Attendant II
26.	Mr Ime Asua Sunday	Agric. Field Attendant II
27.	Mr Azogor Echeng Isong	Agric. Field Attendant II
28.	Mr Bassey Igbang	Agric. Field Attendant II
29.	Mr Iwara Eteng	Agric. Field Attendant II

30.	Mr Augustine Ubi	Agric. Field Attendant II
31.	Mr Abraham Samuel	Agric. Field Attendant II
32.	Mr Godwin Idagu	Agric. Field Attendant II
33.	Mr Peter Ogar	Agric Field Attendant II
34.	Mr Ele Eleng Emeng	Agric Field Attendant II
35.	Mr Patrick Iyaji	Agric Field Attendant II
36.	Mr Ekereobang Sunday	Senior Watchman
37.	Ms Mercy Umontia	Agric Field Attendant III
38.	Mr Godwin Peter	Agric Field Attendant I
39	Mr Anthony David	Agric Field Attendant III
40.	Mr Idorenyi Okpo	Agric Field attendant III
41.	Mr Udo Johnny	Agric Field Attendant III

Retirees on the payroll of CRIN Ajassor Substation : As at 31 December 2013, there were all -male 21 retirees on the payroll of CRIN. The detail is in Table 2.

Table 2: List of Retirees on the CRIN payroll at Ajassor Substation as at 31 December 2013

S/N	Names
1.	James C. Dibang
2.	Peter Ezoke Egbe
3.	Peter Eni Echeng
4.	Attah Bassey Edem
5.	E.E.Eworo
6.	I.S. Odey
7.	U.U.Innah
8.	B. Iwara
9.	M. Ogar
10.	Umontia Okpo
11.	Mboto Odum
12.	Mbum R.
13.	Beka Sabath
14.	Udoh Monday Frank
15.	Ojor I.U. Abam
16.	Owor O. Agbor
17.	Ononiwu Aloysius
18.	Onyukwu Kyrian
19.	Imoke James
20.	Ayambim Charles
21.	M.T. Ekput

Plantation Management: All cocoa (both CRIN and Cross River State Cocoa Seed Garden), kola, coffee and tea plots were well maintained throughout 2013. Rehabilitation of old cocoa plantations were done n phase planting of young seedlings under old trees. The details of the plantations and research plots under maintenance arein Table 3.

Table 3: Plantations/ Research Plots with their hectares and status in Ajassor as at 31 December 2013

Cocoa Research Plots	Hectares	Status
Cocoa plots		
1967 Trinidad	2.9	Maintained
1975 F_3 Amazon	1.6	Maintained
CRIN/NIFOR 1	6.0	Maintained
CRIN Elite Seed Multiplication	2.2	Maintained
T38 Kalime	2.8	Maintained
Commercial	2.0	Maintained
Cocoa Cuttings	1.0	Maintained
15 Acres Extension	2.0	Maintained
Amelonado	2.0	Maintained
1973 F_3 Amazon	2.0	Maintained
Seed Garden Multiplication	2.2	Maintained
Okondi	10.69	Maintained
Planting at stake	1.6	Maintained
Farming System Experiment	2.0	Maintained
Adaptability/Tolerant Trial	2.1	Maintained
65 Lines Experiments	1.0	Maintained
CRIN Elite Seed Multiplication	2.2	Maintained
Kola Research Plots		
Kola Progeny	1.6	Moribund
Kola Cuttings	0.65	Maintained
Kola Germplasm	2.92	maintained
Kola Fertilizer Trials	2.0	Moribund
Coffee Research Plots		
Okondi	1.46	Moribund
1989 Ajassor	1.57	Moribund
Tea Research Plots		
Tea Ajassor	0.28	Maintained
New Establishments		
Cocoa Research Plot	1.32	Maintained
Ornamental Cocoa Plot	0.5	Maintained
Okondi (Cocoa) Plot	0.4	Maintained

Cocoa Transformation Agenda (CocTA) Pod Distribution: In 2013, a total of 54,544 of high yielding and disease resistant cocoa pods were distributed freely under the current Federal Government Cocoa Transformation Agenda (CocTA). This covered 17,309 cocoa pods for the 2nd phase (January to June 2013) of 2012/2013 and 37,235 pods for the 1st phase (October to December 2013) of 2013/2014 pods distribution periods. The programme was executed in collaboration with the two (2) States (Cross River band Akwa Ibom States), their Ministriesof Agriculture, Cocoa Association of Nigeria (CAN) and other stakeholders in cocoa business. Cocoa pods distributed were mainly F_3 Amazon, Seed Garden and WACRI varieties while the distributions were to corporate organizations, cooperative societies, individual farmers through their respective states and individual farmers directly from CRIN Ajassor Substation. The 2ndphase of 2013/14 free cocoa pods distribution is on-going and due to end in March 2014. The breakdown of the cocoa pods distributed in 2013 is shown in Table 4.

Table 4: Free Cocoa Pods Distribution under CocTA at CRIN Ajassor Substation to Cross River and Akwa Ibom States

Period	Cross River State			Akwa Ibom State			TOTAL
	F_3 Amazon	WACRI	Seed Garden	F_3 Amazon	WACRI	Seed Garden	
Jan–June 2013	3,778	10,512	2,135	684	200	-	17,309
Oct-Dec 2013	18,770	20,944	6,621	900	-	-	37,235
TOTAL	12,548	31,456	8,756	1,584	200	-	54,544

Research Experiments: A number of research experiments are on-going at CRIN Ajassor Substation, most of which had been established before now. However, in 2013, new research experiments include an herbicide screening trialconducted for the suitability and adaptability of some herbicides to our manadate crops while 3 fungicides (Proxanil, Tiram and Macknechie) were alsoscreened for their field effectiveness against *Phytophthora megakarya,* which is the casual organism of the black pod disease of cocoa. Not only those, a farming system research trial and other field experiments were initiated at the substation during the year under report.

Vehicles/Motorcycles/Generators at Ajassor

The list of the vehicles/motorcycles/generators and their conditions are as below:

i. Toyota Hilux Van FG 09 Vo3 (functional)
ii. Peugeot 404 Pick – up FG 2326 B034 (not functional; recommended for boarding)
iii. Mercedes 911 Water Tanker FG237 B02 (functional but needs total overhauling)
iv. The Eicher Truck (not functional; recommended for boarding)
v. Mitsubishi L200 Van FG 741 B03 (not in good condition; needs total overhauling)
vi. Bedford FG 238 BO3 (not functional; recommended for boarding)
vii. Tractor – FG 239 B03 MF 265 (functional)
viii. Motor-cycles: The two Motor Cycles Suzuki 185- FG 335 B03 and FG 335 B03 need total overhauling
ix. 50 KVA Generator plant is in good order but some worn out parts need replacement
x. Unserviceable Tractor is recommended for boarding.

Infrastructure/Capital Projects: The In year 2013, major renovation work started on our 2 Office complexes, the HOS residential apartment and the Health Centre. Besides, the laying of asphalt on about 1km road within the Office/Residential Quarters commenced in 2013 while Ajassor substation is now being linked up with the National Grid. Furthermore, the substation can now boast of ability to take accurate and effective weather data as the installation of a brand new Digital Meteorological Station was completed in 2013.At this juncture, the entire Staff and Tenants of CRIN Ajassor Substation appreciate the laudable initiative of our Executive Director, Professor Malachy Akoroda and the Federal Government of Nigeria for their great gestures.

Cocoa Fermentary/Drying slab/Shade nets: The fermentary is still functioning but needs roofing and other renovation works.However, the drying slab is obsolete and need replacement with more recent recommended raised platform type. Only one of the 3 shade nets is in good condition therefore, repair work on the two torn nets is urgently needed. The drying oven is totally bad and needs to be re-constructed in 2014.

Environment Sanitation: At CRIN Ajassor, we know that 'health is wealth' and so we placed a high premium on the cleanliness of the our offices and the residential quarters. Against this backdrop, a Monthly Environmental Sanitation on every last Saturday of the monthwas observed throughout the year under report. We also implore our amiable executive Director to provide more public toilets at our residential quarters in 2014.

CRIN Image and Visitors to the Substation

The image of CRIN got improved in 2013 through many laudable programme the substation at the substation. As an instance, there was a live Radio Broadcast at the Cross River State Broadcasting Corporation (CRSBC) Ikom on safe cocoa production and many other modern methods of cocoa production which had projected CRIN's image positively. Ajassor Substation is still sustaining the cordial relationship between the CRIN, State Government and the communities around us.

As usual, a lot of visitors from different part of the country and CRIN Staff members from the CRIN Headquarters in Ibadan were at the Substation for various reasons in 2013.The names and addresses of our visitors as well as purposes of their visit to CRIN Ajassor in 2013 are in Table 5

Table 5: Names and addresses of sampled visitors at CRIN Ajassor and purposes of their visit in 2013

	Names	Address	Purpose of visit	Date of arrival
1.	Mr OnahCypress Eje	Cross Rivers Agric. Project	Official	21/01/13
2.	Prof.Malachy Akoroda	Executive Director, CRIN, Ibadan	Official	25/01/13
3.	Mr J. O. Babafemi	CRIN HQ, Ibadan	Official	25/01/13
4.	Dr A. R. Adedeji	CRIN HQ, Ibadan	Research	27/01/13
5.	Dr A. O. Famaye	CRIN HQ, Ibadan	Research	04/06/13
6.	Mr Kayode Adejobi	CRIN HQ, Ibadan	Research	04/06/13
7.	Mr K.A. Oluyole	CRIN HQ, Ibadan	Research	05/06/13
8.	Mr Henry Otunoye	CRIN HQ, Ibadan	Research	06/06/13
9.	Mr E. U. Asogwa	CRIN HQ, Ibadan	Research	14/07/13
10.	Elder E. D. Umoh	Min of Agriculture, Uyo	Official	18/07/13
11.	Chief Michael Udo Akpan	Min of Agriculture, Uyo	Official	18/07/13
12.	Apostle Friday Imule	Min of Agriculture, Uyo	Official	18/07/13
13.	Mr Asein Uwaifo	CRIN HQ, Ibadan	Audit Exercise	19/10/13
14.	Mr V. O. Oguntona	CRIN HQ, Ibadan	Audit Exercise	17/10/13
15.	Mr K. M. Fabowale	CRIN HQ, Ibadan	Audit Exercise	17/10/13
16.	Mr Tony Enoduwebe	CRIN HQ, Ibadan	Audit Exercise	17/10/13
17.	Mr Edet Effiong	Min of Agriculture, Calabar	Official	17/10/13
18.	Mr Ubi Ubina	Min of Agriculture, Calabar	Official	17/10/13
19.	HRM Dr E. O. Ojong	Paramount Ruler, Etung	Inquiry/Official	22/10/13
20.	Mr G. A. Ufono	Min of Agriculrure, Calabar	Official	30/10/13
21.	Mr Alfonsus Nanna	Cocoa Association of Nigeria, Calabar	Official	30/10/13
22.	Mr Sayina R. riman	Cocoa Association of Nigeria, Akure	Official	05/11/13
23.	Mr Joseph Iyang	Farming World, Ikom	Official	20/11/13
24.	HRM P. N. Eku	Ikom Council	Official	29/11/13
25.	Mr ishola Abimbola	BSF, Ibadan	Project handing over	04/12/13
26.	Mr Felix Familugba	BSF, Ibadan	Project handing over	04/12/13
27.	Mr Rotimi Modupeola	BSF, Ibadan	Project handing over	04/12/13
28.	Mr Oluseun Kolawole	CRIN HQ, Ibadan	Research	05/12/13

A total amount of Seven Hundred and Fourteen Thousand, Four Hundred and Fifty naira (₦17, 4450) was generated from various sources in 2013. The breakdown of the revenue generated.

Furthermore, in order to effectively secure lives, properties and forestall against land encroachment by the indigenes, there is a need for more security personnel in CRIN Ajassor. The Substation will need an additional 20 Watchmen to complement the 9 personnel at the moment. We also need at least 1 Cleaner to maintain the sanitation of the 9 toilets in the newly renovated office complexes, 1 officer to take and monitor Meteorological Station and one more Administrative Officer to assist the only Administrative Officer at CRIN Ajassor at the moment.

LIBRARY INFORMATION AND DOCUMENTATION DEPARTMENT

Head LID Department (Fagbami,O.O. **)**

Introduction:

The department provides services to users through these divisions:

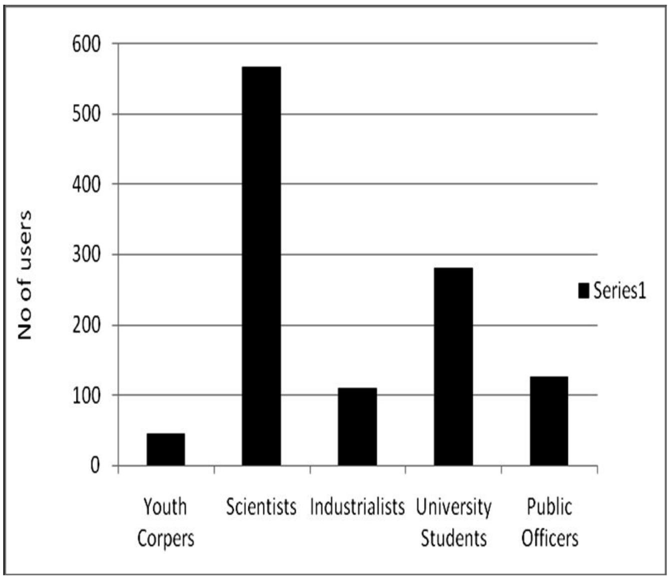
LIBRARY DIVISION Acting head: (Ogunjobi T.E.)

Staff strength: eight (8)

Fagbami, O.O. – Asst. Director (LID)
Ogunjobi, T.E. – Snr. Librarian
Folarin,V.A. – Higher Library Officer
Oyelami, R.A. – Snr. Secretarial Assistant I
Adewumi, E.O. – Higher Library Officer
Okonkwo, T. – Library Officer
Aboderin,A.K. – Clerical Officer
Abass Salau – Agric Field Assistant

Users:

The Library had 1025 patrons from January to December 2013 as shown below:



Functions/Achievements

(i) Accessioning, stamping and displaying of new information resources were done on regular basis.

(ii) Charging and discharging of library materials were done regularly, with cataloguing and classification of some gifts and exchange materials for the library. Overdue books and journals were retrieved from users, used books and journals were shelved daily, while shelf readings were carried out occasionally.

(iii) **Compilations of Bibliographies**
-Bibliography of cocoa literature (2000-2010), Page 174, ISBN 978-978-50656-4-0;
-Bibliography of Kola, Coffee, Cashew and Tea research (2000-2010), Page 72, ISBN: 978-978-50656-1-9

(iv) **Information centre on CRIN mandate crops**: Published articles were collated in Cocoa Research Institute Database on Nigeria (CRIDAN) annually.

(v) **Paper cutting** was done, all matters on CRIN mandate crops and agriculture related matters were kept for consultation of scientists and all interested users.

(vi) **Resources maintenance:** Binding of collated journals and damaged books were done for future consultation. Few of the books that were damaged by rainfall during the unions strikes were sun dried and has since been arranged back to the shelves.

(vii) **Training:** Four industrial attaché sent to library division were trained.

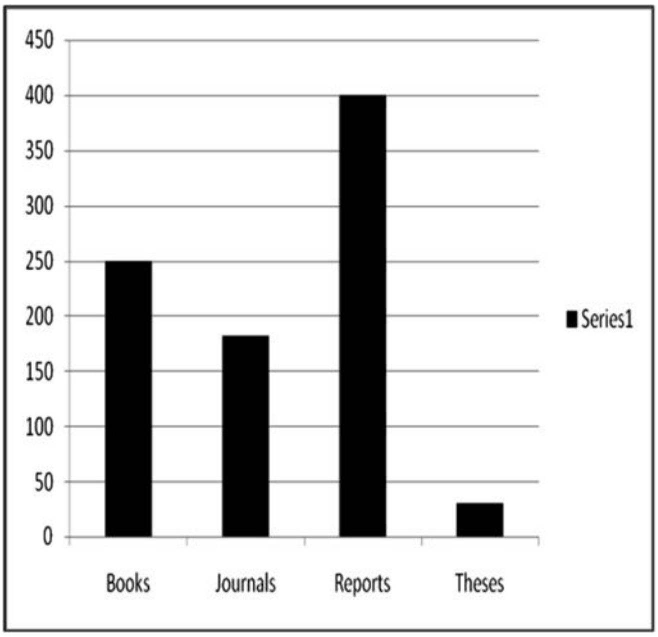
(viii) **Information Outreach:** Compilation of CRIN News is ongoing and very soon it will be released. Library and ICT bulletin is used to convey information to library users.

(ix) **Annual reports** were collated, reviewed for Programmes, Department, and Divisions in the Institute while typesetting of some reports scripts were done in some cases.

(x) **Library automation:** Articles published on CRIN mandates crops by CRIN scientists and other scientists outside on cocoa, cola, coffee cashew and tea were added to databases in the library.

(xi) **E- Library** resources were used regularly through intranet and AGORA details were publicized to users.

Library Resources Usage for year 2013



Printed Resources Usage

Infrastructure Development: Some office facilities were supplied to Library Division, they are: One (1) piece of split Air Conditioner, seven (7) Chairs, One (1) HP Laptops and two (2) UPS's.

Future Expectation

The following are the future expectations of Library Division:

- Transformation into a digital/virtual library;
- On-line linkage of the Headquarters library to substations;
- Hyperlink of digitized library in-house document to substations;
- Improvement in the patronage of the library through users' awareness lectures;
- To make CRIN the focal point of all materials available in Nigeria on its' mandate crops.

PUBLICATION DIVISION

Acting Head: (Babafemi Ibitope)

Staff Strength: Four (4)

Babafemi, Ibitope	–	Prog. Analyst I
Oyedotun, O.O	–	Chief Printer
Ikpefua, A.E	–	Data Processing Officer
Efunniyi Muyiwa	–	Photographic Asst. II

Functions

- Digitalization of Library Resources: Books, thesis, Journals, etc.
- Online search for CRIN mandate Crops for from AGORA and other search engines such as; Google, Ask.com, Vivisimo etc. 171 publications were uploaded.
- Barcode Labeling of Library Books
- Printing of all CRIN staff ID Cards, and Re-printing of missing or Stolen ID Cards
- Trained Publication staff on how to develop and print ID cards
- Edited and Formatted CRIN Annual Report for the year 2006 to 2010

Infrastructural Development

The following were the items given to Publications Division: Chair (1), Laptop (1), UPS (1), Split A/C 1.5HZ (1)

Photography and Photocopying Services

The Photography unit has been proactive in many ways. This unit in library has been able to cover several events in the Institute and subsequent events that came up till now. The photocopying unit helped in the photocopying of official documents in the Institute. This unit provides service to users by making photocopies of documents for research use.

Printing Services

Spiral binding, Lamination of documents, and production of Annual reports, posters, letter head papers, banners and official documents based on request.

Future Expectations

In the nearest future, the Publication Division is expected to:

- Re-brand CRIN ID card for durability and for security purposes
- Engage in vigorous training of staff in Desktop Publishing; to enable staff to be more informed and diligent in the production of CRIN ID cards.
- Source for all publications on CRIN mandate crops, upload for use in the Library automations.

ICT DIVISION

Acting Head: (Ibe Osita)

Staff Strength: Two (2)

Ibe Osita	–	Prog. Analyst. I
Adeyemo Stephen	–	Clerical Officer II

Functions

Provision of Internet services, E-mail, website maintenance, ICT centres maintenance, inventory of computers and training staff and industrial attaché.

Infrastructural Development

Routers were installed to provide internet signal wired or wirelessly. (1) Chair was procured for server room.

Future Expectation

The following are the future expectations of ICT Division:

- Improve inverters power supply through solar panels to enhance 24 hours Internet availability.
- Sponsor annual workshops/conferences for all ICT staff so as to enable us keep in step with emerging technologies in the field.
- Revenue generation through monthly subscription by all Internet users.
- Replacement of all obsolete computers and monitors.
- Extension of GLO fibre Internet to offices at the Engineering/PEM divisions and the events centre.

Imprest for Department

The imprest prompt release alleviates problem of getting funds on time to sort out some minor issues in the department that may require urgent attention.

Library

The photocopy machine counter should be taken at regular intervals to serve as a control measure. It is recommended that the counter is read at the close of work, every Friday.This will form the basis for checking against numbers of copies made and numbers of waste; per week. The revenue from library (from all sources) should be remitted into the coffers of the Institute and receipted not later than the last working day of every week.

A situation where revenue is delayed (no matter how small) before it is lodged is unacceptable and against the Public Service Rule and Financial Regulations.

INTERNAL AUDIT REPORT (Fabowale, K. A)

The Internal Audit exercise of the Institute's activities was carried out on a continuous basis for the financial year 2013.

The Audit report as at 31 December, 2013 is presented below but it excludes reports on activities of our six substations as none of the substations has been visited for the purpose of audit for the year under review. This report only covered activities and records available at the headquarters.

1 Records of accounts

Postings into the cash books were checked and the monthly totals checked against the bank statement balances. Receipt and voucher booklets were properly issued and copies maintained as required.

The positions as at 31 December, 2013 for each account areas shown below.

	₦
Salary account No 1770688062 with Skye Bank Plc.	51,355,888.99
Skye capital account No 1770693473 with Skye bank Plc.	179,553,678.11
CBN capital account No with CBN	9,690.00
Revenue account No 1770687285 with Skye bank Plc.	1,414,830.37

The Bank Reconciliation Statements as at 31/12/2013 for the various accounts were checked and found correct. The reconciliation differences represent un-cleared E-payment as at the year end.

The various projects account records were also properly maintained.

2 Salary

Salary records (salary cards and payroll) maintained at the Payroll Division were checked on monthly basis before salary payment. As at the year-end, 2013, 754 staff were paid at the headquarters.
Monthly deductions of tax and other deductions from staff salaries are remitted to Oyo State tax authority and other beneficiaries respectively.

3 Internally Generated Revenue

Records of revenue from various sources, including rent of staff quarters and sales of farm produce were examined. Total IGR for the year ended 31 December, 2013 earned at the headquarters only was ₦9,431,423.13. The following analysis is observed

	Ranking in %
Rent (staff quarters and other sources)	38.05%
Cocoa (beans, seedlings and pods)	22.55%
Kola	00.03%
Coffee	00.00%
Cashew	00.64%
Tea	00.00%
Other sources	38.73%

4 Board of Trustee (Pension) account

Total no of Pensioners on record as at the year-end was 339
Total premium received for the year was ₦227,804,349.58
The gross pension paid for the year was ₦184,242,295.25 (including deductibles)
Total gratuity paid for the year was ₦4,144,020.24

The cash book and the Bank reconciliation statements were checked and found correct.

5 Procurement

The Public Procurement Act 2007 is complied with in the award and execution of contracts

6 Health Centre

The total revenue for the year was ₦108,900.00.No of children delivered between January and December, 2013 was nine (9). 5 boys and 4 girls.

7 Others

The Rest House and Marketing Units were visited and their records checked for the year under review.

General Observations

The total capital allocation received for the year under review (₦528,189,003.00) was justifiably spent. The executions of the capital projects, including those that are still in progress are commendable.
The audit observed and would like to remark the new look of the health center, the Rest House and the road from the main gate to the office complex.

For a complete audit, it is important that the Institute's substations are visited as integral part of CRIN internal audit. As at the time of this report, the substations have not been visited for the 2013 check. This is not healthy for control purpose particularly now that some of the stations have had a change of hand in terms of Head-of–station (HOS) and the Stations' Accountants. The essence of internal audit is to detect error and other irregularities early enough and ensure uniformity in the accounting practice between the various stations. Please, be reminded that a copy of the report has to be submitted to the Auditor-General of the Federation as demanded from a letter from the office of the Auditor-General of the Federation.

During the year under review, the Institute experienced an internal crisis for a period of three months between July 29 and October, 21, 2013 when the Executive Director was denied access to office following some allegations by the in-house unions against the Executive Director. On the constitution and arrival of the Governing Board however, entry was gained by the Executive Director and the Governing Board on 22nd of October, 2013. The ED had since resumed office and normalcy restored.
The three months of crisis was not without some disadvantages however as revenue generation dropped drastically due to loss of productive hourswhile the crisis lasted. The willing staff were prevented from working and the premises became weedy and untidy. Many cocoa seedlings raised under the Federal Government Cocoa Transformation Agenda died due to lack of maintenance during the crisis.

Recommendations

1 Government reformations on financial matters:

Due to the on-going government reformations on financial matters, it is recommended that internal education and training be organized for all staff of the Institute in order to intimate all staff with the operations of the Government Integrated and Financial Management Information System (GIFMIS) and what is expected by staff. The in-house awareness will ensure that stake holders are carried along in the implementation.

2 Imprest account centers

The suggested training of the imprest account cashiers is yet to hold. It is recommended that the training is extended to cover the following subjects and for person(s) concerned.

i. Maintenance of imprest account
ii Retirement of advances
iii Pre-funding of expenses before the ED's approval

These are areas that the Internal Audit has noted and thinks that it is necessary to remind members of staff concerned on the need to comply with the Financial Regulations on these matters.

3 Rest House

Revenue from Rest House for the year 2013 was three thousand Naira (₦3,000.00) only apart from the ₦118,000.00 paid directly into screening project account with Zenith bank. This was a bulk sum paid by the screening team who lodged at the rest house during their exercise.

The revenue generation capacity of the Rest House has been improved by the attention given to it in the capital fund released to the Institute. In order to compensate for the cost of renovation, it is recommended that the rate per room and per chalet be reviewed upward from its present ₦1,500.00/night for a room apartment and ₦3,000.00/night for a chalet. Our suggestion is ₦2,000.00 for a single room apartment and ₦3,500.00 for a chalet per night.

4 Computerization of Finance and Accounts and Internal Audit

For the year under review, the automation of the Finance and Accounts Department and the Internal Audit Division has been proposed. It is recommended that the management puts in its pipeline the entire system automation to include the Stores, Procurement, and Administration and Supplies Department. The idea is to be able to access essential and frequently needed data electronically and carry out a complete system audit. Softcopies of data may then be collected from other Units, Sections and Divisions.

5 Payroll

The present salary cards in use at the Payroll Division is designed to record salary data of every staff for a whole year, January to December before it is filed up for future reference and other use.

The way this document is left naked without any protection renders it to fast tear and wear within a very short time.

It is recommended that these papers are packed in Kalamazoo binders for durability.

Conclusion

In the absence of any material misstatement, the business of the Institute was carried on in an orderly manner and in compliance with the requirements of relevant rules and regulations.

As stated earlier however, this report is considered inconclusive because the Institute operates with six (6) substations and none of the stations has been visited for the 2013 audit exercise.

ENGINEERING (Bakare A.T.)

S/NO	JOB DESCRIPTION
1.	Servicing of Engine and repair of steering system of a 75 HP Tractor
2.	Purchase of 2 Units battery for a 4 – Water tanker (Fg 483 N03)
3.	Repair, Engine Servicing and replacement of water pump of a 50 Hp Tractor
4.	Engine servicing/Purchase of a 75 AH 12V Battery for a 55 HP Tractor (45B-5FG)
5.	Repair of the Hydraulic system of a 3.ton tractor Trailere
6.	Servicing/Maintenance of 3 units 1-5m tractor-drawn slashes
7.	Servicing and routine maintenance of 3 units 5 Hp Lawn mowers

8. Wiring of transfer pump from T.O Quarter bore hole to the extended station
9. Replacement of bore hole pump at Junior Staff quarters
10. Erection of concrete Pole at Senior Staff Quarter a long road 2
11. Re- Infer cement of windows and doors at Open personnel and Confidential Registries
12. Construction and installation of burglary proof at CRIN Library
13. Construction of raised Platform for drying Cocoa beans at PEM
14. Construction of protective cage for generator set at Executive Director's Officer
15. Wire fencing of Palm Milling Unit
16. Welding of sugar face-wire guage on existing stands at Nursery
17. Laying of water pipes from T.O. Borehole to the fetching point near CRIN S.S.W. A at T.O. quarters
18. Installation of water closet materials and fixing of Storex tank at CRIN Rest House
19. Replacement of drainage pipes at Biotechnology laboratory (C16)
20. Replacement of pumping machine at CRIN Health Centre
21. Purchase of Electrical tools & Kits
22. Installation of Portable generator in the office of the Director Research CRIN
23. Replacement and Rewiring of Air conditioners in the office of the Executive

Some other major Projects for the Year 2013 are as follows:

- ❖ Construction of 745M Asphalt tarred road at the Junior Staff Quarters.
- ❖ Construction of 2 nos Boreholes @ Zones 8 and Zone 6.
- ❖ Glo Optic fibre internet connectivity.
- ❖ Rehabilitation of the former store warehouse to Event/Training Centre.
- ❖ Procurement of three numbers utility vehicle for Research activities.
- ❖ Repair of faulty 500 KVA transformer and replacement of burnt cable @ old laboratory.
- ❖ Repair of faulty 200 KVA transformer @ the J.S.A. quarters.
- ❖ Maintenance of the Panels/Oil Circuit Breakers (OCB).
- ❖ Construction of 1KM Asphalt tarred road @ the CRIN Headquarter.
- ❖ Procurement of 9 nos Hilux Jeeps and 1no High roof bus for Research Programmes.

PLANTATION ESTABLISHMENT MANAGEMENT (Akande)

A Introduction

The plantation and Estate Management Division is one of the service providers of the Institute. The division has four main units namely:

UNIT I – Plantation unit develops new experimental plots for research divisions and maintain all the experimental and non-experimental plots of Cocoa, Coffee, Kola, Cashew and Oil palm. The plantation is divided into zones: 1, 2, 3/4, 5, 6, 7, 8, 9 and BCOO plot at Moor-plantation, Ibadan. The total effective hectrage and crops in each zone are stated in Table 1.

UNIT II – Management unit is charged to maintain all open grounds around the office and residential areas so as to have high standard of environmental sanitation to provide a congenial atmosphere for research and other activities. It is also responsible for the establishment and maintenance of lawns, ornamentals and hedges at the office compound and the residential areas such as senior staff quarters, T.O quarters and Health centre.

UNIT III – Nursery Development and Management deals with the raising of all the CRIN mandate crops including tea for sale to farmers and research experiment purposes.

UNIT IV – Fermentary unit is responsible for the processing of all harvested cocoa pods through fermentation, drying and bagging. It also processes coffee berries, air-dry of cashew nuts and sun dry of plantain chips.

B **STAFF STRENGTH:** In the year under review, the Plantation and Estate Management worked with total number of 277 permanent staff and 50 casual workers recruited within the months of September and October in replacement of 69 field staff deployed as pollinator gang for the sustainability of Cocoa Transformation agenda programme between September and October 2013.

Another periodical recruitment of 150 casual workers was carried out within the month of November 2013, in order to salvage the situation of the experimental plots and commercial plantation when there was industrial dispute. Hence the division ended up with total number of 273 members of 42 senior staff, 229 junior staff and 150 casual workers.

The division witnessed the retirement of Chief Secretariat Assistant in person of Mr. Azeez who served as PEM typist. The sad event of the sudden death of 3 junior staff Messrs. Felix Igwe, Adesiyan Mufutau and Asimi Olasimbo occurred.

Table 2: Staff strength

S/No	Unit	Effective hectare	No. of supervisor	No. of field staff	No. of junior staff
1	PEM: Office		1	-	2
2	Zone 1	35.76	2	23	21
3	Zone 2	11.90	2	11	10
4	Zone 3/4	11.70	2	11	9
5	Zone 5	24.78	3	17	16
6	Zone 6	26.75	2	18	18
7	Zone 7	23.35	2	16	14
8	Zone 8	35.71	2	20	20
9	Zone 9	18.48	2	12	12
10	BCOO	6.0	-	2	2
	GM	-	6	40	35
11	Fermentary	-	2	7	7
12	NDM	-	2	9	9
13	HPU	-	1	23	22
14	VPU	-	1	30	29
	Total	194.45	30	239	226

C **FUNCTIONS**

DAY TO DAY ACTIVITIES OF THE DIVISION IN LINE WITH THE ACTUAL FUNCTIONS ON GROUND INCLUDE:

A Maintenance of existing plantation (plots) and research plots with the following operations:

1) Regular slashing and weeding in all the CRIN mandate crops and oil palm plantations.
2) Removal of noxious parasitic plants notably mistletoes.
3) Rehabilitation of moribund/abandoned plots.
4) Removal of over head stades/moribund plants
5) Pruning of excessive canopies and branches
6) Regular spraying against pests and disease
7) Mulching of young seedlings of all the CRIN mandate crops
8) Regular and prompt harvesting of all farm produce including cocoa, kola, coffee, cashew, palm fruits, plantain and banana
9) Processing of all harvested farm produce
10) Record keeping
11) Farm sanitation
12) Cutting of fire tracing round the plantations and EARLS building
13) General notational duties/work

B Establishment of new plots and experimental plots which include:

1) Kernel surveying and demarcation of newly proposed land
2) Under-brushing and felling of forest trees
3) Cross-cutting of felled trees
4) Lining, pegging, holing and planting (shade tree and mandate crop)
5) Weeding and fertilizer application
6) Supply of missing stands or gapping up of dead stands
7) Date collection and record keeping
8) Mulching, watering, farm sanitation, pruning
9) Harvesting
10) Cutting of fire tracing

C CRIN mandate crops seedlings production for research and commercial purposes with the following operation:

1) Land preparation
2) Shade erection/shade net erection
3) Filling and setting of polythene bags
4) Sowing and labeling
5) Weeding and watering of seedlings in dry season
6) Vegetable propagation operations such as budding and grafting on root-stock
7) Maintenance of budded and grafted seedlings
8) Environmental sanitation around nursery

D Pollination exercise on Cocoa

E Maintenance of ground, hedges and horticultural and ornamental plants which includes:

1) Regular manual slashing and mowing by the lawn mowers and the tractor drawn slasher
2) Regular manual slashing of the grounds, lawn of offices, roadsides and residential premises
3) Regular training of hedges along roadside and public places of the Institute.
4) Landscaping design
5) Raising of horticultural and ornamental plants
6) Gapping up of flower hedges
7) Planting of potted flowers
8) Maintenance of horticultural, ornamental and potted plants e.g. weeding, watering

9) Picking up of dropped refuse around the estate offices and burning off of dumping debris
10) Sanitation of estate management

F Production of arable crops (maize) and fresh vegetable for sale to members of staff and the public

G Multiplication of plantain suckers: to meet increasing demand from the general public for large scale planting of plantain for fruits

H Assistance to trainees, students on excursion/Industrial Training and other official visitors

I Labour control and coordination:

1) Preparation of casual workers wages
2) Control of activities/operations of both established field staff and casual workers in the farms
3) Supervision of all field staff welfare
4) Keeping records of field staff
5) Monitoring farm offices and field staff

D ACHIEVEMENTS/PROGRESS

1) ***Estate maintenance:*** This aspect of our activities demanded a lot of labour and in order to maintain greenness of our Estate, few herbicides (glyphosate – force up 24, paraquat – weed crusher 24) allocated to Ground Maintenance Section were used to spray hidden open areas of ground because of the rains, environments and open ground field witnessed rapid growth and regeneration of weeds. Constant maintenance of the Institute's environments and residential areas were greatly affected by the National Strike embarked upon by the Joint Research and Allied Institutions Section Unions (JORAISU) and total lying off of casual workers. The use of lawn mowers, tractor-drawn-slasher with the few hands staff supported by the rotational general work (twice weekly general pulling together of all workers from various zones and sections) were used to carry out weeding operations. Ornamental plants were raised, nurtured and planted to produce beautiful environment while regular trimming of existing ones was not left out. During the period under review, replacement of potted flowers in the front of the ED's office with cocoa hybrid seedlings, cashew seedlings, kola seedlings and coffee seedlings was carried out.
2) ***Plantation activities:*** All plots (commercial and experiment in the various zones were maintained during the period under review. Required cultural operations which included weeding (manually and chemically controlled), pruning of branches (to reduce the canopies) plots gapping of missing cocoa stands, removal of mistletoes/moribund plants, watering of young cocoa and kola plants, cutting of fire tracing round the plantations, felling of overhead shade trees preparation of mini-nursery in the zones to avoid transportation problem at the time of planting. Harvesting of ripe pods, picking of cashew nuts, kola nuts and coffee berries were done with the introduction of harvesting gang into the rotational general field work. The BCOO plot at I. A. R & T was not left out as frequent visitation, maintenance and harvesting were carried out. The effectiveness of this assignment could not be noticed or seen on the field due to the 3 months national strike started on the 4th February 2013 and ended on the 6th May 2013. Industrial dispute which occurred on February 17th 2013 and total laid off casual workers as at 31st December 2012.
3) ***Research activities:*** Researchers were assisted with adequate labour to perform the necessary activities in research plots that situated in zones 1, 2, 3/4, 5, 6, 7, 8 and 9 and at times around the office complex and in the glass house.
4) ***Rotational general duties***: With the total laid off of casual workers during the period under review, the sustenance and strict compliance of the twice weekly rotational general work had gone a very long way. The system had helped the Plantation and Estate Management (PEM) a lot in all units of our field cultural activities especially during the rainy season when weed growth became eminent to both Estate and Plantation (plots).
5) ***Planting of new hybrid cocoa TC_1 – TC_2***: During the period under reference, new hybrid cocoa of TC_1 – TC_8 was planted along CRIN mandate crops while the one hectare hybrid cocoa of TC_1 – TC_8 plot at zone one was also maintained.
6) ***Digging of borehole***: During the period under review, the Executive Director tried to rescue us from experiencing draught on our young cocoa plants by sinking two (2) boreholes at zone 6 and zone 8 respectively. Even though zone 8 borehole did not function yet, we highly appreciate your effort Sir, but still expecting more at the remaining zones.
7) ***Raised cocoa drying platform***: In order to improve the standard of the CRIN dried cocoa beans to the International level, effort was made by the Executive Director to release fund for the construction of iron raised platform to the fermentary section along with improved bamboo made raised platform with seven (7) weaved raffia mats for the spreading of cocoa for dying. The project is still on going.
8) ***Construction of metallic signpost and numbering:*** Fourteen (14) metallic artistic signposts were constructed for various zones and other units with full information written on them about each specific unit but they are yet to be erected to their permanent place. In the course of numbering of all the CRIN mandate crops in all various zones and other units, glossy paints, written brush and kerosene (for

dilution) where supplied to every zones/units for the operation so as to know the numbers of existing plants per crops per zone. This operation has commenced and is still on going.

9) ***Fermentation:*** Harvesting of cocoa pods ought to be done weekly but due to unavailability of enough space for drying, inadequate labor force, delay in drying especially during the rainy season, insufficient number of tarpaulin for covering and occasionally when there were no fund to purchase diesel, it had to be done every other week. Harvested pods were transported to the breaking point, broken, weighed, fermented and dried at the fermentary unit. Cashew nuts were air dried while harvested unmatured bunches of plantain and banana were sliced into chips and dried. Sales made to the interested customers were 4.6tons of dried cocoa beans, 200kg of cashew nuts, 85.6kg of dried plantain chips, and 1,727.5kg are still in the store.

10) ***Provision of farm tools***: One (1) million fund was released for the division to purchase some of the necessary farm equipments and purchased equipments were: 2 basuki motorcycle couple with trailer, 2 CP – 15, spraying machine, 1 chain saw machine, 4 reinforced wheel barrow and 8 (30mtre) tape rule meters.

In addition, the farm tools and field materials requested for at the beginning of the year for the effectiveness of field staffs and smooth running of the Plantation and Estate Management Division were just supplied by the contractor and hope to be collected out from the store for onward distribution to field staff in the year 2014.

11) ***Supply of Agro-chemical and spraying tools:*** In order to aid the division in its various cultural operations, agro-chemicals such as herbicide, insecticide, fungicide and spraying gargets were purchased and supplied to us.

The distribution and collection tabulated below:

Units	Effective Hectare	170 force-up alloc./coll.		170 weed crusher allo./collect.		200 fungron alloc./coll.		170 ridomil allo./collct.		200 actarate coll.		80 tricel collec.		Nose mask 12	Eye goggle 12	Hand glove 12	Crops planted
1	-	19	12	19	12	22	10	16	10	22	15	6	3	1	1	1	Cocoa coffee kola & cashew
2	11.90	12	8	12	8	18	10	15	10	18	15	6	3	1	1	1	Cocoa kola & cashew
3/4	11.70	12	8	12	8	18	10	15	10	18	15	6	3	1	1	1	Cocoa cashew & oil palm
5	24.78	19	12	19	12	22	10	16	10	22	15	6	3	1	1	1	Cocoa coffee
6	26.75	19	12	19	12	22	10	16	10	22	15	6	3	1	1	1	Cocoa, cashew & kola
7	23.35	12	8	12	-	-	-	-	-	-	-	6	3	1	1	1	Kola
8	35.71	19	12	19	12	22	10	17	10	22	15	6	3	1	1	1	Cocoa, cashew & oil palm
9	18.48	15	10	15	10	16	10	15	10	16	15	6	3	1	1	1	Cocoa, cashew & oil palm
BCOO	6.00	5	3	5	-	16	-	15	-	16	-	5	-	-	-	-	Cocoa
NDM	-	5	3	5	3	18	10	15	10	10	10	5	3	1	1	1	
HPV	-	5	3	5	3	18	10	15	10	18	15	5	3	1	1	1	Cocoa
VPU	-	5	3	5	3	16	10	15	10	16	15	5	3	1	1	1	
GM	-	20	24	20	24	-	-	-	-	-	-	7	4	1	1	1	
FARM	-	3	2	3	2	-	-	-	-	-	-	5	3	-	-	-	
STORE	-	-	50	-	53	-	100	-	70	-	55	-	40				

Farm produce harvested for I.G.R : Various farm produce harvested for Internal Generate Revenue are analyzed below:

Record of harvested farm produce

Zones	Cocoa pods	Cashew nuts kg	Kola nuts basket/pod	Coffee kilogram	Oil palm fruit bunches	Plantain bunches	Banana bunches
1	44631	-	-	114.0kg	-	91	181
2	17549	-				67	
3/4	10615	-					
5	12743	-					
6	32256	3.9kg					
7	-	-	2500nuts				
8	37999	-				69	27
9	11370	25.7kg				129 merged to 56	
BCOO	2034	-					
GM	-	22.8kg					
NDM	-	-				207 merged to 157	
Total	169197	52.4kg	2500nuts	114.0kg		688	208
Palm oil procession unit	-	-	-	-	525	-	-

Out of zone 8 harvested cocoa 28,112 pods were given to COCTA for distribution to farmers:

Record of other harvested farm produce

Zones	Cherry trees	Immature plantain bunches	Vegetable bunches	Cassava bags	Firewood tractor
1	-	-	-	4bags	-
2	-	-	-	9 bags	-
3/4	-	-	-	-	1 load

Nursery development and management: This units deals with the raising of all the CRIN mandate crops with the exception of tea for both commercial and research purposes. During the period under review, these were the achievement made.

57500 Cocoa seedlings of both hybrid and open pollinated pods were raised and sold out to the farmers for last year and these plantings.

475 Cola acuminata seedlings and 620 Cola nitida seedlings were raised and sold out.

E MAJOR OBSTACLE/RECOMMENDATION

1) ***Inadequate supply of manpower:*** There was gross inadequate of manpower to cope with various division operations for the CRIN scheduled crops. This inadequacy affects the output of work done. The effort of Management to ameliorate this problem is highly commendable considering the financial constraints. Increase in labour force will further help in the job carried out in the division such as new planting, rehabilitation of old plots, sanitation of the environments and plantations hence boasting of farm produce which will definitely increase Internally Generated Revenue (IGR). It will be therefore be highly appreciated if recruitment of at least 150 Assistant Field Attendant (AFA) could be embarked upon along with occasional special task force operation. Gender, age and fragility should be put into consideration whenever recruitment would be carried out so as to inject male youth into field staff system.

2) ***Porosity of zones/units axis:*** The porosity of the zones/units allows for encroachment and stealing by unwanted visitors especially during the dry season (NDM, HPU, zone 1, 2, 3/4, 5, 6, 7, 8 & 9). It has really affected our output.

3) ***Inadequate supply of agro chemicals:*** e.g. glyphosate for the control of growth weed. The chemical i.e. herbicide released to the division this period really assisted with the few hands of field staff available in combating the vigorous growth of weeds within the Institute environments and plantations. During this rainy season, we found it extremely difficult to cope with our agronomic operations. We appeal to the Executive Director for assistance in releasing more chemical to the division and especially glyphosate which is recommended for the CRIN mandate crops and making sure that adulterated chemical are not supplied or purchased so as to have expected effectiveness i.e. suppression of weeds in our plots.

4) ***National Strike/Industrial dispute:*** There is a great loss due to the National Strike embarked upon by the Joint Research and Allied Institutions Sectors Unions (JORAISU) February to May, 2013 and 26 July to 16 December 2013 which affected maintenance of all the Estate's environments, plantations, all agronomic

practices and internally generated revenue by not able to harvest all farm produce which ought to be sold out. As much as possible, peace and understanding should be maintained in the Institute.

5) ***Rain storm:*** There was a great loss due to a heavy rain storm in the month of February, 2013 which destroyed all plantain and banana stands in all the plots in various zones along with some of the CRIN mandate crops and economic trees which barricade major accessible roads both in the Estate's environment and plantation roads.

6) ***Non-accessibility dedicated vehicle:*** There is lack of transportation for the monitoring purposes in the division. If a sound and good separate vehicle could be provided for the division (Hilux), it would be easier to touch hooks and corners of various units and BCOO plot at Ibadan throughout the season than the usage of personal pleasure car which is fragile and limited. In addition, by having full control on the wage and purchase of fuel into the vehicle, complain of faulty vehicle and fuel consumption will be minimized.

7) ***Inadequate supply of farm tools:*** These farm tools are necessary to provide good working condition. Tools that are presently available in the zones and other units are worn-out and needed replacement. These tools include: reinforced wheel barrow, aluminum bowls, head pans, watering can, harvesting hooks, plastic kegs, low stools, iron rakes, storex-tanks, rubber hoses, spades, basket, spraying pumps, chain saw etc.

8) ***Insufficient tables, chairs, stools and office cabinet:*** The chairs and tables in the units/zones are nothing to write home about, as they are worn-out. The offices allocated to the division in ERLS building were locked up because there are no tables and chairs. No cabinet in PEM's office to keep essential documents. Immediate upgrading of furniture items will be highly appreciated.

9) ***Zonal offices:*** There are no toilet in almost all the zones and other units. The effort of the Management to ameliorate problem of farm offices are highly appreciated but ground maintenance, NDM (Nursery) and fermentary unit do not have a specific farm house where their workers could hide themselves during heavy rainfall or sunny period while available farm houses are not burglary proofed (door and window) hence allows pilfering/thefts of properties and farm produce.

10) ***Supervisory motorcycles:*** The division finds it difficult to maintain supervisory motorcycles and it has to be done with individuals' personal money. For the durability of these motorcycles, we shall be grateful if certain amount could be approved and released either monthly or quarterly for such purpose.

11) ***Non availability of protective clothing:*** Protective clothes and footwear are not made available to all field staff. Due to the hazard these field staff are facing, it would be highly appreciated if field coat, spraying overall, rain boat, raincoat with cap, cutlass, sharpening file, nozzle cover and eye goggle could be provided.

12) ***Prompt release of fund***: Late release of money to purchase diesel and petrol to supply water for watering young cocoa plant on the field always affect the survival rate of plants, instead of releasing the money in bits, the amount required throughout the dried periods should be released once. The lasting solution is to sink well/borehole in the zones. Prompt payment of imprest anytime requested for should be ensured.

13) ***Delayed in prompt payment of wages***: Late payment of wages to special or regular casual workers constituted problems. If the small wages is paid as at when due to casual workers, they will be encouraged to work more and labor will be available within the locality. Hence early payment will encourage and enhance productivity.

14) ***Fencing round the Estate Nursery area:*** Log fellers did lot havoc to our young cocoa plants by passing through illegal roads with their trucks. Farm produces are being destroyed by Fulani cattle rearer. Thieves are also having free access to pilfer plantation and some other products while plantain bunches are harvested immature. All these can only be minimized or checked or controlled by fencing ground the Estate.

15) ***No enough imprest to run the affairs of the PEM, zones, NDM, HPU, VPU and Ground Maintenance:*** This imprest is used mainly for the purchase of diesel and lubricants into the Institute's tractor, eicher truck, lawn mower and motorcycles. The current amount of ₦70,000 per imprest is grossly inadequate, therefore should be increased and released on time.

F RUNNING IMPREST/EXPENDITURE IN THE LAST YEAR'S ESTIMATE

Imprest	January	₦70,000.00
	June	₦70,000.00
	July	₦70,000.00
	September	₦70,000.00

Running of tractor, law mower, ₦250,000.00 chain saw and supervisory motorcycle

Purchase of office stationery ₦35,590.00 and computer consumable

Construction of metallic artistic ₦218,000.00 work and numbering

Construction of raised platform ₦770,150.00 for drying Cocoa bean
Provision of farm tools ₦1,000,000.00
Purchase of petrol for ₦15,000.00 PEM's generator
Recruitment of 150 ₦5,280,000.00 casual workers
We are very grateful for the improvement on the release of funds to the division because it made the local running of the division easier compared to the previous year and also for the upgrading of the division's standard.
We commend your efforts and will highly appreciate Sir, if you can continue with improvement.

G FEATURES I.E. WHAT I LIKE TO SEE IN MY DIVISION IN TERMS OF STAFF RECRUITMENT, LEVEL AND NUMBERS

Periodical recruitment of more field staff (AFA III) level about 150 (one hundred and fifty) numbers
Upgrading/conversion of self trained (OND/HND)
Conversion of some laid off casual labors who have served for long years.

H BUSINESS TO BE CONSIDERED IN 2014 AND BEYOND

1) Establishment of 18hectares of new cocoa hybrid plots
2) Establishment of 10hectares of cashew plots
3) Establishment of 6hhectares of kola accuminata and cola nitida
4) Places of rehabilitation of old cocoa plots, kola plots and cashew plots
5) Provision of first aid box in all various zones/units
6) Advertisement of CRIN hybrid on Radio programmes to increase awareness and patronage level.
7) Production of 450,000 hybrid plots
8) More research work to be carried out on conventional dryer of Cocoa.
9) Local and International training of workers on various techniques related to the Institute scheduled crops.
10) Presentation of gifts/awards to the best unit and worker in respect of yield, maintenance, attitude/behavior and punctuality.

Table 1

Zones	Total hectrage	Effective hectrage	Crops planted
1	36.09	35.76	Cocoa, coffee, kola & cashew
2	13.91	11.90	Cocoa, kola & cashew
3 & 4	14.46	11.70	Cocoa, cashew, oil palm
5	32.335	24.75	Cocoa, coffee,
6	37.88	26.75	Cocoa, cashew, kola
7	25.94	23.35	Kola
8	40.78	35.71	Cocoa, cashew, oil palm
9	44.09	18.48	Cocoa, oil palm, cashew
BCOO	6.20	6.00	Cocoa
TOTAL	251.685	194.4	

Total Effective hectrage 194.4

ADMINISTRATION AND SUPPLIES DEPARTMENT (Ubebe, P.A.)

The Administration and Supplies Department of the Institute applied itself meritoriously to its primary responsibilities of supporting and assisting the Executive Director in the day-to-day administration of the Institute in conformity with the Institute's Mandate and mission statements.

A. STRUCTURE OF THE DEPARTMENT

To facilitate the activities of the Department, the Department is structured into three (3)
Divisions, viz: Administration Division, Supplies Division and Health Services Division.
Two of these Divisions are further structured into the following Sections:
Administration Division - Human Resources Management Section, Legal and Corporate Matters Section, Pension Section and Catering Services Section.
Supplies Division - Purchase and Supply Section and Stores Section.

B. ACTIVITIES OF THE DEPARTMENT

Detailed reports of the functions of the Department are as follows:

(i) Cost-effective management of all the administrative activities of the Institute, including all elements of Personnel function, Legal and Corporate Matters, incorporating Governing Board affairs and Public Relations.
(ii) Planning, organizing, co-ordinating and control of all activities, personnel, funds, materials, equipment and

infrastructural resources in the Administration and Supplies Department of the Institute.

(iii) Identifying, articulating, formulating and reviewing from time to time the administrative activities of the Institute in compliance with the statutory mandate of the Institute, current Government policies and priorities, as well as all rules and regulations for the management of Government Institutions as they affect the Institute, the demands of farmers for the Institute mandate crops and manufacturers of products derivable from the Institute's mandate crops, promotion of staff welfare and public image of the Institute.

(iv) Human Resources Management, including appointments, staff training and development, promotions, discipline, disengagement, post-disengagement, and staff welfare. Records of the aforementioned administrative functions are highlighted below:

C. PROMOTIONS

Briefs on staff (both Senior & Junior) due for year 2013 promotions exercise had been submitted to Management for consideration and further directives.

D. APPOINTMENT

No appointment was made in 2013.

E. CONFIRMATION

As at June 2013, One hundred and fifty-two (152) staff were confirmed (63 senior staff and 89 Junior Staff)

F. TRAINING

As at 31 December, 2013 seven (7) Research Scientists were on training for their PhD Programmes while one (1) Programme Analyst is on PhD training and sixteen (16) Non Research Staff were also on training on part time and self sponsorship basis.

The Table shows the list of Research Staff on Training as at 31 December, 2013.

RESEARCH SCIENTISTS CURRENTLY ON TRAINING

LIST OF RESEARCH OFFICERS ON TRAINING FROM JANUARY TO DECEMBER, 2013.

S/N	NAME	DESIGNATION	CONRAISS	PROPOSED COURSE OF STUDY	NAME OF INSTITUTION	DATE OF COMMENCEMENT	REMARKS
1	Mrs. Ugioro Osasogie	Research Officer I	08	Ph. D (Plant Physiology)	FederalUniversity of Agric,Abeokuta, Ogun State	2010	
2	Mr Oduwaye O. F	Research Officer I	08	Ph.D (Pathology)	Federal Univeristy of Agric.Abeokuta, Ogun State	2010	
3	Mr Kolawole Oluwaseun	Research Officer I	08	Ph.D (Microbiology)	University of Ibadan, Ibadan.	2008/2009	
4	Mr. Adeniyi D. O	Research Officer I	08	Ph.D (Plant Breeding)	Federal University of Agriculture,Abeokuta Ogun State	2012	
5	Mr. Olaniyi Olayinka O.	Research Officer I	08	Ph.D (Plant Breeding)	Federal University of Agric.Abeokuta, Ogun State.	2012	
6	Adeosun A. Seun (Mr.)	Research .Officer I	08	PhD (Crop Physiology)	University of Ibadan, Ibadan.	20/12/2013	
7	Nduka Beatrice Abanwu	Research Officer I	08	PhD (Crop Soil & Pest Mgt.)	Federal University of Technology (FUTA), Akure.	2012/2013	

PROGRAMME ANALYST CURRENTLY ON TRAINING AS AT DECEMBER, 2013

S/N	NAME	DESIGNATION	CONRAISS	PROPOSED COURSE OF STUDY	NAME OF INSTITUTION	DATE OF COMMENCEMENT	REMARKS
1	Mr. Ibe Osita	Programme Analyst I	08	Ph.D (Physics, lower atmospheric physics)	University of Ibadan, Ibadan.	2011/2012	

The Table below shows the list of Non-Research Staff on part-time/weekend training as at 31 December, 2013

NON-RESEARCH SCIENTISTS CURRENTLY ON TRAINING FROM JANUARY TO DECEMBER, 2013

S/N	NAME	DESIGNATION	CONRAISS	PROPOSED COURSE OF STUDY	NAME OF INSTITUTION	DATE OF COMMENCEMENT	REMARKS
1	Mr. Adewoye G. Adebowale	Higher Science Lab. Tech	07	M.Sc (Environmental science) Environmental Toxicology)	Olabisi Onabanjo University, Ago - Iwoye	2011/2012	
2	Mr. A. O. Orimogunje	Agric Supt	06	M.Sc (Agric Extension and Rural Development)	University of Ibadan, Ibadan.	2010/2011	
3	Mrs. Arowosafe F. F	Snr. Clerical Officer	05	ND (Public Admin)	The Polytechnic, Ibadan, Akure Study Centre	2010	
4	Mrs. Ogundare O.A	Snr. Agric Field Overseer	04	ND (Agric Technology)	Federal College of Agriculture, Moor Plantation Ibadan		
5	Mr. Robert V. O	Clerical Officer II	03	Bachelor of Law	National Open University of Nigeria Sango, Ibadan	2012	
6	Miss Ganiyu B. Omolaja	Clerical Officer II	03	OND (Office Tech. and Management)	The Polytechnic,, Ibadan	2011/2012	
7	Mr. Ganiyu Ibrahim	Agric Field Attd. III	01	ND (Computer Sci.)	The Polytechnic, Ibadan	2010	
8	Mr. Oghenegueke Gift	Agric Field Attd. III	01	ND (Agric Tech.)	Federal College of Agriculture Moor Plantation, Ibadan	2011	
9	Miss Alhassan Gloria E.	Agric. Field Attd. III	01	ND (Business min. and Management)	Gateway (ICT) Polytechnic, Igbesa, Ogun State	2011/2012	
10	Adesina Motunrayo C.	Agric Field Atted. III	01	(Accountancy)	The Polytechnic, Ibadan	2010	
11.	Idi Mohammed (Mr.)	PAS	11	MSc. (Agric. Techno)	FUTA, Akure	2013	
12.	Adegboye Jibola (Mrs.)	HAS	07	MSc. (Crop Mgt.)	FUTA, Akure	2013	
13.	Ibhrahim Wasiu Adewale (Mr.)	AEO	05	B.Sc. (Accounting)	LAUTECH, Ogbomoso	2013	
14.	Olagunjui Rasaki (Mr.)	AFA II	02	ND (Agric. Technology)	Federal College of Agricultural, Moor Plantation, Ibadan	2013	
15	Baoku F.A. (Mrs.)	Matron I CRIN, Ibadan	11	B.Sc. (Nursing	LAUTECH, Ogbomoso	2013	
16	Mrs. Oduola A. O.	Prin. Nurses Sister II	07	MSc. Social Work (Health Option)	University of Ibadan, Ibadan.	2013	

ATTENDANCE AT NATIONAL AND INTERNATIONAL CONFERENCE/WORKSHOP/SEMINAR IN YEAR 2013

S/N	NAMES/DESIGNATION	CONRAISS	CONFERENCE	DATE	VENUE	SPONSORING BODY
1.	Mr. Kolawole Oluwaseun Research Officer I	08	6th Annual Conference of the Mycological Society of Nigeria NAU 2013	Mon 10 – Thursday 13 May, 2013	Chike Okoli centre, Nnamdi Azikwe University, Akwa Anambra State	Self sponsroship
2.	Adewale Babasola A. Senior Research Officer	09	Second International Conference/Workshop on Giant African Land Snail	2013	Federal University of Agricultural, Abeokuta, Ogun State.	
3.	Mrs. Mokwunye, I. U. Senior Research Officer	09	A monitoring Porgramme of the African Women in Agriculture Research and Development (AWARD)	18 – 22 March, 2013	Kenya	
4.	Mrs. Mokwunye, I. U. Senior Research Officer	09	The African Women in Agricultural Research and Development (AWARD) Science Skill course.	26 June – 02 July, 2013	Uganda	
5.	ILoyanomon C. I. (Mrs.)	11	Competing Claims on Natural Resources	4 – 5 March, 2013	Netherland	

S/N	NAMES/DESIGNATION	CONRAISS	SEMINAR	DATE	HOST ORGANISATION	SPONSORING BODY
1	Dr. O. S. Ibiremo (Asst. Director)	14	Presentation of Proposals on Cocoa and Cashew	17 September, 2013	OLAM NIG. PLC, Lagos	OLAM NIG. Plc., Lagos
2	Dr. R. R. Ipinmoroti (Asst. Director)	14	Presentation of Proposals on Cocoa and Cashew	17 September, 2013	OLAM NIG. PLC, Lagos	OLAM NIG. Plc., Lagos
3	Mr. F. Olasupo Research Officer I	08	Presentation of Proposals on Cocoa and Cashew	17 September, 2013	OLAM NIG. PLC, Lagos	OLAM NIG. Plc., Lagos

S/N.	NAME	DESIGNATION	CONRAISS	PROPOSED COURSE OF STUDY	NAME OF INSTITUTION	DATE OF COMMENCEMENT	SPONSORING BODAY	REMARKS
1.	Onigbinde O. O.	Prin. Acct I	11	Workshop on Auditing and investigation at the Administrative Staff College of Nigeria	ASCON Topo Badagry	Mon 21st and Friday 25th October, 2013	CRIN	
2.	Onigbinde O. O.	Prin. Acct I	11	Workshop on Auditing and investigation at the Administrative Staff College of Nigeria (ASCON)	ASCON Topo Badagry	Mon 21st and Friday 25th October, 2013	CRIN	

OFFICERS ON IN-SERVICE

G. LEFT THE SERVICE

Seven (7) Staff retired from the Institute on ground of Statutory Retirement Age of 60 years and Length of Service of 35 years while (3) left on account of death.

LEFT THE SERVICE AS AT JULY - DECEMBER, 2012

S/N	NAME	DESIGNATION	CONRAISS	DATE OF BIRTH	DATE OF 1ST APPT.	DATE OF EXIT	MODE OF RETIREMENT
1.	Adeyemi Amos Olalekan	Senior Exec. Officer	08	28/12/55	1/2/78	1/12/13	Length of Service
2.	Buari A. O. (Mrs.)	Chief Sec. Asst.	08	29/12/54	20/11/78	20/11/13	Length of Service
3.	Azeez Bamidele	Chief Sec. Asst.	08	7/2/55	1/12/78	1/12/13	Length of Service
4.	Babafemi J. O.	Director	15	3/12/53	26/4/82	3/12/13	Age
5	Aboderin Caroline A.	Chief Sec. Asst.	08	15/11/57	4/12/78	4/12/13	Length of Service
6.	Ojo Ezekiel Oluwole	Snr. Clerical Officer	04	24/12/53	1/9/93	24/12/13	Age
7.	Ige F. A.	Asst. Chief Agric. Overseer	05	*24/12/53*	8/7/80	24/12/13	Age
8.	Asimi Olasinbo	Asst. Chief Agric. Field Overseer	05	*8/2/69*	14/6/01	7/11/13	Deceased
9.	Adio Joshua	Higher Agric. Supt.	07	*29/4/80*	30/9/10	10/10/13	Deceased
10.	Adesiyan Mufutau	Agric. Field Attd. II	02	*10/10/63*	2/2/09	26/9/13	Deceased

H. CRIN FOUNDER'S DAY: The Institute's Founder day was celebrated on 7 December, 2012 and non was done in 2013.

I. TOP MANAGEMENT MEETING: Four (4) Top Management Meetings were held between January – December, 2013. (i.e. 3/4/13, 22/7/13, 23/7/13, 26/7/13)

J. INTERNAL MANAGEMENT COMMITTEE MEETINGS FROM JANUARY – DECEMBER, 2013: Five (5) IMC Meetings were held between January – December, 2013. (i.e. 29/1/13, 2/4/13, 13/5/13, 26/9/13, 29/10/13)

K. LITIGATIONS: The Institute's cases presently in Court include:
(i) Mr. Ibrahim Suleiman V CRIN
(ii) 10 retrenched staff of 1985 V CRIN
(iii) ASURI V Federal Ministry of Agriculture and Rural Development, CRIN and 4 others.
(iv) Mrs. Stella-Maris Ogunjobi V CRIN.

L. CORPORATE VISITS: The Institute received a lot of visitors in year 2013 including the Executive Secretary, Agricultural Research Council of Nigeria (ARCN), House Committee on Agriculture, Regional Director (FMA & RD), etc.

M. CRIN GOVERNING BOARD: The Institute's Governing Board was inaugurated on Monday, 30 September, 2013 in Abuja by the Minister of Agriculture & Rural Development, Dr. Akunwumi Adesina. The Membership of the Institute's Governing Board are as listed below:-

1. Chief Francis A. Fadahunsi, MFR - *Chairman*
2. Prof. Malachy O. Akoroda - *Secretary*
3. Dadiowei Terilayefa Ebimo - *Member*
4. Hajiya Mairo Momoh - "
5. Hon. Mike Umoru Inalegwu - "
6. Mrs. Ugo Ukpai - "
7. Hon. Hajiya Hadiza Mohammed - "
8. Prof. M. D. Magaji (Rep. of Executive Secretary, ARCN) - "
9. Mr. A. O. Azeez (Rep. FMA & RD) - "

O. PENSION ADMINISTRATION: Pensioners were attended to as at when necessary. The pension pay parade was conducted on 17 June, 2013, and monthly pensions were prepared and paid as at when due. Institute's Pension Scheme Board of Trustees meetings were held and serviced as appropriate, during the year under review:
(i) 18 February, 2013 Ibeku Substation
(ii) 20 May, 2013 Gboko, Benue State
(iii) 6 August, 2013 Ajassor Substation
(1) 27 September, 2013 Federal College of Agriculture, Akure (emergency)
(2) 29 November, 2013 Ijebu-Ode, Ogun State. (emergency)

Workshop/Seminar for members of Board of Trustees and Staff of Pension Secretariat was facilitated by Projectlink Konsult Limited at Ikogosi Warm Spring on 7 – 10 October, 2013.

P. CRIN HEALTH CENTRE (Famaye,F.B.)

STAFF

10 Qualified Nurses
1 Chief Secretarial Assistant
2 Store keepers
1 Assistant Executive Officer
5 Hospital Attendants
1 Clerical Officer
1 Gardener

FUNCTIONS

NURSES FUNCTIONS

1. Treatment of minor ailment of staffs, casuals and patients within the community and outside the community.
2. Referral and outside the community.
3. Dressing of complicated cases to the Hospital in the town.
4. Supervision of Attendants on their job.
5. Taking deliveries of normal vaginal deliveries pregnant mother in labour
6. Care of babies during the infant welfare clinic
7. Antenatal care of pregnant mothers
8. Suturing of extensive wound and laceration
9. Giving of immunization to both adult and babies
10. Rendering of family planning services to clients
11. Carrying of social work services when need arises
12. Training of IT students when posted to the centre
13. Dispensing of drugs
14. Checking and monitoring of v/signs
15. General counseling on Health

HEALTH ATTENDANT FUNCTIONS

1 Issuing of card for patients
2 General cleaning of the Health Centre which include:
   - Emptying of the dust bin
   - Dusting of the cub webs
   - Cleaning of Lovoures windows
   - Mopping of floors
   - Sweeping of surroundings
3. Assisting the Nurse in the Labour room and other nursing duties
4. Counting of drugs used after each days work.
5. Washing of dirty clothes, window, blinds used instrument and their sterilization
6. Dressing of minor wounds
7. Fetching of water
8. Running of errands when need arises.

THE SECTIONAL HEAD FUNCTIONS

Performs administrative duties along with other Nursing duties. Also see to the welfare of staffs in the division and see to the smooth running of the Health Centre.

- Notifying the relevant authority of outbreak of diseases.
- Weekly facility Report of Acute flaccid paralysis (AFP) surveillance system to the LGA.
- Monthly Medical Report of activities the Health Centre to the Director of Administration.
- Collects impress for the running of the centre and makes returns
- Request for drugs for Health centre and sub-stations.

FUNCTION OF SECRETARIAL ASSISTANT

- To type documents
- To file documents
- To receive mails

FUNCTIONS OF AEO

- Recording of names and particular of patients and their treatment into treatment book.
- Recording of patients that comes and goes in and out of the Health Centre
- Opening and registering of files for new patients at the Health Centre
- Issuing of cards
- Making sure that patients files are kept in good condition and properly arranged.

CLERICAL OFFICER FUNCTIONS:_perform clerical job which include:

- Cleaning of offices
- Collecting mails to and from the offices
- Dispatching mails and circulars
- Filling of letters and circulars
- Running errands when necessary.

THE STORE KEEPERS' FUNCTIONS: Takes care of drugs in the drug store

- Takes and keep their stock and gives to Nurses when needed
- Shares and gives drugs to substation as necessary
- Arrangement of the inventory
- Balancing of drug ledger
- Checking of drugs from time to time to prevent obsolete drugs and expired drugs

GARDNER

- He cuts the grasses and weeds thus making the environment neat and tidy.
- He trims the flowers.
- Wetting of flowers.
- He assists when necessary.

DISPENSARY: Between January – December 2013, a total of 7,024 Patients were attended to in the dispensary section.

MATERNITY: Between January – December 2013 a total of 640 cases were seen amongst whom are pregnant women 2 and children under 1 year.

DELIVERY: 9 Babies were delivered normally by spontaneous vaginal delivery without any complication.

FAMILY PLANNING: 50 Clients attended the Family Planning Clinic

DEATH: No death was recorded throughout the year 2013

IMMUNIZATION: About 18 children and Adult immunized during the period of report. The figure is due to place of electricity supply to store the vaccine.

INCOME GENERATION: Income generated from Maternity Section was N27,900:00
From Dispensary Section N77,000 were generated this year 2013.

SOURCES OF INCOME GENERATION: Income is being generated from non- CRIN Staff that comes for treatment in the form of registration and consultation/delivery fee from both staff and non-staff. Treatment of emergency cases like suturing of laceration cutlass/matchet cut from non-CRIN Staff Admission fee for both staff and non-staff through at a reduction rate for staff members.

SICK OFF/ REFERRALS: Sick off were given to casuals and staff members depending on the medical condition on presentation at the health centre. Few cases of Patients of both staff and non-staff were equally referred to the Hospital for expert management.

IMPREST COLLECTED: The total imprest collected for year 2013 was seventy-three thousand, one hundred and eighty naira only (N73,180:00) The money was used for running the division such as maintaining the cleanliness of the environment, office work such as Typesetting and photocopy of documents, fueling of ambulance, kerosene, generator and repairs as necessary.

CASH ADVANCE FOR DRUG PURCHASE: About One million nine hundred thousand naira was released for drugs purchase for both Headquarters and substations in December, 2013.

STAFF EDUCATION: None of the Nurses enjoyed sponsorship for important seminars or workshop that is needed to update and improve their knowledge and skill in year 2013.

Uniform Allowance: Uniform approved uniform allowance of N20,000 (twenty thousand naira) per annum due to each Nurses was not paid in year 2013.

ROUTINE BLOOD PRESSURE CHECK AND ADMINISTRATION OF WORM EXPELLANT DRUG TO STAFF: This exercise was carried out in the month of June, July and August 2013. About Five hundred and five (505) staff benefited from the exe4rcise before it was disrupted by the crisis in the Institute.

BABIES PARTY: This is an annual programme organized for children and babies to create awareness on some Health issues that will improve the general health status of the community and encouraged others to patronize the clinic. An amount of One hundred and twenty five thousand naira was released for the programme.

ACHIEVEMENTS PROGRESS

1. Periodical monitoring of CRIN Staff and casuals blood pressure to detect hypertensive crisis as well as administration of worm expellant drug to staff to aid perfect health was carried out.
2. **Good road Newwork**: The Access road in the Junior staff quarters leading to and fro from the Health centre was constituted and completed on March 2013, this making transportation of clients and patients easy.
3. **Total Renovation of Health Centre**: This was commenced in December 2013 and is still in progress as at reporting. This will beautify the environment and promote the will being of staff and patients as well as maintain our dignity.
4. **Staff Promotion**: All the staff at the Health centre due for promotion in year 2012 were promoted in year 2013 about six (6) of them.
5. Nurses were included in year 2013 CRIN pay parade verification exercise for retirees at the headquarter and six (6) other substations to attend to the welfare of the retirees on health related issues.
6. Accreditation of Health Centre as NHIS provider We are earnestly praying looking forward to being accredited. The officials came for inspection on 12th September, 2013 but we have not heard from them since though they promised to contact us.

FUTURE EXPECTATIONS

1. Accreditation of Health Centre as NHIS provider. We are earnestly praying and looking forward to being accredited as NHIS primary provider as this will benefit all staff and the community at large.
2. We have received a Computer system with UPS on 3/1/14, but there is need to provide us with a printer and a photocopier machine for use.
3. Termite Infestation: Fumigation should be carried out every three months to avoid re-infestation.
4. Regular and constant electricity supply by providing a standby 10,000 watts generator (Petrol) for use for procedures and preventing spoilage of vaccines and injections or extending the power supply from the main office to the Health Centre during working hours.
5. Provision of constant water supply by digging a functioning bore-hole with pipe fittings to supply running water for use.
6. Shift Allowance as well as Hazard allowance for medical workers is yet to be implemented. This is emoluments enjoyed by Health personnel all over the

world but is not being paid to us. We appeal to management to intercede on our behalf.

7. The imprest given to the division is not regular for instance throughout year 2013, a sum of 73,180.00 was received There should be bulk allocation i.e a specific amount should be given to us yearly for use to avoid bureaucracy involved during the allocation. This will allow for efficiency and proper utilization.
8. Training Needs: It is of immense importance that each of the Nursing is allowed to partake in one or two training sessions that is related to the Nursing field annually to update their knowledge and it is also mandatory for them to renew their practicing license issued by the Nursing & Midwifery council of Nigeria. A certificate of workshop/Seminar is needed from the council before renewal of license is approved.
9. Inadequate Manpower: there is need to recruit (2) two Nurses, and (3) Health Attendants to cater for their three (3) shifts and provide coverage for maternity leave, sick leave, casual leave, examination leave etc.
10. There is need for a permanent driver to be attached to the Health Centre on shift basis (i.e 24 hrs) to cater for emergencies.
11. Provision of medical equipment like a stretcher for carrying non ambulant patients.
    - An authoclave machine for sterilizing of instrument and dressing material
    - Examination couch for examination of patients
    - Rubber boots for use in the labour room
    - Suction machine (electrical) for resucitative procedures
    - Digital sphygmomanometer for monitoring of blood pressure
    - Sonicaid and gel for foetal heart monitoring.

12. There is need to deploy a security staff to the Health Centre to ward of intruders and ensures security of staff, clients and patients.

Q **SUPPLIES DIVISION**

- **BALANCING AND CHECKING OF LEDGERS:-** Store ledgers are balanced and checked on monthly basis.

- **TALLY CARD:-** Tally Cards are being put on each item in the store and they are updated from time to time.
- **TAKING MATERIALS ON CHARGE:-** Materials purchased by Procurement Unit during the period under review were properly checked to ascertain the quantity and specification of the items received into the stores. The receipts of the purchase were treated accordingly.
- **ISSUE OF MATERIALS:-** Materials in the Store were issued out to the users accordingly as authorized or instructed.
- **CONTRACT/LPO:-** Materials delivered into the Institute through Contractors and Suppliers were properly checked and taken on charge accordingly. e.g.

(i) Supply of General Ledger folder and Ledger sheets for Pension Sections by HENTZA ADE ENT. Vide ADM BOT 9/Vol. 11/1 of 07/06/13)

(ii) Supply and Installation of Reagents for Electro Phoresis at CRIN Headquarters by WINTECK NIGERIA LIMITED on 19/06/13 vide Adm. 260 (Lot 2 (ii) of 07/11/13

(iii) Supply of Laptop and Other Accessories for Account use on (WAAP Project) vide Adm 263/3/1 on 11th Sept. 2013 by Glorious G & C Consult on 30th Sept. 2013.

(iv) Supply of Adjusted Books of Account for Account use for WAAP Project by HENTZA ADE ENT. Vide ADM 26/3/2.

(v) Supply of Farm Tools & Field Material vide Adm 268/1 by Joelim Venture Limited

(vi) Supply of Furniture & Equipment for Account and Finance Department vide Admin. 264/D by REMZEG Nigeria Limited

(vii) Supply of Computer and its Accessories for EUR Department by KURTNODE Associates vide Adm24/A

(viii) Supply of Office Furniture and Equipment for Library Information & Documentation Department by NEW JERUSALEM Ventures Nigeria Limited vide Adm 264/C.

(ix) Supply of Computer and it's Accessories for Admin. & Supplies Department by NEW JERUSALEM Venture Nigeria Limited vide Adm 264/B

(x) Supply of Metal Lateral file Cabinet for Admin. Division by Posires Nigeria Limited Ad 260 Lot 2.

(xi) Supply of Computer and it's Accessories for Research Department vide Adm 264/f by PAT and Nigeria Enterprises.

(xii) Supply of Polythene Bags for the Institutes vide Adm. 263/1 by Global GRA Ventures Limited.

(xiii) Supply and Installation of Reagents for Electro Phoresis by WINTECK NIGERIA LIMITED vide Adm 260 (Lot 2 (ii))

(xiii) Supplies of Laboratory Equipment by TUNNEX Laboratory Engineering Limited vide Adm (Lot 2 (I)

- **CHECKING OF STORES AND STOCK:-** The various stores were visited regularly to check the stores and stocks therein and make sure everything were in order.

- **RE-ORDER LEVEL:-** Re-Order Level of Materials like diesel, oil etc. were forwarded from time to time, to make sure that such items are not out of stock.

- **RELEASE OF AGO:-** Diesel and Oil were released to Engineering Division everyday to power the two 250KVA Generator Set in the Institute.

- **EVACUATION:-** Participated in the evacuation of obsolete material and bonding of old materials in the store.

- **GENERAL CLEANING AND RE-ARRANGING OF ITEMS:-** General cleaning and re-arranging of items in the research store and health centre store was carried out during the period under review.

- **EXTRACTOR OF STOCKTAKING LIST: -** In preparation for the end of year 2012 stock taking, stock list were extracted from the ledgers in all the various store.
- **STOCK TAKING:-** End of year 2012 physical stock counting exercise started on 04 January 2013. This exercise involved the Account Staff, Audit Staff and Store Staff. During this exercise three teams travelled to all the Sub-stations for this same exercise in January, 2013.

- **EXTERNAL AUDITORS:-** External Auditor's from the office of Auditor General and office of Accountant General visited store.

- **REPORT:-** Report of activities in Store Section were forwarded as at when necessary

- **BOARDING EXERCISE:-** Participating in the Boarding exercise of the old and obsolete materials from store.

- **OBSOLETE MATERIALS:-** List of obsolete items were extracted and compiled in all the store for Task Force Team and Board of Survey Committee to carry out their assignment last year and early this year.

LEGAL UNIT (Ikokoh, L.U.)

The Institute's Legal Unit was subsumed under the Legal and Corporate Matters Section in the Administration and Supplies Department before 22 October, 2013. At present, the Legal Unit is under the Office of the Executive Director. This report is based on the operations of the Unit while it was still under the Administration & Supplies Department and its present status, that is, under the office of the Executive Director.

1. <u>FUNCTIONS</u>
   The Legal Unit undertook the following functions:

(a) Litigation
   All matters in Court were attended, both at Ibadan and Lagos.

Below is the list of cases still pending, the cause of action, the various Courts and the stage of the cases:

S/N	CASE LIST	CAUSE OF ACTION	COURT	STAGE
1.	Mr. Ibrahim Suleiman v. CRIN	He is challenging the termination of his appointment as Higher Security Officer in the Institute in 2010, on the claim that the termination was unlawful	National Indusrial Court Ring-Road, Ibadan	Hearing stage, the evidence of both parties is presently being examined by the Court.
2	10 Retrenched staff of 1985 v. CRIN	They are seeking to be paid all their benefits as at the time of their retrenchment, based on the number of years spent as staff of the Institute.	The matter is at the Federal High Court, Ibadan but is to be transferred to the National Industrial Court which has exclusive jurisdiction over labour, employment and trade union matters.	At mention stage.
3	Academic Staff Union of Research Institutes v. Minister of Agriculture and five others	They are challenging the Federal Government, that no one from ooutside the Research	National Industrial Court, Lagos.	The Court was about taking evidence.

		Institute or has never been one should be made the Executive Director of a Research Institute.		
4	Mrs. Stella Maris Ogunjobi & 2 others v. 1. Mr. Ogunkunle Gbadebo 2. CRIN	She is seeking redress for the death of her husband which occurred in 2009 in an accident in which a team of Research personnel were on their way to Delta State to carry out an assignment on cocoa. Mr. Ogunkunle Gbadebo was the driver	Federal High Court, Ring Road, Ibadan.	At mention stage.

(b) Legal Documents

Most of the legal documents were drafted and interpreted by the Unit especially Memorandum of Understanding between CRIN and other International Organizations and other Institutions.

(c) Legal Advice

(i) The Unit provided legal advice on various issues to the Institute's Management especially on procurement matters.

(ii) The Unit also advised on the legal implications in the areas of staff discipline, Panels of Enquiry and Committees set up by Management.

2. Achievements

(a) The major achievement of the Unit was the creation of the Legal Unit under the Office of the Executive Director, which has made the Unit more operational.

(b) The Unit has also been successful in handling all Institute's matters in Court through the Institute's Legal Retainer, Chief K.O. Latunji and so far, CRIN has the upper hands.

3. Staff Strength

As earlier stated, there was only one staff of the Unit and that is Barr. L.U. Ikokoh (Mrs.),
Senior Administrative Officer (Legal) and Ag. Head, Legal Unit. Although, there were some other staff of the Administration Division that assisted in carrying out other functions relating to the unit.

4. Conclusion

I want to use this medium to thank the Executive Director and the Institutes Governing Board for deeming it fit to create the Legal Unit, under the office of the Executive Director On 22 October, 2013

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ANNUAL REPORT

OF THE

COCOA RESEARCH INSTITUTE OF NIGERIA, IBADAN

2014

TABLE OF CONTENTS

COCOA PROGRAMME

Experimental Title: Commercial evaluation of boiled cocoa bean shell in layers mash

Investigators: Olubamiwa O.; Adebowale B.A.; Ogunnaike E.F and Adeoti J.O

Introduction

Nigeria is currently rated as the number one egg producing nation in Africa, and poultry production contributes 25% to the domestic agriculture (Nasta, 2013). Cocoa bean shell (CBS) is a waste product in the Nigerian cocoa industry. CBS is the seed coat covering the cocoa bean cotyledon. It constitutes nearly 10% of the bean weight resulting in disposal problems for the cocoa processing factories in Nigeria. The national estimated annual production of CBS is about 10,500 tonnes (Aina, 1998). According to Hamzat and Adeola (2011), agricultural byproducts like CBS, spent tea leave and coffee pulp constitute major pollution to the environment as they are discarded into nearby water bodies. The use of CBS as animal feed therefore would represent a significant gain to the cocoa industry (Olupona *et al*., 2003).

Evaluation of CBS as a non-conventional feed ingredient was first reported by Gohl (1981). Hutagalung and Chang (1978) reported the amino acid profile of CBS to be similar to that of palm kernel cake - a popular fibrous feedstuff. Dried CBS contained 13.12% crude protein, 13.00% crude fibre, 9.87% ether extract, 8.25% ash and 2400 Kcal/kg metabolizable energy (Olupona *et al.,* 2003). Very little attention has been given to the use of CBS in the animal sector due to the presence of theobromine (an antinutritional factor).

Emiola*et al.* (2011) reported that average daily feed intake and percentage hen/day production decreased significantly beyond 15% inclusion of raw CBS in the diets of Shaver Brown pullets fed CBS. This report substantiated the need to pre-treat CBS before inclusion into animal diets. Previous reports have shown boiling as the most efficient method of reducing the theobromine in CBS and thus enhancing its nutritive potential (Olubamiwa*et. al*. 2006; Adeyinka and Ademoroti, 2003). This was in agreement with the report of Menon (1982) which indicated that anti-nutritional compounds in feedstuffs could be reduced by heat, sun drying and boiling. To confirm this, a study (Olubamiwa*et al.,* 2006) was conducted on the effect of different boiling durations (15, 30, 45 and 60 minutes) on CBS to determine which will produce the best economic performance of layers. The 15-minute boiled CBS produced the best egg performance measurements.

Objective

This present study aimed at confirming the repeatability of the economic potentials of the 15-minute boiled CBS in the diet of laying hen on a commercial (on-farm) basis.

Methodology

Boiling treatment: Two previous studies showed that pre-boiling CBS prior to dietary incorporation in layers mash proved very profitable (Olubamiwa and Hamzat, 2006; Olubamiwa*et al.,* 2006). As a means of extending the results to feed-millers, an on-farm experiment was conducted within Ogunnaike Agricultural Industry (Hope Farms), Ibadan, Nigeria. Treatment of CBS involved keeping CBS in boiling water (100^{o}C) for a duration of 15 minutes then sun drying (Olubamiwa*et al.,* 2006).

Experimental birds: Seven hundred and fifty (750) point-of - lay black Hacco birds at 20 weeks of age were selected from within several thousands of other birds at Ogunnaike Agricultural Industry (Hope Farms), located within Ibadan metropolis. This farm has about the largest feed milling factory within Oyo state of Nigeria. The farm was a collaborator in this study.

Experimental birds' management: The 750 birds were housed in 5 (1000 bird capacity) battery cages. Birds were arranged in such a way to allow for cross ventilation and easy data taking. They were fed twice daily (8:00 -8: 30 am and 2: 30 - 3: 00 pm).

Experimental design and data collection: A total of 750 birds were randomly allocated into five treatments. Each of the treatment had 10 replicates each of which had 15 birds. The birds were allocated into five dietary treatments in a completely randomized design. CBS replaced a similar feedstuff, wheat offal, in the commercial feed of Hope Farms at 5 and 10% dietary inclusions. This resulted in 5 dietary treatments: 1. (Commercial feed; 0% CBS); 2. (5% Raw CBS); 3. (5% Treated CBS); 4. (10% Raw CBS) and 5. (10% Treated CBS).

Daily egg collection was done and records of each replicate and treatment were taken. Weekly summation of data was used in calculating bird performance. Parameters determined included percent egg production, egg mass, egg weight and feed efficiency. Egg quality determination was done by calculating the mean shell thickness. Yolk coluration was determined using Roche Colour Fan.

Statistical analysis: Data obtained from this study were analyzed using the analysis of variance (ANOVA) and the mean values were separated by Duncan Multiple Range Test of SAS (Duncan, 1955; Steel and Torrie, 1980).

Results and Discussion

Proximate composition analysis of treated and untreated

CBS and those of the experimental diets are shown on Tables 1 and 2. CBS showed an improvement in crude protein level. The value was found to be similar to that of Adeyina*et al.* (2011). Data for the untreated CBS was found to be similar to that obtained by Apata and Ogundele (2005) and Emiola*et al.* (2011). Table 3 showed the summary of the productive performance of birds on the dietary treatments. The mean egg weight obtained in Diet 5 was significantly (P<0.05) higher than all other dietary treatments.

Egg mass, egg percentage and feed efficiency were also higher (P<0.05) on Diet 5. Feed intake did not differ across treatments. As established in the previous study on this subject, the 15-minute boiled CBS at 10% dietary inclusion produced higher egg production and better feed conversion. Egg quality parameters were equal across dietary treatments. Feed efficiency values reflected a better utilization of the 15-minute boiled CBS. This thus solved the earlier reported problem that the higher the dietary inclusion of CBS in feed, the higher the percentage fibre, theobromine level and consequently the poorer the feed utilization. Feed cost/kg egg was least on the 15-minutes boiled CBS diet. This lend further credence to the findings of Olubamiwa and Hamzat (2006) which reported that fifteen minute boiled CBS was efficiently utilized. Mortality of birds fed cocoa bean shell based diets decreased considerably when compared to the control. Price per tonne of compounded feed decreased across treatments. The results supported the replacement possibility of CBS in layers mash as well as the accruing economic benefit.

Conclusion

The essence of the five consecutive studies to establish CBS as a poultry feedstuff in Nigeria was given a boost by the result of this on-farm trial. The outcome was significant. Immediately following the last study, Hope Farms demanded through CRIN some 30 tonnes of CBS from Multi-Trex Integrated Foods PLC to test-run the market. Sequel to this Hope Farm purchased 90 metric tonnes of CBS from Multi -Trex. Given these facts, there is no gainsaying that CBS is moving towards being one of the poultry feedstuffs in Nigeria.

Acknowledgement

The authors are grateful to the Management of Hope Farms, Ibadan, Nigeria for making available 750 birds, feeds, their poultry house and some of their staff for the execution of the on - farm study. A similar gratitude goes to the Management of Multi – Trex Integrated Foods PLC, Ogun State, Nigeria, for providing the CBS and part funding the study.

Table 1: Results of proximate composition of raw and treated cocoa bean shell (% (DM))

Parameter	Raw cocoa bean shell	Treated cocoa bean Shell
Crude Protein (%)	12.82	14.68
Crude fibre (%)	17.42	16.42
Gross Energy(kcal/g)	2.478	2.329

Table 2: Ingredient composition of the experimental diets (%) kg

Ingredients	*Diets**				
	1	2	3	4	5
Maize	30.00	30.00	30.00	30.00	30.00
Wheat offal	10.00	5.00	5.00	-	-
Cocoa bean shell (CBS)	-	5.00	5.00	10.00	10.00
Sundry ingredients**	70.00	70.00	70.00	70.00	70.00
TOTAL	100.00	100.00	100.00	100.00	100.00
Calculated Analysis					
Crude Protein (%)	16.80	16.01	17.05	16.45	16.20
Crude fibre (%)	3.67	3.91	4.36	4.76	5.17
ME (K.cal/kg)	2702.00	2715.00	2682.00	2689.00	2700.00

*Diet 1 (0%CBS); Diet 2 (5% Raw CBS); Diet 3 (5% Treated CBS); Diet 4 (10% Raw CBS); Diet 5 (10% Treated CBS).

** Sundry ingredient composition: Groundnut cake(15.0), Soya bean meal(10.0), Palm kernel cake(7.0), Biscuit dust(8.0), Pelletized wheat offal(10.0) Bone meal(1.5), Oyster shell(7.0), Salt(0.3), Choline chloride(0.05), Albac(0.4), Toxynil farm.(0.015), Coliston sulphate (0.05), Vit. C(0.1), Layers premix(0.03), Lysine(0.2) and Methionine(0.2).

Premix composition/kg diet. Vitamin A - 10,000,000 i.u, Vit D3 - 200, 000 i.u, Vit E - 23,000 mg; Vit K3 2000 mg, Vit B1 - 3000 mg, Vit B2-6000 mg, Niacin 50,000 mg, calcium pantotherate - 10,000 mg, Vit B6 - 5000, Vit B12 - 25 mg, folic acid 1000 mg, Biotin - 50 mg, choline chloride - 400,000 mg, Mn - 120000 mg, Fe 100000 mg, Zn - 80,000 mg, Cu - 8,500 mg, I - 1500 mg, Co - 300 mg, Se - 120 mg

Table 3: Performance characteristics of laying hens fed graded levels of treated and raw CBS

Dietary Treatments						
Parameter	**1**	**2**	**3**	**4**	**5**	**SEM**
Egg weight (g)	51.17^a	48.80^a	48.83^a	50.83^b	53.25^d	0.22
Egg mass (g)	26.49^c	27.35^b	27.78^b	27.20^{ab}	29.53^{cd}	1.02
Egg Percentage	51.92^a	55.35^b	55.84^b	53.24^a	56.32^c	0.47
Mean feed Intake	100.29	101.50	101.71	98.50	100.33	n.d
Feed efficiency	0.26^a	0.27^a	0.27^a	0.27^a	0.30^c	0.42
₦/kg egg	211.00	184.10	197.74	190.68	179.34	n.d

Means on the same row with different superscripts are significantly different (p<0.05).
SEM = Standard Error of Mean. Nd – Not determined

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Experimental Title: Extension of CRIN technologies on cocoa value chain through training manual and demonstration plots.

Investigators: Williams O.A.; Ogunlade M.O.; Jayeola C.O.; Yahaya L.E.; Uwagboe, E.O.; Famuyiwa, B.S.; Oluyole K.A.; Adebiyi S.; Ndagi I.; Ogunjobi, M.A.K.; Abdul-Karim I.F.; Agbongaruyi A.E and Lawal J.O.

Introduction

Cocoa is one of the major cash crops that have placed Nigeria in the second position in the world market in the past. Cocoa production is a major agricultural activity in Nigeria. Its foreign exchange earning capacity and income generating ability cannot be over emphasized. In terms of foreign exchange earnings, no single agricultural export commodity has earned more than cocoa. Value chain in cocoa production is one of the connection or network which links all stakeholders in cocoa production from the field- to - table together. The chain among others includes the farmers, the processors, and cocoa merchants, the processing and manufacturing industries. Cocoa Research Institute of Nigeria (CRIN), has carried out research on technologies to be adopted by farmers and industrialists to improve production. Some of the technologies are cocoa pod husk fertilizer, cocoa pod liquid detergent and cocoa bread among others. There are diverse ways of using cocoa to improve livelihood of farmers and other stakeholders. This can only be achieved through training and dissemination of CRIN technologies. The studies of cocoa and their related products have become an area of interest owing to their health-promoting properties. In recent years, cocoa and cocoa products, namely cocoa powder, dark chocolate and cocoa liquor, have been shown to suppress the development of atherosclerotic lesions (Kurosawa *et al.* 2005), decrease platelet function (Murphy *et al.* 2003), increase dermal blood flow (Neukam*et al.* 2007), inhibit the proliferation of human breast cancer cells (Ramljak *et al.* 2005) and exert hypoglycemic properties (Tomaru*et al.* 2007).

Nowadays, consumers are more concerned with the nutritional status of foodstuffs. Cocoa powder and chocolate are extremely rich sources of many essential nutrients and phyto-chemicals that can contribute to a healthy diet (Lecumberri *et al*, 2007; Ieggli*et al*, 2011). Hence inclusion of cocoa powder in bread recipe will not only add to the nutritional quality of the bread but also serve as means of adding bioactive compounds to it. Also, local consumption and utilization of cocoa will increase thereby reducing the quantity available for the international market where the price of cocoa is always determined. On the other hand, there is the process which

involves the breaking down of plant and animal materials by microorganisms in the presence of water and air with cocoa pod husk. The end - product is known as compost/cocoa pod husk fertilizer. Compost is a store of organic matter and beneficial microorganisms.
In conclusion, soaps are largely produced from materials of petrochemical origin, which are rather finite, expensive and exhaustible in nature. This has rekindled interest in sourcing for alternative for their production. To this end, effort has been geared towards evolving such substitutes and cocoa pod husk stands. The procedure includes potassium salt which is used for soap production being extracted from cocoa pod husk.

Objectives

1. To improve farmers' livelihood.
2. To empower farmers and other stakeholders on the adoption and application of research results, technologies and techniques for agricultural production.

Materials and Methods

The study was carried out in areas where there were quests and prospects for the CRIN technologies. The CRIN technologies are as follows; Cocoa pod husk fertilizer, Cocoa bread, and Cocoa pod liquid detergent.
The study areas were chosen from the following states: Osun and Ondo (the first and second cocoa producing states in the South-West Nigeria). In each state, one cocoa growing community was selected; thus Ondo (Owena) and Osun (Ilare). Thirty five farmers were selected for training on fertilizer and liquid detergent while 10 bakers were selected for training on Cocoa bread. Thus, a total number of 85 farmers were trained. Participatory approach was used throughout the training session.

Activities

Cocoa bread: The exercise was achieved through participatory approach in a selected bakery in the communities of Ondo and Osun states. The practical demonstration of cocoa bread production was carried out by Dr (Mrs) C.O. Jayeola and Mr M.A.K Ogunjobi. The bakers were made to know the importance of incorporating cocoa in the ingredients of bread and the NAFDAC recommended ingredients to use in baking bread. The cocoa bread produced was shared to the participants for palatability test and perception of the consumers towards cocoa bread.

Cocoa Pod Husk Fertilizer: Dr. M.O. Ogunlade, a Soil Scientist made a power point presentation onmaking cocoa pod husk based compost using cocoa pod husks, chromolaena leaves,sunflower leaves cow dung/ poultry droppingsetc,.The practical aspect was demonstrated through participatory approach in selected sites by the farmers from both states. The management and maintenance of the composting was put in-charge of the representative of the farmers who was charged to do the turning and every other necessary occasional practice required to give the best compost.Ring application method was recommended at the rate of 5tonnes per hectare. Fortification or complementary use with mineral fertilizer will reduce the above rate. Application rate could also be based on the result of soil test. It can be applied once in a year as it slowly releases plant nutrients into the soil.

Cocoa Pod Liquid Soap: Dr. L.E. Yahaya,gave a power point presentation and practical demonstration on the activities involved in liquid soap production from cocoa pod husk. The steps involved started from collection of cocoa pod husk. He explained that ashing of dried cocoa pod husk was done in a drum with an open end, the process continued with the extraction of potash after which the solution was heated in a container and palm kernel oil was added to form a semi-solid mass after which it was dissolved in water to attain the requisite specific gravity.
The importance of keeping records of every activity in their farms was emphasized by the economists. Economic decision is always based on data collected and this can only be possible if data are collected by the farmers. The importance of inventory records, farm production records and financial records were also emphasized.

Record Keeping: On the Economists aspect; Emphasis was made on the importance of keeping record of every activity in their farms. Economic decision is always based on data collected and this can only be possible if data are collected by the farmers. Explanation was made on inventory records, farm production records and financial records are types of records a farmer should always keep for his activities.

Knowledge Management and Platforms: The Extensionists, gave a power point presentation explained the overall objective of information through sharing ideas, innovation, and experiences for quality practice along the value chain.
The wrap-up session was an interesting aspect. Majority of the participants came out to explain how much they understood what they have learnt. In addition, the farmers were made to know the benefits of each technology; the use compost fertilizer to improving soil nutrient on their farms, and the advantages over chemical fertilizer as supported by European Union (EU)

Regulations on environment pollution. There was a Health talk/awareness session delivered by the project coordinator on Ebola Virus Disease (EVD). The numbers of participants during the training were more than the expected; 118 participants were present instead of the expected 85.

Conclusion

Farmers in Owena appreciated CRIN for the training on compost fertilizer and promised on adopting of the technology. The drying period for the pod husk was between 6-8 weeks after which dried cocoa pod husk fertilizer/compost was put into bags and kept for the next cocoa planting season on a farm plot selected by farmers. This process was monitored from the 1st to the 8th week through telephone conversation and visit to both States. Bakers commended CRIN on the Cocoa bread training and promised to include the technology in production. Soap makers especially women saw the need of including Cocoa pod liquid soap in their production to boost their business in addition to the convectional black soap.

Analysis is on going.

The Monarch (Olu of Owena) and the Participants at the training in Owena, Ondo State.

Cocoa bread

Cocoa Pod husk fertilizers in a box

The Monarch Owalere of Ilare Osun State (middle), Participants and Scientists

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Experimental Title: Survey and evaluation of sprayer desings and pesticide application practices adopted by farmers for controlling insect pests and diseases of cocoa in southwest Nigeria

Investigators: Adeleke, S.A.; Okeniyi, M.O and Agbongiarhuoyi, A.E

Introduction

Global food insecurity and hunger have led to various approaches to strengthen food production methods and raise agricultural productivity. Pesticides have been emphasized by the producers along with a range of policy incentives as the only solution to pest and disease problems with farmers being progressively encouraged to apply pesticides to control diseases and pests. More so, abrupt change in cropping systems by farmers from mixed cropping to a more intensified mono-cropping has tendency of increasing pests and diseases population, their distribution and dynamic because the natural ecosystem would have been destroyed in the process.

The right choice of sprayer, correct calibration and observing the right agro-technical requirements are essential in achieving good results in pesticide application.

This study intends to obtain information on various sprayer designs and understanding of the concept of good spraying practices by farmers so as to determine if there is need to design a special sprayer for Nigeria cocoa farmers and educate them on the importance of good spraying practices in order to obtain better results in controlling pests and diseases of cocoa trees.

Methodology

1. Administration of questionnaire to cocoa farmers in two states in Southwest Nigeria with different levels of cocoa production (Ondo and Oyo).
2. Two villages were selected from one Local Government Area (LGA) from each state.
3. Selected major dealers in Agricultural Equipment (Sprayers) will be interviewed verbally on the various designs and current prices of sprayers recently adopted by most cocoa farmers in the selected states. Information received from them will be assisted with physical inspection of the sprayers and manufacturer manuals to determine the best sprayer design among those currently adopted by the majority of cocoa farmers.
4. Analysis of data obtained from farmers through questionaire by using the appropriate statistical tools such as Descriptive Statistics and Pearson Product Moment Correlation Coefficient.

Results and Discussion

The work is on-going and data is yet to be collected. The administration of questionnaire to farmers was earlier scheduled to commence from 21 January, 2015.

Experimental Title: Analysis of the factors affecting the practice of cocoa rehabilitation techniques in Nigeria: A case study of South- West and South-South geo ecological zones.

Investigators: Adejobi, K.B.; Taiwo, O.; Ogunlade, M.O.; Ayegboyin, K.O.; Famaye, A.O.; Adeniyi, D.O., Oyedokun, V.A. and Adeosun, A.S.

Introduction

The Nigerian cocoa economy has a rich agricultural history which is well documented in literature. It is a known fact that the cocoa industry in Nigeria contributed greatly to the country's GDP in the 50s and 60s up until early 70s when oil was discovered. The proceeds from cocoa were used in the development of schools, roads and several other infrastructures. However, the discovery of oil led to the neglect of the agricultural sector, which also affected the cocoa industry. Consequently, cocoa farmers abandoned their farms and shifted focus to other areas. There was equally massive migration of youths who hitherto were engaged in farm labour to the city in search of white collar jobs. As a result of this, most cocoa plantation in Nigeria became old and moribund and are thereby characterized by very low yield (Montogomery, 1981 and Olaiya, 2001). Hence these followed great decline in national cocoa output.

Folayan et al (2006), noted that cocoa production in Nigeria witnessed a downward trend after the 1971 season, when its export declined to 216,000 metric tons in 1976, and 150,000 metric tons in 1986, therefore reducing the country's market share to about 6% and placing Nigeria who used to be second largest producer in the world to fourth largest producer to date. This worrisome development led to the recent cocoa stakeholders forum held in Calabar, Nigeria by the Presidential Initiative on Cocoa, to deliberate on the state of the cocoa sub-sector and reach consensus on how investments in the cocoa sub-sector can be strengthened and increased among other issues that bother on the cocoa sub-sector, so as to boost cocoa production, domestic utilization and export.

In order to address this problem, Cocoa Research Institute of Nigeria (CRIN) developed various Cocoa Rehabilitation Techniques (CRTs) with the bid to rehabilitate and regenerate the old cocoa farms in order to improve on cocoa production output.

In view of the need for increased cocoa production, the institute has garnered effort in the sustenance of cocoa rehabilitation program and practice. Rehabilitation techniques considered for this study are grafting, planting under old cocoa trees (Turrialba method), chupon regeneration and coppicing methods. Rehabilitation according to Opeke (2005) is in two ways: the first is putting a cocoa field back into good condition, while the second is clearing the old cocoa trees and replanting with young seedlings. In his study, Adebiyi (2013) found that farmers in Oyo State are already old with low level of adoption and that farm size and farming experience are the factors affecting adoption of cocoa rehabilitation. He also found that majority (73.7%) of the cocoa farms have passed their productive ages which shows the need for rehabilitation of cocoa trees. This is in line with the assertion of Montogomery (1981) and Olaiya (2001) that the highest cocoa yield is achieved between 15 and 25 years and that a profitable life span may be 50 years, that from the twenty-sixth year, yields decline gradually and production cost rise steadily. This corroborates the findings by Adeogun (2010), that cocoa farmers were old and had aged trees older than 30 years of age of which diminishing return on production is expected to set in. Opeke (2003) opined that the prime-forest lands for cocoa cultivation are virtually exhausted and hence there is the need to focus research on rejuvenating the old moribund cocoa trees for greater cocoa production.

However, in spite of the fact that there are technologies on cocoa rehabilitation techniques available, cocoa productivity is still not at a near satisfactory level and hence the question, what are the factors militating against cocoa rehabilitation practices in Nigeria? Other pertinent questions among others are what is the level of awareness of the various rehabilitation techniques available? Do socio- economic factors affect cocoa rehabilitation? What are the various types of rehabilitation techniques the farmers practice? To this end, there is the need to focus research attention on the factors affecting cocoa farm rehabilitation practice in Nigeria since with such rehabilitation practices cocoa output is expected to increase hence the reason for the study.

Main Objective of the Study

The main objective of the study is to determine the factors affecting the practice of cocoa rehabilitation techniques in Nigeria.

The Specific Objectives were to:

1 ascertain the socio- economic characteristics of the cocoa farmers in the study area;
2 determine the level of awareness of cocoa rehabilitation techniques in the study area;
3 ascertain the type of rehabilitation techniques practiced by the cocoa farmers and the relationship this has with age and farm size of the farmers;
4 determine the rehabilitation constraints faced by the cocoa farmers and
5 make policy recommendation is that can improve on the practices of cocoa rehabilitation.

Methodology

Four States were selected using a multistage random sampling technique. The selection was done across the South- West and South- South agro ecological zones of Nigeria. The four states, namely, Osun, Ondo, Cross River and Ogun were selected for the study. Three Local Government Areas (LGAs) planting cocoa in the selected states were randomly chosen to obtain 12 LGAs. Finally, fifty cocoa farmers were randomly selected in each of the local government Areas and interviewed using well structured questionnaires bordering on socio economic characteristics, Agronomic practices, production, and rehabilitation techniques practiced among others. Out of all the respondents interviewed, only four hundred and fifty questionnaires representing 75 percent were found useful for the analysis.

The data collected were analyzed using inferential statistical tool such as correlation coefficient to determine the factors affecting cocoa rehabilitation practices and descriptive tools such as frequencies and percentages as well as cross tabulation to determine the socio economic variables, type of rehabilitations techniques and practice, constraints faced by farmers and how these variables are related.

Results and Discussion

Personal characteristic of respondents: The socio-economic characteristics of the farmers are important variables in the understanding of the farmer's practice of cocoa rehabilitation techniques in the study area. Analysis on Table 1 showed that majority (68.7%) of the farmers were males and 26.2% of the farmers constituting the majority falls between the ages 51-60 years while 24% were between ages 41-50years. This indicates that though there were more males in cocoa farming which is an indication of the farmers' ability to cope with the strenuous demand for the practice of rehabilitation techniques however, most of the farmers were fairly aged and had passed economic age of productive life hence a probability of low practices of rehabilitation techniques on cocoa. Analysis further showed that 60.7% of the farmers had no formal education while 18.9% and15.3% possess the primary and secondary education respectively. This finding corroborates with the findings by Adebiyi*et a*l (2013) and LeonardKyei*et al* (2011) that most of the cocoa farmers have passed their productive age and have no formal education hence a strong indication that the practice of rehabilitation will be low. Table 1 further revealed that 65.8% of the farmers had cocoa farm size of less than 1ha while 10.2% had between 1-2ha and 13.8% had between 4-5ha.This show that most of them weresmallholders' farmers who weremerely subsistence cocoa farmers. Further analysis showed that 76.1% of the farmers cocoa farms were aged between 21-50 years and above. This indicates a diminishing return on cocoa productivity as asserted by Montgomery (1981) and Olaiya, (2001) on cocoa yield as the tree age.

Awareness of cocoa rehabilitation: Analysis on Table 1 also showed that 51.8% of the respondents had knowledge of cocoa rehabilitation. This constitutes the majority. However, further analysis showed that only16.7% indicated that they practiced one form of rehabilitation techniques or the other. The low level of practice of rehabilitation techniques could be due to low educational level, age and financial constrains faced by the farmers, particularly cost of labor required. This level of awareness also corroborated the finding of Adebiyi (2013) that over 88% of the respondents in Oyo State are aware of cocoa rehabilitation techniques. Furthermore, the various cocoa rehabilitation programs and extension work by CRIN and other stake holders must have been responsible for this. Table 1 also showed that most (84%) of the farmers were faced with lack of finance and labour as a major constraint hindering them from practicing cocoa rehabilitation techniques. Analysis on Table 2 showed that most (20.9%) of the farmers practice coppicing type of rehabilitation followed by coppicing/ complete replanting (8.2%). This is in line with a-priori expectation since coppicing form of cocoa rehabilitation is relatively easier to carry out and less laborious than others forms of rehabilitation techniques.

Analysis on Table 3 showed the cross tabulation between the types of rehabilitation practiced and the age groups of the farmers. On Table 3, analysis showed that majority (54.4%), across all the age groups practice coppicing type of rehabilitation. However, ages 31-40years constitute the majority (15.7%) who practiced coppicing across the age groups considered and 27% of the farmers between ages 31-40years practiced one form of rehabilitation techniques or the other. This is expected as this age group are considered agile and are still in their productive years, hence their ability to cope with the stress involved in coppicing method of rehabilitation. Further analysis on Table 4 revealed that coppicing is mostly practiced (39%) among all types of rehabilitation methods, across all the farm sizes considered. however, most of them (31.5%) that practice coppicing had less than 1ha of cocoa farm. Furthermore, the analysis revealed that 64.3% of the cocoa farmers having less than 1ha practice one form of rehabilitation or the other. This indicated that the farmers were smallholder farmers who could easily practise coppicing due to the small land size and low labour cost/input required.

Determinants of thetypes of rehabilitation techniques practised among cocoa farmers: Analyses on Table 5 showed the pearson correlation coefficient of the variables that influenced the type of rehabilitation practices among the farmers. The analysis revealed that all the variables considered were positively correlated. However, critical factors that influenced the type of rehabilitation practices were level of education of the farmers (5%) level of significance), farm size and years of farming experience (1%) level of significance). This indicated that an increase in the variables will give a corresponding increase in the practices of the various types of rehabilitation techniques.

Table1: Socio-economic characteristics of respondents

Gender		
male	309	68.7
female	141	31.3
Age of respondents(years)		
less than 30	60	13.3
31-40	103	22.9
41-50	108	24.0
51-60	118	26.2
61-70	43	9.6
Above 70	18	4.0
Educational level		
No formal education	273	60.7
Primary education	85	18.9
Secondary	69	15.3
Tertiary	21	4.6
Others specified	2	0.4
Farm size		
Less than 1ha	296	65.8
1-2ha	46	10.2
3-4ha	33	7.3
4-5ha	62	13.8
Above 5ha	13	2.8
Farm age(years)		
Less than 5	28	6.2
5-10	75	16.7
11-15	49	10.9
16-20	68	15.1
21-25	45	10.0
26-30	36	8.0
31-35	15	3.3
36-40	59	13.1
41-45	19	4.2
46-50	19	4.2
Above 50	37	8.2
Cooperatives		
Yes	329	73.1
No	121	26.4
Knowledge of rehabilitation		
Yes	233	51.8
No	217	48.2
Practice of rehabilitation		
Yes	75	16.7
No	375	83.3
Rehabilitation constraints		
Lack of finance and labour	378	84
No spare time	10	2.2
Lack of seeds and other inputs	49	10.9
Others specify	13	2

Source: Field Survey, 2014

Type of rehabilitation techniques practiced

Type of	Rehabilitation	Frequency	Percent
	No response	246	54.6
	Coppicing	94	20.9
	Complete replanting	12	2.7
	Partial replanting	8	1.8
	Phased replanting	3	.7
	Planting under old cocoa tree(Turriabamethod)	1	.2
	Copicing/phased planting	22	4.9
	Copicing/patial planting	23	5.1
	Complete planting and phased planting	4	.9
	Copicing and complete planting	37	8.2
	Total	450	100

Source: Field Survey, 2014

Table3: Cross tabulation of type of rehabilitation practiced and Age

Type of Rehabilitation		Age							Total
		0	less than 30years	31-40years	41-50years	51-60years	61-70years	above 70years	
Coppicing	Count	5	24	38	23	25	13	3	131
	% of Total	2.1%	9.9%	15.7%	9.6%	10.4%	5.4%	1.2%	54.4%
Complete /replanting	Count	1	3	5	0	1	2	0	12
	% of Total	.4%	1.2%	2.1%	0.0%	.4%	.8%	0.0%	5.0%
Partial replanting	Count	1	1	3	2	1	0	0	8
	% of Total	.4%	.4%	1.2%	.8%	.4%	0.0%	0.0%	3.3%
Phased replanting	Count	1	1	0	0	0	1	0	3
	%	.4%	.4%	0.0%	0.0%	0.0%	.4%	0.0%	1.2%

	of Total								
Planting under old cocoa tree(Turriaba method)	Count	0	0	0	0	1	0	0	1
	% of Total	0.0%	0.0%	0.0%	0.0%	.4%	0.0%	0.0%	.4%
Copicing/phased planting	Count	0	6	4	3	5	3	1	22
	% of Total	0.0%	2.5%	1.7%	1.2%	2.1%	1.2%	.4%	9.1%
Copicing/patial planting	Count	0	2	5	4	9	2	1	23
	% of Total	0.0%	.8%	2.1%	1.7%	3.7%	.8%	.4%	9.5%
Complete planting and phased planting	Count	0	0	1	1	0	1	1	4
	%	0.0%	0.0%	.4%	.4%	0.0%	.4%	.4%	1.7%

	of Total								
Copicing and complete lanting	Count	5	1	9	11	8	0	3	37
	% of Total	2.1%	.4%	3.7%	4.6%	3.3%	0.0%	1.2%	15.4%
Total	Count	13	38	65	44	50	22	9	241
	% of Total	5.4%	15.8%	27.0%	18.3%	20.7%	9.1%	3.7%	100.0%

Source: Field Survey, 2014

Table 4: Cross tabulation of type of rehabilitation practiced and Farm size

			Farm size						Total
			0	less than 1ha	1-2ha	3-4ha	4-5ha	above 5 ha	
type rehabilitation practiced	No response	Count	4	24	3	0	5	1	37
		% of Total	1.7%	10.0%	1.2%	0.0%	2.1%	.4%	15.4%
	Coppicing	Count	2	76	3	6	6	1	94
		% of Total	.8%	31.5%	1.2%	2.5%	2.5%	.4%	39.0%
	complete replanting	Count	0	6	0	1	5	0	12
		% of Total	0.0%	2.5%	0.0%	.4%	2.1%	0.0%	5.0%
	partial replanting	Count	1	6	1	0	0	0	8
		% of Total	.4%	2.5%	.4%	0.0%	0.0%	0.0%	3.3%
	phased relanting	Count	0	2	1	0	0	0	3
		% of Total	0.0%	.8%	.4%	0.0%	0.0%	0.0%	1.2%
	planting under old cocoa tree(turriaba method	Count	0	1	0	0	0	0	1
		% of Total	0.0%	.4%	0.0%	0.0%	0.0%	0.0%	.4%
	copicing/phased planting	Count	0	6	2	3	10	1	22
		% of Total	0.0%	2.5%	.8%	1.2%	4.1%	.4%	9.1%
	copicing/patial planting	Count	0	16	1	2	3	1	23
		% of Total	0.0%	6.6%	.4%	.8%	1.2%	.4%	9.5%
	complete planting and phased planting	Count	0	1	1	0	2	0	4
		% of Total	0.0%	.4%	.4%	0.0%	.8%	0.0%	1.7%
	copicing and complete lanting	Count	6	17	5	2	7	0	37
		% of Total	2.5%	7.1%	2.1%	.8%	2.9%	0.0%	15.4%
Total		Count	13	155	17	14	38	4	241
		% of Total	5.4%	64.3%	7.1%	5.8%	15.8%	1.7%	100.0%

Source: field survey 2014

Table 5 : Correlations analysis

Control Variables		Gender	Age	Edu level	Farm size	Farm Age	Yrs farming experie-nce	type rehabilitati on practiced	Labor cost	Extensio-n visit
yield1 1	Gender	1.000	-.020	-.116	-.120	-.008	-.071	.053	-.084	-.012
	Age	-.020	1.000	-.019	.079	.349**	.491**	.120	.111	.034
	Edu level	-.116	-.019	1.000	.653**	-.014	.010	.151*	-.029	-.099
	Farm size	-.120	.079	.653**	1.000	-.035	.055	.184**	-.027	-.058
	Farmage	-.008	.349**	-.014	-.035	1.000	.529**	.056	.012	-.037
	Yrsfar min	-.071	.491**	.010	.055	.529**	1.000	.182**	.043	.027
	type rehab practice	.053	.120	.151*	.184**	.056	.182**	1.000	.021	.032
	LAB O11(0 00)	-.084	.111	-.029	-.027	.012	.043	.021	1.000	.109
	Extnv isit	-.012	.034	-.099	-.058	-.037	.027	.032	.109	1.000

**. Correlation is significant at 0.01 level

*. Correlation is significant at 0.05 level

Source: Field Survey, 2014

Conclusion and Recommendations

Considering the findings from the study, most of the respondents were male subsistence farmers with less than 1ha of cocoa farm size. They were aged farmers with little or no productive life. Most of them were aware of cocoa rehabilitation techniques. However, just few practise it. Coppicing techniques was widely practiced among the farmers. Ages 31-40years mostly practiced one form of rehabilitation techniques or the other. Major significant factor that affects the practices of cocoa rehabilitation were farmers educational level, farm size, and farmers years of experience.

It is recommended that more training on cocoa rehabilitation techniques be encouraged by extension agents and other stakeholders. Youth should be encouraged to go into cocoa farming by providing land and other inputs at subsidized rate to them as a form encouragement. Hybrid cocoa should equally be introduced to farmers so that other rehabilitation techniques such as Turrialba method, phased planting method, etc; can be adopted and practised by farmers.

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Experimental Title: Effects of nematode management options on old cocoa farms for improved productivity in South-Western Nigeria

Investigators: Orisajo S. B. and Okeniyi M. O.

Introduction

Cocoa farming in Nigeria reached its peak in the early seventies and has since then been on the steady decline. Many reasons have been adduced for this serious problem. Two however stand out. These are: the age of the old cocoa farms and the difficulties encountered by farmers in rehabilitating old cocoa farms and establishing new ones. Many reasons have been put forward by soil scientists as being responsible for the problem encountered in rehabilitating old farms. One prominent one is the accumulation of copper ions in the soil due to decades of spraying copper fungicides to control the black pod disease of cocoa in the old farms.

One area of research that has been very much neglected in the search for solution to rehabilitation and establishment problems is the effect of nematodes on young cacao seedlings and the effect of years of uncontrolled multiplication of these microorganisms on adult trees. Studies in the past have shown that nematodes cannot be ignored without repercussion in the search for sustainable solution to this problem (Afolami, 1981, 1984, 1996, Orisajo and Afolami, 2008).

Plant-parasitic nematodes are microscopic roundworms that are obligate parasites of plants. They are known to be polyphagous, surviving on weeds when the main crop host is absent. Being soil-inhabiting microorganisms, they survive from year to year on both crops and alternative weed hosts until a favoured crop is planted again. There is abundant evidence in literature to show that they are inimical to the health of arable and tree crops. In Nigeria, their harmful effects on arable crops have been studied and publicized better than on tree crops. Available literature however clearly reveals that they cannot be ignored in a serious program of replanting of older farms and establishment of new ones.

Studies in Nigeria, Brazil, Ghana Central America and Central Africa have shown that the root-knot nematodes, *Meloidogyne* species are major culprits in this regard.

Four of the over fifty species of root-knot nematodes have been documented to be of global economic importance in coordinated research involving scientists from seventy-five countries. Three of these (*Meloidogyne incognita, M. arenaria and M. javanica*) are found in Nigeria; *M. incognita* being the most prevalent in the Southern parts of the country. Research in the countries earlier mentioned revealed that the latter species is cosmopolitan in its effect.

There is ample evidence in Nigeria that this root-knot nematode causes a lot of harm to young cocoa plants. There is also the suspicion that these hidden enemies of the farmer are playing a key role in the difficulties being faced all over the cocoa-producing states in establishing new farms and rehabilitating old ones. The problem with nematodes is that they are too small to be seen, and their effects are generally mistaken for soil problems until definite nematode control programmes are put in place to firmly establish the true cause of the problem. It was so in Europe and America for potato, citrus and wheat. It is time we conclusively find out if the lingering problem of cocoa farmers in Nigeria could be solved by including nematode management strategies in the rehabilitation and new establishment programmes of the cocoa-producing states of the country.

Objective

To study the effect of nematode control in old moribund cocoa plantation yield

Methodology

Six 40m x 10m plots will be used in a Randomized Complete Block Design (RCBD) to test the effect of nematode control on established farms for improved productivity of trees in established plantations and the effect of nematode control in rehabilitation of old farms in Ibadan and Ondo

Testing the effect of nematode control on Productivity of adult cocoa trees: Initial soil sampling will be done before cocoa pod husk, neem powder and nematicide application to ascertain the level and types of nematodes associated with trees in the experimental plots. Carbofuran or any other systemic nematicide will be applied as granules in a ring at the base of trees in treated plots at the beginning of the rains in April/May. Data will be collected monthly on number of pods harvested and weight of fresh and dry cocoa beans for one year. Samples of the beans will be analyzed for nematicidal contamination/residue. Soil will be sampled in September/October to determine the level of nematode control achieved and the effect on yield. Data will be subjected to statistical and economic analysis for efficacy of nematode control and the consequence on yield and profit. Soil will also be analyzed for microbial content and the effect of nematicide on non-target micro-organisms.

The experiment will be replicated in two locations.

Effect of nematode control on replanting of older farms and establishment of new plantations, using nematode-resistant cocoa varieties: Seedlings of recommended cocoa variety/clones will be raised in the nursery in sterile soils to ensure nematode-free seedlings are transplanted to the field. At the time of transplanting in May/June, initial soil sampling will be done to ascertain the types and population levels of nematodes in experimental plots. The treatments will be applied at the base of seedlings to kill nematodes in order to establish nematode-free plots while no nematicide will be applied in the control plots. Data on seedling vigour and survival will be taken every six months for two years. Analysis of variance will be carried out to ascertain the effect of nematode control on cocoa seedling establishment ability and plant vigour as measured by plant height, girth, leaf area. Yield will also be analysed where available for precocious stands.

Results and Discussion

From the 60 samples examined, ten genera of plant-parasitic nematodes were found in the rhizosphere of cacao plants in Ibadan. The plant-parasitic nematode encountered are *Meloidogyne* spp., *Pratylenchus*spp., *Helicotylenchus*spp. *Paralongidorus*spp., *Eutylenchus*spp., *Scutellonema*spp., *Hemicyclophora*spp., *Xiphinema*spp., *Longidorus*spp. *Anguillulina*spp. *Meloidogyne* spp. was the most frequently occurring specie in the soil with a frequency rating of 67% and having a population of 28,234/250g soil. This was followed by *Anguillulina*spp. with a frequency rating of 50%and a population of 5,893/250g soil. *Paralongidorus*spp. had 33% frequency rating and a population of 9,573/250g soil. While *Pratylenchus*spp and *Scutellonema*spp. had a frequency rating of 16% and 28% and a population of 4541and 4238 respectively. *Helicotylenchus*spp. had the lowest frequency rating of 8% and a population of 1204 (Figure 1).

Thirteen genera of plant-parasitic nematodes were encountered in the soil sample collected from Owena in Ondo State. The plant-parasitic nematodes identified were *Meloidogyne* spp., *Pratylenchus*spp., *Helicotylenchus*spp. *Paralongidorus*spp., *Eutylenchus*spp., *Scutellonema*spp., *Hemicyclophora*spp., *Xiphinema*spp., *Longidorus*spp., *Anguillulina*spp., *Psilenchus*spp., *Tetylenchus*spp. and *Heterodera*spp. *Meloidogyne* spp. was the most frequently occurring specie in the soil with a population of 40,307/250g soil and a frequency rating of 75%, this was followed by *Hemicyclophora*spp. and *Paralongidorus*spp. with a population of 10,326/250g soil, 9,445/250g soil and a frequency rating of 33% and 20% respectively. The specie with the lowest population was *Anguillulina*spp. with a population of 1,045/250g soil and a frequency rating of 8% (Figure 2).

Daramola (2004), observed declined from over 300,000 tonnes to 155,000 tonnes with average annual growth rates of cocoa output decline from 8.3% in Nigerian cocoa output during the 1997-2001 period. Some studies (Opeke 1987, 2003, 2005 and Wood and Lass, 1989) on sustainable cocoa production have made it known that the maintenance of production in Nigeria deserves a good standard husbandry for rehabilitation of old and moribund cocoa trees.

The root-knot nematodes (*Meloidogyne* spp) is a major obstacle to the production of sufficient food, beverage and fibre crops in Nigeria and many other developing nations (Sasser, 1989). Root-knot nematode species are obligate, sedentary endoparasites of many plant species. Their potential host range encompasses more than 3000 plant species. Among the many genera of nematodes having some economic impact, *Meloidogyne* sp. are responsible for a large part of the annual billion dollar losses attributed to nematode damage (Sasser, 1982). The most economically important species are *Meloidogyne incognita,M. hapla, M. arenaria* and *M. javanica*of which *M. hapla* is exclusive to the temperate regions of the world. *M. incognita* is found in every temperate and tropical country, and it is possibly the single most damaging crop pathogen in the world (Trudgill and Blok, 2001). Losses due to nematodes are often difficult to assess since small reduction in yield may pass unnoticed. Yields are commonly reduced by up to 30% per year (Caveness, 1992). Meloidogyne spp are the most important nematodes of cacao due to their pathogenicity and wide distribution in cocoa producing regions (Campos and Villain, 2005). It is a common pest of cacao in West Africa (Whitehead, 1969; Asare- Nyako and Owusu, 1979; Fademi*et al*., 2006). Symptoms of M. incognita damage on cacao seedlings are dieback, stunting, wilting, chlorosis and reduction in size of the leaves, galling of the root or complete death of the seedlings (Afolami and Caveness, 1983; Orisajo and Fademi, 2005; Orisajo*et al*., 2007; Okeniyi*et. al*. 2009).

Figure 1a &b: The frequency of occurrence and percentage frequency rating of plant-parasitic nematodes extracted from CRIN headquarters Ibadan.

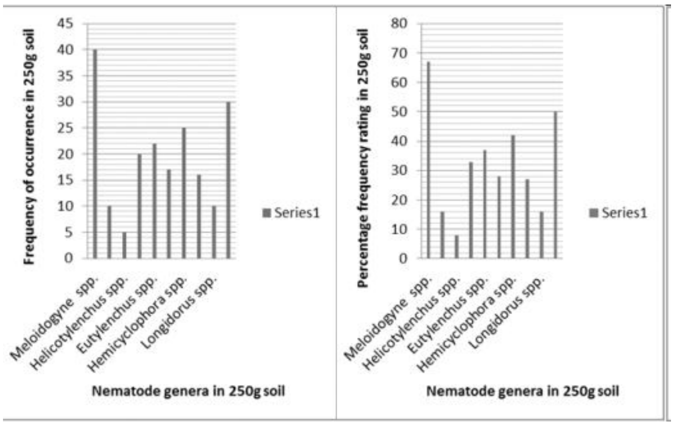


Figure 2a &b: The population and percentage population of plant-parasitic nematodes extracted from CRIN headquarters Ibadan.

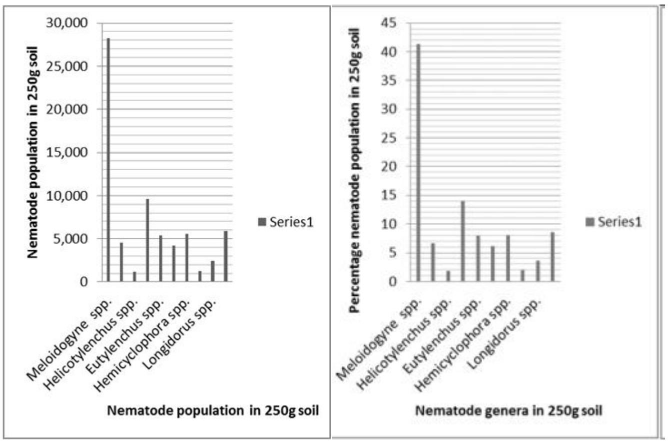


Figure 3a &b: The frequency of occurrence and percentage frequency rating of plant-parasitic nematodes extracted from Owena Ondo State.

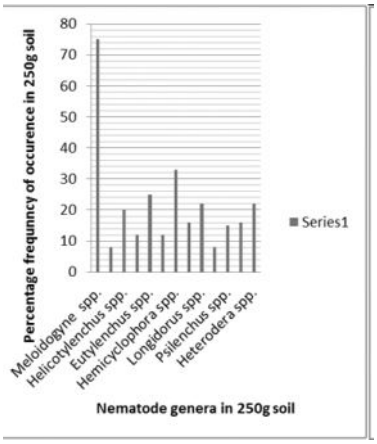
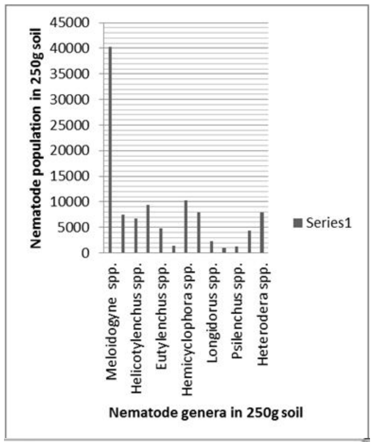
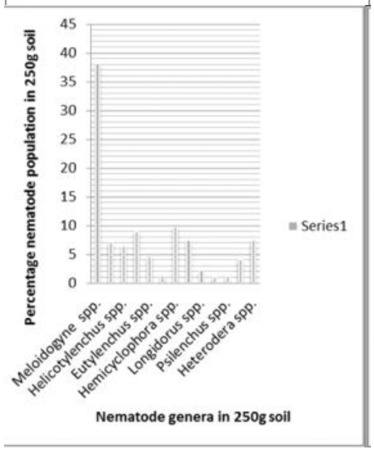


Figure 4a &b: The population and percentage population of plant-parasitic nematodes extracted from Owena, Ondo State.





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Experimental Title: Live mulch weeds control system for field establishment of new varieties of cocoa (*theobroma cacao* l.) in two contrasting ecologies

Investigators: Idrisu, M.; Adejobi K.B. and Ogunlade M.O.

Introduction

Living mulches are cover crops that are planted between the rows of a main crop and are maintained as a living ground cover during the growing season of the main crop.

Necessity to develop alternative weed control methods in cocoa using living mulch: Since weeds are one of the major problems in cocoa production around the world destroying a total plantation at seedling stage and at present, weed control highly depends on chemical and mechanical practices that are very expensive, hazardous for the environment and, consequently, unsustainable. For example, few of the weed experiments carried out on cocoa seedlings at cocoa research Institute of Nigeria (CRIN) since its inception in 1964 to date were herbicide based; with little work done on mechanical control like slashing and brushcutting (CRIN Annual Reports: 1963 and 1994, 1972 and 1973, 1985, 1986, 1987). Hence the necessity to develop alternative weed control methods that will be adaptable and sustainable, cheap, not laborious, neither time wasting nor tedious and would be good for those wishing to be certified as organic producers of cocoa.

Objective

The objective of this study is to improve cocoa production using living mulch weed control materials, know the level of weed tolerance of some of the CRIN newly released cocoa varieties to living mulch to be used, have knowledge of the important weeds affecting cocoa seedlings and their level of infestation.

Methodology

The experiment was conducted in the farm of CRIN headquarters and Owena substation on split plot design replicated 3 times. The main plot treatments comprised of 3 varieties of cocoa (CRIN-Tc1, CRIN-Tc2 and Local (F3 Amazon)) and the sub-plot treatments comprised of 2 types of cover crops as live mulch for weed control; 3 food and 1 none food plus a control (weeded and unweeded plots) randomly assigned to the main plots. The food types planted were creeping varieties of cucumber, watermelon and egusi melon and the conventional none food legume type used was*Pueraria phaseolides.* Plantain used as a shade crop in between the cocoa stands was established a year before the planting of cocoa.

Work done: The project is ongoing. However, the following activity has been carried out in both locations: Site selection & initial soil sample collection, Felling /clearing of trees, pegging& holing. The 3 varieties of cocoa, plantain suckers and live mulch materials have been planted. Weed sample collection and morphological parameters on cocoa from June to December 2014. The soil and weed samples collected is being prepared for analysis.

Conclusion
About 40% of the work is done but more funds are required to complete the project going by the main proposal I submitted.

Experimental Title: Evaluation of pesticide residue in cocoa beans using multiresidue analytical technique
Investigators: Aikpokpodion P.E., Ajao A.A. and Ndagi I.

Introduction
The menace of pests and diseases is a strong factor responsible for the dwindling production of cocoa in Nigeria. Among the various insect pests of *Theobroma cacao*, the brown Mirid, *Sahlbergillasingularis*Haglund is the most harmful insect pest of cocoa tree in Nigeria (Opeke, 1992). Mirid feeds by inserting its mouth parts into the plant and sucking the juices and at the same time, salivary secretions are injected into the tissue which results in plasmolysis of the cells. The cellular lysis results in necrosis, followed by the appearance of lesions (Mariau, 1991). Canker sores develop from lesions due to invasion by cryptogamous parasites causing weakness. The combination of tissue necrosis and cryptogamic attack results in wilting of the plant leading to very low productivity (Mariau, 1999). Yield loss of about 30 – 70% has been attributed to Mirid infestation and damage (Idowu, 1989; Ojelade*et al*., 2005).
In order to combat the destructive activities of Mirid, Nigerian cocoa farmers use various brands of insecticides including organochlorine, organophosphorus, carbamates etc. Orgnochlorine pesticides have been used extensively worldwide since the early 1950s (Kin *et al*., 2006; Kuet and Seng, 2004) until restriction were introduced in several developed and developing countries due to their persistence in the environment and growing evidence of adverse associated health implications. Many organochlorine and organophosphorus pesticides pose substantial short and long-term health risks (WHO, 1990). They are known to disturb the biological and physiological functions of erythrocytes and lymphocytes (Banerjee *et al,* 1999). The adverse health effects include a series of chronic end-points including cancer (Settim*et al*., 2003), neurotoxic (Kamel and Hoppin, 2004), immunotoxic, developmental, endocrine, reproductive (Yucra*et al*., 2006) and neuro- behavioral effects (Amr *et al*., 1993). In recent time, many developed nations discovered an increase in the case of cancer among their citizens. This made the European Union to become conscious of the quality of food products meant for consumption among her citizens. Parts of the measures to monitor food safety and quality was the setting of maximum residue limits (MRL) of pesticides in all agricultural products entering Europe from different parts of the world. This regulation limits the amount of pesticides that must be left on agricultural produce after phytosanitation activities. The penalty attached to the violation of the regulation is a total rejection of such product at the International market. Cocoa which is the main non- oil source of foreign earnings in Nigeria economy is not left out of the maximum residue limit regulation. In order to ensure that pesticide residues in Nigerian cocoa beans fall within the MRL limit, the project was executed to assess the pesticide residues in cocoa beans obtained from selected places in Ondo State with a view of identifying the various brands of insecticides being used by cocoa farmers in Ondo State using multiresidue analytical technique.

Objectives
1. To assess the level of organic pesticide residues in cocoa beans obtained from selected parts of Ondo State.
2. To be acquainted with the various brands of organic pesticides used by cocoa farmers in Ondo State through questionnaire administration.
3. To use multi-residue analytical technique as an investigating tool used in validating information supplied in questionnaire as it correspond with the residues found in beans.

Methodology
Cocoa beans were obtained from selected areas in Ondo State where cocoa is being cultivated, harvested, fermented and sun-dried. The samples were oven-dried until constant weights were attained. The samples were de-husked, ground, extracted with organic solvent and treated for multiresidue analysis using standard method.
The samples were subjected to full multi-residue analysis. The instrument conditions for organochlorine was: Rxi-5sil Ms/Rxi-35sil Ms @ 140°C for 2 min then 10°C/min to 290°C; For organonitrogen residues, instrument condition was Rtx-5/Rtx-50 @150°C for 3 min then 10°C to 280°C: For organophosphate, the condition was Rtx-50@140°C for 2min, then 10°C/min to 290°C; For N-methyl carbamates residues, HPLC scan was used with

instrumental conditions: pickeringcarbamate C18, 511/4 4.6x150mm, 40°C, post column OPA derivitization.

Results and Discussion

The result of concentration level of organophosphate pesticide residues in presented in Table 1. In cocoa samples obtained from selected area of Ondo State. Methaminodophos residue in cocoa beans ranged from nd – 0.01 mg kg-1 with a mean value of 0.0058mg kg^{-1}. No ethoprophos was detected in any of the samples. Phorate residue in the samples ranged from nd – 0.005mg kg^{-1}. Sample from OD 2 had the highest value while sample obtained from OD 6 had the least detectable phorate. On the other hand, phorate was below detectable limit in 80% of the sample population. The residue of Fonofos was detected in 20% of the sample population at a concentration range of nd – 0.005mg kg^{-1} with an acerage value of 0.0040mg kg^{-1}. There was however, no detectable fonofos in 80% of the samples.

Diazinon residue was detected in 60% of the samples ranging from nd – 0.02mg kg^{-1}. Sample from OD 10 had the highest value while sample from OD 1 had the least detectable diazinon.

Dimethoate was detected in 30% of the samples at a concentration range of 0.003 – 0.006mg kg-1 with an average value of 0.037mg kg^{-1}. Pirimiphos-methyl residue ranged from nd – 0.004mg kg-1, Chlorpyrifos residue ranged from nd – 0.015mg kg-1 with a mean of 0.0098mg kg^{-1}. Sample from OD 8 had the highest residue while sample from OD 3 had the least detectable residue. Fenitrothion residue ranged from nd – 0.021 with an average of 0.009mg kg^{-1}. It was detected in 70% of the sample population. Parathion residue was detected in 40% of the samples. Chlorfenvinphos residue was detected in only 10% of the sample at a concentration of 0.003mg kg^{-1}. Profenofos and malathion residues were detected in 30 and 50% of the sample population respectively.

Levels of organochlorine pesticides in cocoa beans are shown in table 2. The organochlorines were the most prominent pesticide residues detected in cocoa beans among the various classes of pesticides considered in the investigation. With the exception of p,p, DDD and p,pDDT which were detected in 80% of the sample population, the remaining organochlorine (p,p DDE, endosulfan sulphate, β-endosulfan and α-endosulfan) were detected in 100% of the sample population.

Table 3 showed the residual levels of pyrethroids residues in cocoa beans. Four pyrethroid pesticides were detected in the cocoa samples analysedi.ecypermetrin, Deltametrin, permethrin and Fenvalerate. Among the four pyrethroids, cypermetrin and Deltametrin were detected in all the samples which only 30% of the samples had detectable permethrin. There was no fenvalerate residue in the analysed beans.

The distribution pattern of the various pesticide residues in the analyzed cocoa beans indicates a widely use of organochlorine insecticides among cocoa farmers in Ondo State. The absence of the carbamates and organonitrogen residues in the analyzed cocoa was an indication that, cocoa farmers in the selected area of Ondo State may not have used carbamate and organonitrogen insecticides on their plantations. On the other hand, it could be as a result of complete degradation of the pesticide which is a factor of persistence and resident time.

On overall, the levels of the various pesticide residues in the examined cocoa beans were below the maximum residue limits set by the European Union. Hence, cocoa beans from the studied area of Ondo State are fit and safe for consumption with respect to the minimum level of pesticide residues.

Table 1: Organophosphate residues in cocoa beans

Pesticides	OD 1	OD 2	OD 3	OD 4	OD 5	OD6	OD 7	OD 8	OD 9	OD10 mg kg^{-1}	Mean
Methaminodophos	Nd	nd	0.006	0.003	nd	nd	0.010	0.004	Nd	nd	0.0058
Ethoprophos	Nd	nd	nd	Nd	nd	nd	nd	Nd	Nd	nd	Nd
Phorate	Nd	0.005	nd	Nd	nd	0.003	nd	Nd	Nd	nd	0.0040
Fonofos	0.003	nd	nd	0.005	nd	nd	nd	Nd	Nd	nd	0.0040
Diazinon	0.004	nd	nd	0.006	0.007	nd	nd	0.005	0.01	0.02	0.0087
Dimethoate	Nd	nd	0.004	Nd	0.006	nd	nd	Nd	0.003	nd	0.0037
Pirimiphos-methyl	Nd	0.004	0.003	Nd	nd	nd	0.004	Nd	Nd	nd	0.0037
Chlorpyrifos	0.011	0.010	0.005	0.006	nd	nd	0.012	0.015	Nd	nd	0.0098
Fenitrothion	0.002	0.015	0.006	0.021	0.006	nd	nd	0.008	0.005	nd	0.009
Parathion	Nd	nd	nd	0.002	0.005	nd	nd	0.004	Nd	0.004	0.0038
Chlorfenvinphos	Nd	nd	nd	Nd	0.003	nd	nd	Nd	Nd	nd	0.003
Profenofos	0.002	0.005	nd	Nd	nd	0.003	nd	Nd	Nd	nd	0.003
Malathion	0.009	0.003	0.002	Nd	nd	0.002	nd	0.001	Nd	nd	0.0034

Table 2: Organochlorine pesticide residues in cocoa beans

Pesticides	OD 1	OD 2	OD 3	OD 4	OD 5 mg kg^{-1}	OD6	OD 7	OD 8	OD 9	OD 10	Mean
P,p DDD	0.002	0.004	0.005	Nd	0.004	0.008	0.003	0.007	nd	0.016	0.0061
p,p DDE	0.008	0.005	0.002	0.009	0.002	0.042	0.037	0.003	0.021	0.006	0.0135
P,p DDT	0.001	0.002	0.001	0.002	nd	0.003	0.005	Nd	0.002	0.001	0.0021
Endosulfan SO4	0.004	0.002	0.006	0.008	0.01	0.004	0.015	0.012	0.006	0.008	0.0075
β – endosulfan	0.002	0.001	0.003	0.006	0.006	0.003	0.007	0.004	0.002	0.004	0.0038
α – endosulfan	0.005	0.021	0.005	0.014	0.004	0.016	0.018	0.006	0.015	0.003	0.0107

Table 3: Pyrethroid residues in cocoa bean

Pesticides	OD 1	OD 2	OD 3	OD 4	OD 5	OD6 mg kg^{-1}	OD 7	OD 8	OD 9	OD 10	mean
Cypermetrin	0.008	0.013	0.005	0.002	0.006	0.016	0.007	0.006	0.012	0.014	0.0089
Deltametrin	0.003	0.006	0.008	0.004	0.007	0.006	0.016	0.009	0.008	0.007	0.0074
Permethrin	0.002	nd	nd	0.005	nd	Nd	nd	Nd	Nd	0.001	0.0027
Fenvalerate	Nd	nd	nd	Nd	nd	Nd	nd	Nd	Nd	nd	nd

Values are means of three replicates
nd: not detected

Conclusion

The study showed that, cocoa farmers in the study areas used various brands of insecticides in controlling insect pests on their farms. It also revealed that, the residues of the various pesticides detected were much below the maximum residue limits set by European Union. This infers that cocoa beans obtained from the selected areas of Ondo State are safe for consumption with respect to pesticides residue in food.

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Experimental Title: Screening cacao genotypes for resistance to *Phytophthora megakarya***Investigators:** Dongo, L. N.; Agbeniyi, S. O.; Orisajo, S. B.; Adedeji, A. O. and Kolawole, O. O.

Introduction

Phytophthora pod rot (Black pod disease) is an important disease of cacao production in Africa including Nigeria. Black pod disease causes very serious losses, affecting the pods, beans, flower cushion, leaves, stems and root of cacao (Peter and Agus, 2004). In fact it is considered the most important disease of cacao in Africa. Pathogens of the genus *Phytophthora* are the causative agent of black pod disease. *P.megakarya* is known to be the predominant causal agent for black pod disease in Nigeria with about 60% -70% yield loss in uncontrolled plots. Controlling of black pod disease is quite a challenging task. Several methods are adopted for the control of the pathogen, but the use of copper-based fungicide is the most predominant. Although the fungicides offer a very good solution to reducing the incident of the disease, notwithstanding, there is still outbreak every cropping season. Breeding cacao with resistance to disease has been long regarded as the most economical, environmentally friendly and effective way of disease control (Iwaro *et al*., 2004). Cacao genotype with resistance to *Phytophthora* pathogens will be a great feat to controlling black pod disease. To breed for resistance to cacao diseases, there is the need to screen available germplasm in order to select for resistant genotypes. Resistance to black pod disease of cacao is quantitative in nature. Field resistance evaluation takes many years of observation in uniform, well designed trials in order to obtain reliable outcomes (Kebe *et al*., 1999). Early screening for resistance to *Phytophthora* invasion has shown to be effective using leaf disc inoculation (Nyadanu*et al*; 2009, Nyasse*et al*., 1995). This method is said to speed up breeding and selection activities such as large scale evaluation of germplasm collections, breeding trials, early selection of individual plants or progenies growing in the nursery or field studies of host and pathogen interaction.

Objectives

This study seeks to screen different cocoa genotypes for their resistance to *Phytophthora megakarya* using detached leaf disc assay.

Methodology

Cacao Seedlings: Twenty genotypes of cacao were used for screening test. The seedlings of the different genotypes were raised in the screen house at Cocoa Research Institute of Nigeria headquarters, Ibadan.

Isolation of Pathogen and inoculum preparation: Isolation of *Phytophthora* species was done from naturally infected pods collected from the cacao plantation. The disease pods were washed with distilled water and surface cleaned with 70% ethanol. Samples were cut from the pod in area of actively growing region of the infection. The cut samples were minced and surface sterilized with 10% sodium hypochlorite. Flooded with two rinse of sterile water and blotted on filter paper. The samples were inoculated on V8 agar and incubated at 25°c for 5-7days. Pure cultures were obtained by sub-culturing the isolates on V8 agar and incubated under dark and light environment for 7days to enhance sporulation. The isolates obtained were identified as *Phytophthora megakarya* base on the morphology observed under the microscope.

Pure culture was grown on agar for 10 days and a 15mm diameter agar disc was inoculated into healthy pods to enhance easy harvest of spores. The pods were incubated by hanging pod method at 25°c for 4-5days. Spores were harvested from the sporulating pods and suspended in water. The concentration of spore suspension was determined and adjusted to 2.0x 10^5per ml as reported by (Nyadanu*et al*, 2009) using the hemaecytometer.

Assessment of Leaf Resistance to *P. megakarya* using Leaf Disc Test: Leaf disc inoculation as describe by Nyasse*et al*. (1995) was adopted for the leaf disc screening test. 50-60 days old seedling leaves of the cacao genotypes were used. Ten leaf disc of 15mm diameter was made from the leave of each clone with a semi-automated perforating machine, with three replicates each, totaling 30 discs per genotype. Leaf discs were placed with their abaxial surface upwards on moist tray lined with double layer of filter-paper. Leaf discs were prepared under humid environment; air conditioned room and water sprayed into the room to increase the humidity. Disc belonging to the same replication were randomly arranged in groups of 20 within each tray, giving 200. However, an extra 20 discs were made, 10 each for a known susceptible and resistant genotype, bringing it to a total of 220 discs per tray. Inoculation was carried out on the same day after preparation of the leaf discs. 10ul of the inoculum was placed on each disc and incubated at 25°c. Reading on the disease severity were taken on the fifth to seventh day using a 0-5 point assessment score developed by Nyasse et al (1995). The mean of the disease severity scores for 6th day of the leaf disc test was analyzed using analysis of variance.

Results and Discussion

The ANOVA (Duncan multiple range test) result for leaf disc test is shown in table 1 below. The result of disease severity score was based on the sixth day data collected as adapted by Nyadanu*et al*. (2009) using the disease severity leaf disc score by Nyasse*et al*. (1995). Disease severity score on leaf discs of the 20 cocoa genotype inoculated with *P.megakarya* were significant at ($P<0.05$) among some genotypes. The disease severity scores varied from 0.033 to 2.63. The genotypes that showed resistance were T65/7 and CRIN Tc-5. The moderately resistant genotypes were CRIN Tc-8, CRIN Tc-6, CRIN Tc-4, T82/7, T101/15, CRIN Tc-7 and WACRI. While the susceptible genotypes were P27, Amazon 15, F3 Amazon, Pa150, CRIN Tc-3, MAN15, APA4, and N38. Among the 20 cacao genotypes screened for resistance to *P.megakarya*, genotype P27 was the most susceptible. The significant differences in response among the cacao genotypes to *P. megakarya*and the distribution of scores for resistance to *P.megakarya*from this trial indicates that the leaf disc test effectively discriminated the various levels of resistance within the cacao genotypes assessed in this study. Similar conclusions which support this study have also been made by several others elsewhere (Nyasse*et al.*, 1995; Tahi*et al.*, 2006).

Table 1: The 6th-day Leaf Disc Disease (LDS) severity score of different cacao genotypes

Genotype	LDS
Amazon 15	0.7667bcd
Spec 54-1	1.0667bc
F3 Amazon	0.9000bcd
CRIN TC-1	1.4333b
CRIN TC-2	1.1333bc
P27	2.6333a
PA150	0.7333bcd
CRIN TC-3	0.8667bcd
CRIN TC-4	0.6333bcd
T65/7	0.0000d
MAN 15	1.4333b
APA 4	0.8667bcd
T82/7	0.4000cd
T101/15	0.3333cd
N38	1.1000bc
CRIN TC-8	0.2333cd
CRIN TC-7	0.3667cd
CRIN TC-6	0.1667cd
CRIN TC-5	0.0333d
WACRI	0.3333cd
N38 (Susceptible Control)	0.0000d
CRIN TC-7(Resistant Control)	0.0000d
LSD ($P<0.05$)	0.7420

Conclusion and Recommendation

Despite the fact that the experiment indicated that the leaf disc test effectively discriminated the various levels of resistance within the cacao genotypes assessed in this study, nonetheless more trials will be needed to further establish this finding.

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Experimental Title: Cultural elements and women subservient roles among cocoa farm families in Southwest Nigeria: Implications for HIV prevention strategies

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Introduction

The HIV/AIDS pandemic is no longer restricted to cities. The disease is now spreading at an alarming rate into rural areas, thereby threatening the lives and livelihoods of millions of the rural farming population, especially those in their most productive age bracket of 15 and 49 years (Hilhorst*et al* 2006, Factsheet, 2011). In most part of Nigeria, rural infection rates are higher than urban (Federal Ministry of Health, 2009) and about 60% live in rural areas and make their living from agriculture (Omoyibo*et al* 2010). In Nigeria, 6 million people (5.4% of the population) had HIV/AIDS in 2003 and 5.3 million (4.4% of the population) in 2005 (HIV/AIDS Policy Fact Sheets, 2005). It is currently estimated that 3.6% of the population is living with HIV/AIDS. (USAID/Nigeria, 2010). Studies on other nations' prevalence rate showed that Nigeria has a higher incidence rate than many other countries around the globe.

HIV/AIDS hit hard on women than men, yielding corresponding decline in agricultural production at both household and community levels. This affects women directly or indirectly. Directly as HIV/AIDS is currently more intense among women, because they are biologically and socio-culturally susceptible to the disease and other STDs than men. Indirectly, women as the care givers become affected whenever any member of the family is entrapped by HIV/AIDS.

Most harmful sexual practices have their origin in patriarchal societies that promote the superiority of men over women; gender insensitive and gender biased laws which are usually male dominated women keep subservient to men. Gender inequality creates fear of abandonment and rejection in women, as a result, they are not empowered to negotiate safe sex, and also, they find it difficult to insist that men wear condoms (Ezumah, 2003; Smith, 2004). Manus and Bateye, 2006 observed that traditional practices such as widow inheritance, widow "cleansing" and polygamy are recognised as being directly responsible for the spread of HIV/AIDS. All these have detrimental effect on women's health and productivity.

The study focus on cocoa-farming households in the southwest Nigeria, where cocoa is one the most popular crop. Koppelman and French (2005) stated that household is the level at which all farm decisions are made. However, despite the significant role played by women in agricultural production, processing and marketing, men have continued to dominate farm decision making (Barasa, 2006). Studies have assessed the level of awareness of HIV/AIDS among farmers in Ondo State (Adesoji and Olalekan, 2003) and among fishing population in Kogi and Niger States (Olowosegun, 2008), however despite high prevalence rate of infection among women, no study had so far being conducted among women in cocoa farming households. This paper is important because, it could provide baseline information for implementing women's freedom and empowerment to participate in decision making process, at the family and community levels, to both the control and the eradication of HIV/AIDS. This calls for drastic steps to curb the gender inequity problems in decision making in Nigeria, especially in the rural areas, which is exposing the women, who are the majority of the agricultural labour force, to HIV/AIDS plagues.

The objectives of this study are to:

1. identify cultural elements that situate vulnerability of women in cocoa farm families to HIV/AIDS;
2. identify women subservient roles that militate vulnerability to HIV/AIDS among cocoa farm families;
3. assess women adoption quotient of some HIV/AIDS prevention strategies among cocoa farm families in south west Nigeria.

The null hypothesis underlying this study is that there exist no significance relationship between women subservient roles and practice of HIV/AIDS prevention strategies among women in cocoa farm families in southwest, Nigeria.

Methodology

The study was carried out in the Southwest Nigeria among cocoa farm families. This area comprise six out of thirty-six states; Lagos, Ogun, Osun, Oyo, Ondo, and Ekiti, in Nigeria. Majority of the farm families cultivate average acre of 2.5, intercropping cocoa with crops such kola, plantain, yam, cocoa yam and cassava. Multi-stage sampling procedure was used in selecting the respondents. Stage one is the selection of three states from six states of the southwest Nigeria: Oyo, Ogun and Osun were selected randomly by hat. Stage two involved a purposive selection of two zones of Agricultural Development Programme (ADP) per state, which gave a total of six ADP zones; Saki and Ibadan/Ibarapa in Oyo State, Iwo and Ife/Ijesha in Osun State and Ilaro and Abeokuta Ogun State.Stage three also consists of random selection of two blocks from the lists of blocks per zones selected. The blocks selected were Saki, Igboho, Ido and Akinyele in Oyo State; Iwo, Ejigbo, Ijebu jesha and Atakumosa in Osun State; Oke-Odan, Adoodo, Ilugun, and Opeji in Ogun State. Stage four comprised of two cells selected randomly from the selected blocks. Ipokia, Oke-Odan, Ipaja, Ihumbo,Ado-Odo, Ilaro, Iwoye, Owode, Odeda, Osiele, Kila, Olodo , Alabata, Araromi, Opeji and Stage five involved random selection of five farm families from two cells from each of the blocks selected using snow ball techniques. This gave total respondents of 120 farm families.

The data collected were analysed using descriptive such as; frequency count, percentages, means, standard deviation, and inferential statistical techniques; Regression and One way analysis of variance (ANOVA) using SPSS17.

Results and Discussions

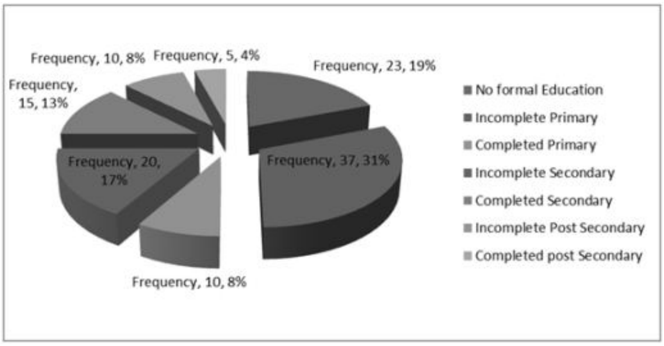

Figure 1 reveals that education among the women was poor with only 10.8% having completed primary education. Half (50%) of the respondents had no formal education and incomplete primary education. About 30% of the women completed secondary school and attempted to further to post tertiary, while only 5% completed tertiary school. The low level of education increases the subservient status of the women thereby making them susceptible to HIV plague. This result shows that majority (91%) of the respondents received primary school and above.

Table 1: Respondents' Subservient status: Sex, economic, social and cultural elements

S/N	Servitude	Frequency	Percentage	Mean	t-test
1	I am in a polygamous family	118	98.33	0.98	.000
2	I cannot determine when to have sex	76	63.33	0.63	.000
3	I cannot determine where to have sex	83	69.17	0.69	.000
4	I cannot determine how to have sex	85	70.83	0.71	.000
5	I do not have right to abstain from sex	70	58.33	0.58	.000
6	I did not have sex education before marriage	74	61.67	0.62	.000
7	I do not have right to protect myself during sex	69	57.50	0.58	.000
8	I do not have right to family planning	102	85.00	0.85	.000

Source: Field Survey, 2012

Some of the complexities in preventing HIV/AID stemmed from the cultural myths and the under girded belief in gender inequality, specifically, male superiority and women marginalization. This cultural gravitation to male superiority provided other cultural and traditional beliefs in polygamy, wife inheritance and other types of marriage arrangements. Table 1 showed that 98.33 % of the respondents had polygamous family and 85% with no rights to family planning. Majority of the women did not have right to when (63.3%) where (69.2%) and how (70.8%) to have sex. The polygamous marriage practices tend to support an equally traditional promiscuous lifestyle for men. Different types of cultural arrangements have made it permissible for men to engage in sexual activity with multiple partners. Ezumah (2003) described how inequality and disparity in gender relations affect contraction of HIV. Gender inequality creates fear of abandonment and rejection in women, and as a result, women are not capable of or empowered to negotiate safe sex because they find it difficult or impossible to insist that men wear condoms (Ezumah, 2003; Smith, 2004). These sexual disparities and inequalities between men and women create a cultural imbalance between the genders, and they also limit the available choices and options women have for safe sex (Ezumah 2003; Smith2003). Studies have shown that cultural practices such as polygamy, wife inheritance and surrogate wife among the Igbos of Anambra state provide a potentially supportive and conducive environment for the contraction and spread of diseases such as HIV/AIDS (Ezumah, 2003; Manus and Bateye, 2006). This is especially true among women because their subservient traditional cultural roles which culminate to their marginalization have driven the women to the margins of the society. Thus, Anambra state women have become dependent on men not only financially but also in making some personal decisions (Okeibunnor, 1999). The culture of the Igbos of Anambra state condones male supremacy and subjugation of women to men. Thus, many women are not capable of negotiating or empowered to negotiate safe sex because they are too dependent on men to insist that men wear condoms (Ezumah, 2003; Smith, 2003). The culture and gender norms dis- empower women sexually and make them vulnerable to HIV infection (Nguyen 2006).

Table 2: Knowledge and Practice scores on adoption of HIV prevention strategies

S/N	Variable	Knowledge scores	Practice scores
1	Abstinence	95 (79.17)	49 (40.83)
2	Condom use	105 (87.50)	56 (46.67)
3	Status check	40 (33.33)	38 (31.67)
4	Safe sex	59 (49.17)	40 (33.33)
5	Blood transfusion	60 (50.00)	54 (45.00)
6	Sharp object	68 (56.67)	57 (47.50)
7	Faithfulness	97 (80.83)	63 (52.50)

Source: Field Survey, 2012

Knowledge and practice of HIV Prevention Strategies among women in cocoa farm families: Table 7 shows that there was a distinct difference between knowledge and practice of HIV/AIDS prevention strategies among women in cocoa farm families. The respondents had high knowledge in Condom use; 87.50% with a low practice of 46.67%, faithfulness; 80.83% with a practice of 52.50%, while Abstinence, 79.17% with 40.83% practice. Though their knowledge on the seven prevention strategies considered were high except for Status check 33.33% and Safe sex 49.17% but they all showed a corresponding low practices.

In a situation where there is no hope for cure of HIV, knowledge of prevention is important to reduce vulnerability to the infection. However, knowledge is not important when the information acquired is not put to use. Badcock-walter (2004) adduced that knowledge does not always equal to practice while Asenso-Okyere and Davis (2009) further stated that proper articulation of innovation is as a result of knowledge created, accumulated, shared, used and valued. It may be adduced that the gap between the knowledge and practiced may be explained by subjective norms; which may include some elements of sexual, economic, domestic, and social deprivation embedded in the culture.

Table 3: Correlation of factors of servitude with knowledge and practice of HIV prevention

			Knowledge of HIV Prevention	Knowledge	Practice of HIV Prevention	Practice
Servitude	Mean	Std Dev.	Pearson Corr. Coeff.	T-test. values	Pearson Corr.coeff.	T-test Values
Sexual	5.641	1.718	-0.478	0.000**	-0.436	0.000**
Domestic	5.633	1.328	0.006	0.946	-0.049	0.597
Economic	5.208	1.114	0.013	0.891	0.086	0.348
Social	4.625	1.539	-0.024	0.798	-0.028	0.763
Cultural	5.183	1.772	-0.119	0.197	-0.057	0.537

** Sig at P=0.001

Table 3 showed that a sexual element is significantly and negatively correlated to knowledge ($r = -0.478$; $P<0.001$) and practice ($r = -0.436$; $P<0.001$) of HIV prevention strategies among women in cocoa farm families in the study area. This is related to the male dominance which is reflected in the polygamous nature of marriage, inability to have rights as to when, where and how to sex. Furthermore faithfulness to their partners cannot be practiced because of polygamy. Even though they have high knowledge of use of condom , it cannot be practice and they cannot demand for safe sex. Other cultural elements are not significant. However, domestic, social and cultural elements are negatively correlated with respect to the practice of HIV prevention. Economic element is however positively correlated to knowledge and practice of HIV prevention. This indicates that women cannot practice effectively the HIV prevention strategies and are more vulnerable to HIV because of their subservient status. Education and training may increase their knowledge of the prevention but they may not be able to put it into practice because of their subservient status. Lewis (2013) opined that Nigeria women are more vulnerable to HIV because of their subservient status**.** The women can only be protected by law, giving them rights to make decisions with regards to sex even concerning their husbands and furthermore they can be empowered financially to carry out regular status checks

Conclusion and Recommendations

This study revealed that as subservient roles reduce among the respondents, there would be increase in practice of HIV/AIDS prevention strategies, hence the hypothesis is rejected. There is a high level of illiteracy and polygamy in the study area yet the women in cocoa farm households had high knowledge of HIV prevention strategies but a low score in the practice of the strategies. However, there is positive and significant correlation between knowledge and practice of HIV/AID prevention strategies. The low scores observed in the practice of the prevention practices were due to the servitude status of the women. The study revealed that sexual elements explains 47% of the knowledge of HIV prevention while the low practice is explained by 43% of the denial of sexual rights of women due to their subservient status This calls for a drastic steps to curb the gender inequity problems in decision making in Nigeria, especially in the rural areas, which is exposing the women, who are the majority of the agricultural labour force, to HIV/AIDS plagues.

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Experimental Tittle: Screening of cocoa genotypes for nutrient use efficiencies

Investigators: Ogunlade M.O; Adeyemi, E.A.; Oluyole K.A.; Adebiyi S.; Ibiremo O.S.; Iloyanomo, C.I.; Asowata F. E. and Taiwo N.

Introduction

Suitable cacao cultivar that grow and produce well at lower levels of soil nutrients may be an important component of a cacao improvement program aiming to increase its productivity. Cacao genotypes that are efficient nutrient utilizers are most desirable because they can produce well at low soil nutrient levels and respond well to applied nutrients. The objectives of this experiment are to (i) evaluate the responses of cacao genotypes to varying nutrient levels (ii) assess genotypic differences for uptake and use efficiency of N, P and K.

Materials and Methods

Three newly released cocoa varieties by CRIN, TC2,TC4, TC8 and one F3 were used in this study. Seeds of these cocoa varieties were obtained from CRIN, Ibadan. Two cocoa beans were sown in 2kg washed river sand placed in plastic pots. These were thinned to one seedling before the application of nutrient solution. The application of nutrient solution started about 10days after the loss of cotyledon leaves when the seedlings were about 40days after planting. Four levels of nutrient were used at the rate of 0, 50, 100 and 150 ml N,P, K/pot equivalent to 0,5, 10 and 15kg/ha respectively. The experiment was carried out under greenhouse conditions for five months.

Nutrient solution was added weekly for 5 months. The seedlings were watered every other day. After each watering, the leachate from the pot was collected in a plate placed under each pot and put back into the respective pots. A complete randomised design was adopted with a factorial arrangement consisting of 4 genotypes, 4 nutrient levels and 3 replications (4x4x3). The experiment was terminated at the end of six months. Cocoa seedlings were harvested, leaves, stems and roots andwere separated, washed, oven dried and dry matter yield determined. The leaves, stems and rootswere milled and analysed in the laboratory for their N, P and K contents. Data analysis was done using SAS.

Results and Discussion

Table 1 shows the pre-cropping chemical properties of soil used for the trial. N, P and K contents of the soil were lower than the critical values required for cocoa. This is expected because river sand was used to ensure a medium with nutrient depletion that will easily show response of cocoa to nutrient application. Given the source of the soil used, the sand particle was very high.

Table 1: Pre-cropping chemical properties of river sand used for the experiment (DM)

S/N	Properties	Values
1	pH(H20)	7.3
2	Total organic carbon(g/kg)	0.9
3	Total nitrogen(g/kg)	0.3
4	Phosphorus(mg/kg)	2.02
5	Potassium(cmol/kg)	0.11
6	Calcium(cmol/kg)	8.28
7	Magnesium(cmol/kg)	1.26
8	Sodium(cmol/kg)	0.28
9	Manganese(mg/kg)	49.25
10	Iron(mg/kg)	23.80
11	Copper(mg/kg)	1.80
12	Zinc (mg/kg)	5.75
13	Sand(mg/kg)	93.2
14	Silt(mg/kg)	4.4
15	Clay(mg/kg)	2.4

DM:Dry matter yield

The leaf, stem and root dry matter yield of cocoa varieties as affected by nitrogen is shown in Table 2. Nitrogen applied at 10kgN/ha to TC4 gave the highest total dry matter yield. TC4 produced higher leaf, stem and root dry matter yield than TC2, TC8 and F3 Amazon using different rates of nitrogen (Table 2). This suggests that the efficiency of nitrogen conversion by TC4 might be better than TC2, TC8 and F3.

Table2: Dry matter yield (DMY) of cocoa varieties treated with varying levels of nitrogen

Cocoa varieties	N rates(kg/ha)	Leaf DMY(g)	Stem DMY(g)	Root DMY(g)
TC2	0	0.24f	0.34def	0.18cd
TC4	0	0.48d	0.39bcd	0.2cd
TC8	0	0.23f	0.21i	0.103d
F3	0	0.42de	0.23hi	0.2cd
TC2	5	0.41de	0.52a	0.24bc
TC4	5	1.14a	0.44bc	0.39a
TC8	5	0.47d	0.25ghi	0.23bcd
F3	5	0.49d	0.25ghi	0.21bcd
TC2	10	0.42de	0.42bc	0.25bc
TC4	10	1.16a	0.46ab	0.34ab
TC8	10	0.84b	0.37cde	0.25bc
F3	10	0.51d	0.31efg	0.27abc
TC2	15	0.43de	0.43bc	0.31abc
TC4	15	0.65c	0.39bcd	0.30abc
TC8	15	0.32ef	0.24ghi	0.17cd
F3	15	0.53cd	0.28fgh	0.21bcd

Nitrogen uptake: Nitrogen uptake values were highest in the leaves of F3 Amazon cocoa at 0, 10 and 15 kgN/ha treatments (Table 3). The higher values in leaf N uptake of F3 Amazon cocoa did not reflect in higher DMY as shown in Table2. N uptake value in the stem of TC4 treated with 10kgN/ha was significantly higher than other cocoa genotypes.

Table 3: N-uptake in leaf, stem and root of cocoa varieties treated with varying levels of nitrogen

Cocoa Varieties	N rates(kg/ha)	Leaf N-uptake	Stem N-uptake	Root N- uptake
TC2	0	0.38g	0.21f	0.06fg
TC4	0	1.68fg	0.28ef	0.14efg
TC8	0	1.59fg	0.2f	0.04fg
F3	0	4.66e	0.06g	0.03g
TC2	5	0.41g	0.59b	0.13efg
TC4	5	7.39d	0.42cd	0.36bc
TC8	5	4.34e	0.26ef	0.23de
F3	5	7.20d	0.11g	0.14efg
TC2	10	1.46fg	0.67b	0.28cd
TC4	10	12.99bc	0.77a	0.44b
TC8	10	10.99c	0.47c	0.28cd
F3	10	14.36ab	0.39cd	0.61a
TC2	15	2.13fg	0.65b	0.24de
TC4	15	7.07d	0.34de	0.48b
TC8	15	3.34ef	0.29ef	0.17def
F3	15	15.62a	0.22f	0.13efg

Conclusion

TC4 produced higher leaf, stem and root dry matter yield than TC2, TC8 and F3 Amazon using different rates of nitrogen. TC4 efficiently converted nitrogen into dry matter better than the other three varieties.

Experimental Title: Introduction of soil test kit to smallholder cocoa farmers in southwestern Nigeria

Investigators: Ogunlade M.O.; Oluyole K.A.; Adebiyi S.; Adeyemi E.A. and Aikopkodion P.E

Introduction

Cocoa belongs to the family *steruliacaea*and genus theobroma. It is a perennial tree crop grown in tropical climates, with over 66 per cent produced by smallholder farmers in West Africa. Since the introduction of the crop into Nigeria in around 1874 (Oyedele, 2007), it has grown to be a major export crop. Nigeria is the third largest producer of cocoa in Africa, producing about 12% of the total world production behind Ivory Coast which produces 35% and Ghana's 13% (Wilcox and Abbot, 2004).

The Nigerian cocoa economy has a rich history which is well documented in literature. The contributions of cocoa to the nation's economic development are vast and have been reported by many authors (Olayide, 1969; Olayemi, 1973; Folayan, *et al,* 2006). In terms of foreign exchange earnings, no single agricultural export commodity has earned more than cocoa. With respect to employment, the cocoa sub-sector still offers quite a sizeable number of people employment, both directly and indirectly (Sanusi and Oluyole, 2005; Abang, 1984; Folayan, *et al,* 2006). In addition, it is an important source of raw materials, as well as source of revenue to governments of cocoa producing states (Oluyole and Adeogun, 2005). Because of its importance, the recent Federal Government's concern of diversifying the export base of the nation has placed cocoa in the centre-stage as the most important export tree crop. Evidence has however shown that the growth rate of cocoa production has been declining, which has given rise to a fall in the fortunes of the subsector among other reasons (Nkang*et al* 2006). Folayan*et al* (2006) noted that cocoa production in Nigeria witnessed a downward trend after 1971 season, when its export declined to 216,000 metric tons in 1976, and 150,000 metric tons in 1986, therefore reducing the country's market share to about 6% and to fourth largest world producer to date. Prior to the Structural Adjustment Programme (SAP), cocoa marketing was carried out by the erstwhile highly regulated Commodity Marketing Boards, which were known to pay farmers far less than the export price of cocoa. This situation affected cocoa production and export in the past as it served as a disincentive to investment in cocoa production. Even after the abolition of the Marketing Boards structure, cocoa production has still not fared better as is evident in the declining production trend reported in previous studies (Nkang*et al,* 2009). One of the possible reasons for this low yield may among other things, be due to nutrient depletion of cocoa plantation soils as a result of “nutrient mining” through cocoa pod harvest without nutrient replacement as more than 85% of smallholder cocoa farmers in Nigeria do not use fertilizer on cocoa (Ogunlade *et al*, 2009). Cocoa farmers are being sensitized to use fertilizer on cocoa to increase bean yield given the low fertility status of cocoa plantation. Most cocoa farmers are showing interest to use fertilizer on their cocoa farms. However, blanket application must be avoided to derive maximum benefit from fertilizer usage. There is need for soil testing which should precede fertilizer recommendation and application. Soil testing through the conventional method is costly and electricity dependent with some logistic problems which makes it difficult for small holder farmers to use. This difficulty notwithstanding, soil testing before fertilizer application is necessary.

The objective of this study was to introduce an affordable, quick soil test kit that has significant correlation with the conventional soil testing method as reported by Ogunlade*et al* (2012) to cocoa farmers.

Methodology

The study was carried out in four cocoa farming communities in Ondo and Osun states in the Southwestern part of Nigeria. Multistage random sampling technique was used to select the respondents from the study area. The first stage was the random selection of two cocoa producing States from the region; these are Ondo and Osun States. The second stage was the random selection of four Local Government Areas from the randomly selected States. The third stage was the random selection of four communities from the randomly selected LGAs while the final stage was the random selection of eighty two respondents from the randomly selected communities. Information was collected from the respondents with the aid of structured questionnaire and the data retrieved from the questionnaire were analysed using descriptive statistics.

Results and Discussion

Table 1 showed that majority (81.71%) of the respondents were males while the proportion of the female respondents was 18.29%. This showed that males are frequently more involved in the ownership of cocoa farms in the study area. Table 1 also showed that 93.90% of the total respondents were married while 3.66% were widowed and 2.44% were single. Since majority of the respondents were married, this signifies the possibility of more availability of family labour for farming activities. 29.27% of the respondents were 40 years and below while 70.73% were more than 40 years of age showing that only few youths are involved in cocoa farming in the study area. However, majority of the respondents (81.71%) were of age 60 years and below while just 18.29% were above 60 years of age. This showed that the substantial proportion of the respondents were still in active stage of farming. However, the mean age of the farmers in the study area is 49 years. Furthermore, Table 1 revealed that about 84.15% of the respondents had formal education while just 15.85% of the respondents had no formal education. The result indicated a high level of literacy among the farmers. High level of literacy will positivelyand significantly influence the farm business. High literacy levels will enable farmers to understand the intricacies of factor and product markets and also predispose them to adopt and use improved farm practices (Oluyole, 2005). About 86.60% of the total respondents had 5 hectares (12.5 acres) and below of farm while 13.4% had more than 5 hectares of famland. However, the least proportion of the respondents (2.4%) had more than 10 hectares of land. The results however showed that majority of the farmers were small scale cocoa farmers. Meanwhile, the mean farm size for the study area is 3.52 hectares (8.8 acres). Hence, on average each farmer had less than 5 hectares of farmland. The result on Table 1 also showed that some (48.78%) had between 1 and 6 household members while 51.22% of the total respondents had more than 6 household members. The mean household members for the study area were 7. This showed that the substantial proportion of the farmers is having a reasonable number of household members that will significantly contribute to labour supply in the study area.

Table 2 revealed that only 20.73% of the respondents carries out soil test while the remaining 79.27% do not. Hence, majority of the farmers do not carry out soil test on their farms. Soil test revealed both the physical and chemical properties of the soil body thereby showing the nutrients that are deficient in the soil and hence would need replacement. If this kind of replacement is not carried out or not properly carried out, then it would result in the low performance of the crop that is planted on it.

Going by Table 3, one could not conclude that farmers do not have the knowledge of the relevance of soil test. According to the Table, 46.34% of the farmers agreed that soil test makes them to know the type of fertilizer they should add to their soil while another 39.02% of the respondents submitted that soil test makes them to know the fertility status of their farm. Hence, a total of 85.36% of the farmers had the knowledge of the relevance of soil test. Therefore, what could have been responsible for their inability to carry out the technology is likely to be the operational difficulty of the technology. Hence, if the farmers are trained on how to carry out the technology, the technology would be adopted by the farmers. Therefore, the farmers need training on how to carry out soil test. This statement is however corroborated by the response of the farmers as revealed on Table 4. The result of the analysis on Table 4 showed that almost all (98.78%) the farmers responded that they need training on soil test. The high response of the farmers revealed how anxious the farmers were to receive training on soil test. Their eagerness to receive training on the technology also informed their readiness to apply the technology on their farms. The farmers' response on their readiness to apply the technology was shown on Table 5. The Table showed that 97.56% of the total respondents agreed that if they are trained on the technology, they are ready to apply it on their farm. This result shows that majority of the farmers are anxious to adopt the technology if they are trained on it. This is positive signal towards high cocoa productivity as soil test would enable the farmers know the required nutrients to be added to the soil to enhance cocoa production. However, the conventional soil test technology is specialized, costly and far away from rural communities where most of the farms are located, hence the farmers may not be able to afford it. This study has come up with a less laborious, less specialized and less costly technique by which farmers can carry out soil test themselves on their farms. This involves the use of a soil test kit. The kit is very easy to use and affordable. Like the conventional soil test technology, soil test kit technology gives an accurate result. This kit was introduced to the farmers and the farmers' response as regards the acceptability of the kit by the farmers is shown on Table 6. The Table showed that almost all the farmers (98.78%) were ready to acquire the kit to be used on their farms.

The study concluded that with the wide acceptance of the soil test kit and with the claim of the farmers that they would adopt the technology, the inherent problems associated with soil test among farmers would be resolved. This would have a positive impact on cocoa production and hence improves farmers' welfare thus contributing meaningfully to Nigerian government Agricultural Transformation Agenda (ATA) policy.

The study therefore recommends that

I. The soil test kit should be included among the subsidized inputs that government supplies to farmers from time to time.
ii. Private entrepreneurs in cocoa business should procure the test kit and make it available to the farmers.
iii. More youths need to be encouraged into cocoa farming. This is quite imperative in as much that the proportion of the youths in cocoa farming in the study area is low.

Table 1: Socio-economic variables of the farmers

Variables	Frequency	Percentage
Age (years)		
≤ 40	24	29.27
41-60	53	52.44
>60	5	18.29
Total	82	100.00
Mean 49		
Std. Deviation14.05		
Sex		
Male	67	81.71
Female	15	18.29
Total	82	100.00
Educational level		
No formal education	13	15.85
Primary education	32	39.02
Secondary education	26	31.71
Tertiary education	11	13.41
Total	82	100.00
Marital status		
Single	2.00	2.44
Married	77.00	93.90
Widow/widower	3.00	3.66
Total	82.00	100.00
Farm size (acres)		
≤ 12.5	71.00	86.60
12.6-25	9.00	11.00
> 25	2.00	2.40
Total	82.00	100.00
Mean	8.80	
Std. Deviation	6.64	
Household size		
1- 6	40	48.78
7-10	36	43.90
>10	6.00	7.32
Total	82	100.00
Mean	7	
Std. Deviation	3.04	

Source: Field Survey, 2013

Table 2: Proportion of farmers that carry out soil test

Category of farmers	Frequency	Percentage
Farmers that carry out soil test	17	20.73
Farmers that do not carry out soil test	65	79.27
Total	82	100.00

Source: Field Survey, 2013.

Table 3: Relevance of Soil Test

Responses	Frequency	Percentage
No response	8	9.76
It makes me to know the fertility status of my farm	32	39.02
I don't need soil test because my soil is fertile	4	4.88
It makes me to know the type of fertilizer I should add	38	46.34
Total	82	100.00

Source: Field survey, 2013.

Table 4: Proportion of farmers that need soil test training

Categories of farmers	Frequency	Percentage
No response	1	1.22
Farmers that need training on soil test	81	98.78
Farmers that do not need training on soil test	0	0.00
Total	82	100.00

Source: Field Survey, 2013.

Table 5: Proportion of farmers that are ready to carry out soil test on their farms

Categories of farmers	Frequency	Percentage
No response	2	2.44
Farmers that are ready to carry out soil test	80	97.56
Farmers that are not ready to carry out soil test	0	0.00
Total	82	100.00

Source: Field Survey, 2013.

Table 6: Proportion of farmers that are ready to acquire soil test kit on their farms

Are u ready to acquire the soil test kit	Frequency	Percentage
No response	1	1.20
Farmers that are ready to acquire soil test kit	81	98.78
Farmers that are ready to acquire soil test kit	0	0.00
Total	82	100.00

Source: Field survey, 2013.

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Experimental Title: Knowledge attitude and practice analysis on cocoa certification among farmers in Southwest Nigeria: Implications for sustainable cocoa production

Investigators: Famuyiwa, B. S.; Agbongiarhouyi E. A.; Adeyemi, E. A.; Okeniyi, M. A.; Aroyeun, S. O. and Yahaya, R.

Justification

There is need for Nigeria to revert to developing the non-oil sector of the economy, by focusing on her rural economy. Cocoa is one of the cash crops that have placed Nigeria in the 2nd position in the world market in the past. It has suffered neglect in the past years but through the discovery of high yielding varieties, the country has a potential of increasing her production. However, the treat from the European Union (EU) to ban cocoa bean from farmers not conforming with the Minimum Residue level (MRL) of .01mg (ICCO, 2010), has created exporting problem. ICCO (2010) also made a recommendation of best known practices on cocoa production to have a sustainable standard in the aspect of economy, social, environmental sustainability. Badcock-walter*et al* (2004) as reported by Famuyiwa and Torimiro (2011) attributed that key antecedents of behavioural change are knowledge, attitude and belief. Information builds up knowledge while knowledge is an important factor in risk aversion because it shapes attitude hence behaviour. Therefore, there is need to study the knowledge, attitude and practice of cocoa farmers' on certification process to understand conformity or non-conformity to save Nigeria cocoa bean for world market.

This project is very much in line with the Agricultural Transformation Agenda (ATA) of Federal Government of Nigeria because cocoa certification is an important aspect of the policy with respect to Cocoa Transformation Agenda (CoCTA). About 25% of farmers group are expected to be certified so as to improve on the quality of bean from Nigeria. This idea will no doubt promote payment of premium to farmers and attract cocoapartners or International projects to our country as is presently obtained in Ghana who is a major player in world cocoa production.

Objectives

1. Determine level of awareness of cocoa farmers' on certification process in the study area,
2. Investigate the perception level of cocoa farmers on certification process
3. Investigate knowledge, attitude and practice of cocoa farmers' certification in the study area
4. Assess the factors militating against the adoption of cocoa farmers certification process
5. Determine and evaluate cocoa farmers training needs on certification process
6. Dissemine and train farmers on cocoa certification process in attempt to have sustainable cocoa bean production along the value chain.

Material and Methods

Cocoa is produced in five of the Nigerian six geo-political zones; southwest, southeast, North-central, North-east and south-south. Smallholder cocoa farmers in Southwest, Nigeria will be considered for the study. Onasanya (2009) opined that 80% of cocoa farmers are smallholders. Based on the earlier visit by CRIN Scientists to two earlier maturing cocoa adopters in Ilare Osun State, a purposive sampling technique was used in selecting Ilare in Osun state and Ile Oluji Farm settlement in Ondo state. Questionnaires will be administered to assess the level of knowledge of the farmers on certification process after which training will be executed as required by the result of the questionnaire analysis. Inferences will be drawn to show level of knowledge acquisition.

Results and Discussion

Diagnostic survey was carried out in the two project locations and revealed results for the stated objectives: Sixty cocoa farmers were sampled in each locations, who were selected through a multistage sampling procedure, in Ilare and Ile-Oluji.

Socioeconomic characteristics

Table 1: showing socioeconomic characteristics of respondents

Variable	Frequency	Percentage	Frequency	Percentage
Age		Ilare		Ile - Oluji
20 - 40yrs	14.00	23.33	12.00	20.00
41 - 60yrs	25.00	41.67	26.00	43.33
61 - 80yrs	21.00	35.00	32.00	53.33
Sex				
Male	45.00	75.00	50.00	83.33
Female	1500	25.00	10.00	16.67
Years of farming experience				
10 - 12years	12.00	20.00	10.00	16.67
11 - 20years	5.00	8.33	6.00	10.00
21 - 30years	4.00	6.67	8.00	13.33
31 - 40years	25	41.67	4.00	6.67

41 - 50years	10	16.67	30	50.00
51 - 60years	4.00	6.67	2.00	3.33
Farm size		-		-
0.5 - 10 acres	12.00	20.00	15.00	25.00
11 - 20 acres	9.00	15.00	12.00	20.00
21 - 30 acres	14.00	23.33	25.00	41.67
31 - 40 acres	25.00	41.67	8.00	13.33
Age of farm				
11 - 20 years	4.00	6.67	2.00	3.33
21 - 30 years	12.00	20.00	2.00	3.33
31 - 40 years	3.00	5.00	18.00	30.00
41 - 50 years	5.00	8.33	21.00	35.00
51 - 60 years	15.00	25.00	9.00	15.00
61 - 70 years	12.00	20.00	5.00	8.33
> 70 years	9.00	15.00	3.00	5.00
Farmers' Extension contact		-		

Table 2: Showing respondents awareness, knowledge and practice of cocoa certification

S/N	Variables		Percentage	
			Ilare	Ile-Oluji
	Awareness	Aware	10.5	37.6
		Not aware	89.5	62.4
	Knowledge	Know	11.2	9.8
		Do not Know	88.8	90.2
	Practice	Practice	5.6	7.3
		Do not Practice	94.4	92.7

Source: Field survey, 2014
N = 60

Table 3: Distribution of respondents by level of their perception towards certification process

Perceived effect Level	Scores	Percentage	
		Ilare	Ile-Oluji
High Perception	> 5	69.1	64.3
Low Perception	< 5	30.9	35.7

Source: Field Survey, 2014
Minimum = 2
Maximum = 10
N = 60

Assess the factors militating against the adoption of cocoa farmers' certification process: Factors militating against the adoption of cocoa certification process were gathered through a Focus Group Discussion (FGD) which was generally discussed as lack of awareness and knowledge of the process. However, haven explained the process it was believed that it will improve the open market system brought about by Liberalization of commodity crops.

Determine and evaluate cocoa farmers training needs on certification process: The training needs were achieved using Borich's need assessment model as explained in Famuyiwa et al (2011). Ten statements of perceived level competencies and importance were constructed and standardized for the survey in a Likert scale of 5 – point. Overall cocoa farmers' needs were analyzed and ranked using mean weighted discrepancy scores (MWDS). It was revealed from the survey that farmers' need to be sensitized in the areas of hazardous practices (MWDS= 12.58), identification of banned cocoa chemicals (MWDS=11.08), and awareness of different certification bodies (MWDS=10.37). It was concluded that concerted training of farmers on cocoa certification is very important in the study areas to enhance sustainable production of cocoa in the study area.

Training: In achieving objective 6, training was organized in the two locations on Cocoa certification - awareness and sensitization - through a training manual. The training covered; meaning and scope of certification, types and process of certification, none or responsible use of chemicals, standard method of cocoa processing, environmental sustainability in cocoa farming, and consumer certification/farmers' economic responsibilities.

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Experimental Title: Response of new cocoa varieties' seedlings to different watering regimes

Investigators: Asowata, F. E.; Ogunlade M.O.; Iloyanomon C. I. and Adenuga O.

Justification

The need for cocoa genotypes with drought tolerant abilities is on the increase especially with global weather changes that have even made areas which originally had favourable soil moisture regime for optimal cocoa growth now getting drier(Omolaja *et al*, 2006)

Drought has taken its toll on cocoa production with high mortality rate of young seedlings and low yields of young farms. It therefore necessary to practically investigate these CRIN new cocoa varieties for their abilities to thrive with minimum amount of water for planting in marginal cocoa area with less than optimum amount of rainfall for cocoa production.

Objective

To identify drought tolerant varieties among the new cocoa varieties (Tc-1 to Tc-8) for marginal cocoa areas

Materials and Methods

Soil samples were collected for use in the laboratory and the screen house. The chemical and physical analysis of the soil was carried out in the laboratory to determine the available nutrients of the soil, Field capacity and the percentage sand, clay and silt contents.

This is a screen house experiment at CRIN headquarters. Soil samples were collected, processed and representative samples were analyzed. The experiment was a 3plx3x3 factorial in a completely randomize design thus giving 27 treatments to be replicated thrice to give 81 experimental units.

The treatments were as follow:

A: Three different cocoa genotype, viz; CRINTc-4, CRINTc-5 and F3 Amazon and B: Three watering regimes of 40%, 60% and 80% field capacity. C: Three fertilizer levels @ 0kgN/ha, 10kgN/ha and 20kgN/ha.

Cocoa beans were sown in 5liter plastic pots filled with 5kg soil. Watering continued after sowing for all the pots until fully grown four-leaf stage seedlings have developed in about six weeks after which the watering treatment was imposed. Growth parameters were taken monthly and the data will be subjected to statistical analysis. Also, agro climatological data will be collectedfor the same period.

Results and Discussion

The experiment is still on-going and Data collection still in progress.

F-3 Amazon @40%FC 4months of treatment.

F3 Amazon@60%FC. 4months of treatment

F3 Amazon@80%FC 4months of treatment

CRIN Tc-4@40%FC 4months of treatment

CRIN Tc-4 80% FC, 4months of treatment

CRIN Tc-4@60FC 4months of treatment

CRIN Tc-5@40%FC, 4months of treatment

CRIN Tc-5@80%FC, 4 months of treatment

CRIN Tc-5@60%FC, 4months treatment

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KOLA PROGRAMME

Experimental Title: Evaluation of Kola-pod Husk meal in broiler finisher diets

Investigators: Olubamiwa, O.; Raji A.M.; Adejinmi O. O.; Owosibo A. O. and Adebowale B. A.

Introduction

The high cost and scarcity of conventional feedstuffs have slowed down the growth and development of the poultry industry in Nigeria. Increasing competition between man and animals for available grains (Tegbe *et. a*l., 1984) and inadequate production of farm crops to meet the needs of man and his livestock (Babatunde *et. al*., 1990), have exarbated the situation. The consequence has been sharp increase in market price of grains up to a level that has directly increased the production cost of farm animals and their products (Emiola*et. al*., 2006). One possible means of reducing cost of poultry production is the use of available and suitable by-products of little or no value to man. Profitable inclusion of such farm by-products in poultry feeds have been reported (Oluremi*et. al*., 2010; Olubamiwa and Oduwole, 2009; Emiola*et. al*., 2006). Nigeria is the worlds largest producer of kola nut. The fruit is made up of about 50% kola pod husk of which Nigeria produces 2 million tonnes (Oluokun and Olaloku, 1999). The kola pod husk meal (KPHM) is fast gaining considerable interest as a livestock feed ingredient in Nigeria. Babatunde *et. al*. (2001) suggested that it could replace up to 50% maize in rabbit diets. Olubamiwa*et. al*. (2001) suitably substituted up to 60% maize with KPHM in laying hen diets. The objective of this study was to evaluate the performance and economic returns of finisher broiler chickens fed KPHM-based diets in partial replacement of maize.

Materials and Methods

One hundred and eighty (180) day-old Mashal broiler chicks from a commercial hatchery were raised on a common broiler starter diet (Table 1). At four weeks, the runts and significantly heavier birds were culled leaving 150 medium weight range birds. These were randomly allocated to five experimental dietary treatments. Each treatment consisting of 30 birds was divided into 3 replicates. Feed and water were provided Libitum during the four week trial.

Kola-pod husk of Cola nitida was obtained from Kola Unit of Cocoa Research Institute of Nigeria, Ibadan. The dried, milled sample was incorporated into the diets of broiler finisher in partial replacement of maize. Five diets were formulated in which diets. Diet 1 served as the control without KPHM. Diets 2, 3, 4 and 5 contained 10, 20, 30, and 40% maize replacement with KPHM (Table 2). Proximate composition of KPHM and the experimental diets were carried out using the procedure of AOAC (1990). Data on feed intake, weight gain, feed conversion ratio and the cost benefits of the diets were collected. The prevailing market prices of the feed ingerdients at the time of the study were used to calculate the cost of 1 kg feed consumed and the cost of 1 kg feed consumed per weight gain. The experimental design was the completely radomized design. Data collected were subjected to Analysis of Variance according to the procedure of SAS (1995). The differences in treatment means were separated using Duncan s option of the same software.

Results and Discussion

The composition of experimental diets were presented on Table 2, while the proximate composition of KPHM was presented on Table 3. The values obtained for KPHM agreed with the range of values obtained by Oluokun and Olaloku (1999), Olubamiwa*et. al*. (2000), Babatunde *et. al*.(2001) and Abioye*et. al*.(2006). The crude proein and crude fibre increased as KPHM increased across the diets while NFE decreased.

Table 4 showed the growth performance of the broilers. The decrease in the final live weight of birds with increasing levels of KPHM was not significant. This may imply that KPHM promote growth in broiler finisher similarly as maize. The feed intake was significantly(PL0.05) higher at 40% maize replacement. This was not unexpected since birds eat to satisfy their energy requirement. The higher feed intake observed as the KPHM increased was to compensate for decreasing energy density of the diets as seen on Table 2. Feed conversion was significantly ($P < 0.05$) poorer on the 40% maize replacement diet. However, feed conversion on the other KPHM diets was similar to that on the control diet. This gives an indication of equivalent biological efficiency of those diets and the control. There was a significant ($P<0.05$) reduction in the cost of feed intake with increasing level of KPHM. This reduction lowered the cost of production of broiler meat. Olubamiwa*et. al*c (2000) also observed a combination of similar feed efficiency and lowered feed cost/kg egg when KPHM partially replaced maize up to 60% in laying hen diets.

The use of KPHM in partial replacement of maize therefore could ameliorate the scarcity of conventional energy feeds, especially the grians, which have hindered the growth and development of the Nigerian poultry industry. In addition, the problem of environmental pollution as a result of production of Kola-nut pod husk will also be addressed.

Conclusion

From the results obtained in this study, it could be concluded that finishing broilers could tolerate the use of KPHM upto 30% replacement of maize to reduce the pressure on maize, reduce the cost of production and solve the problem of environmental pollution arising from indiscriminate disposal of kola-pod husk.

Table 1: Gross composition of broiler starter diets

Ingredients	Percentage(%)
Maize	57.00
Soyabeans meal	20.00
Groundnut cake	12.00
Fish meal(72%)	2.50
Wheat offal	4.80
Bone meal	2.00
Limestone	1.00
Lysine	0.10
Methionine	0.10
Salt	0.25
Vit./Mineral Premix	0.25
Total	**100.00**
Calculated Analysis:	
Crude protein(%)	22.36
Crude fibre(%)	3.47
Metabolizable Energy(Kcal/kg)	2866.64

Table 2: Composition of broiler finisher chickens fed kola-pod husk based diets (%)

Ingredients	T1(0%	T2(10%)	T3(20%)	T4(30%	T5(40%)
Maize	58.00	52.20	46.40	40.60	34.80
Kola pod husk meal	0.00	5.80	11.60	17.40	23.20
Soyabean Meal	16.00	16.00	16.00	16.00	16.00
Groundnut cake	14.00	14.00	14.00	14.00	14.00
Fish meal(72%)	1.00	1.00	1.00	1.00	1.00
Wheat offal	6.70	6.70	6.70	6.70	6.70
Bone meal	2.00	2.00	2.00	2.00	2.00
Limestone	1.50	1.50	1.50	1.50	1.50
Lysine	0.15	0.15	0.15	0.15	0.15
Methionine	0.15	0.15	0.15	0.15	0.15
Salt	0.25	0.25	0.25	0.25	0.25
Broiler Premix	0.25	0.25	0.25	0.25	0.25
Total	**100.00**	**100.00**	**100.00**	**100.00**	**100.00**
Calculated Analysis					
Metabolizable Energy(Kcal/kg)	2840.81	2786.46	2732.12	2677.77	2623.43
Crude Protein(%)	20.67	20.84	21.01	21.18	21.35
Crude Fibre(%)	3.48	3.99	4.50	5.01	5.52

Table 3: Proximate composition of expeirmental diets

Ingredient	KPMH(%)	T1(0%	T2(10%)	T3(20%)	T4(30%)	T5(40%)
Dry Matter	88.15	91.26	90.67	90.77	89.82	90.97
Crude Protein	12.95	21.68	22.23	23.43	23.50	25.38
Crude fibre	12.63	3.30	4.49	3.37	5.33	6.67
Ether Extract	5.00	9.01	10.22	11.14	9.33	9.37
Ash	10.00	8.31	8.69	10.31	12.10	11.00
NFE	47.57	48.96	45.04	42.52	39.56	38.55

Table 4: Performance characteristics and cost- benefit of broilers fed KPHM based diets

Parameters	T1(0%)	T2(10%)	T3(20%)	T4(30%)	T5(40%)	SEM
Initial live wt(kg)	0.59	0.59	0.58	0.59	0.58	0.001
Final live wt (kg)	2.00	1.94	1.92	1.91	1.91	0.017
Weight gain (kg)	1.42	1.35	1.33	1.32	1.33	0.017
Total feed intake(kg)	3.99^{ab}	3.89^{b}	3.97^{b}	4.12^{ab}	4.22^{a}	0.044
Feed conversion Ratio	2.82^{b}	2.89^{ab}	2.99^{ab}	3.10^{ab}	3.17^{a}	0.052
Cost of Feed(N/kg)	63.97	61.38	58.84	56.28	50.49	nd
Total Feed Intake(kg)	3.99^{ab}	3.89^{b}	3.97^{b}	4.12^{ab}	4.22^{a}	0.044
Cost of Feed Intake	255.24^{a}	238.56^{b}	233.59^{b}	231.88^{b}	213.23^{c}	0.00
Cost of Feed/kg gain₦	180.47^{a}	177.40^{ab}	175.97^{ab}	175.84^{ab}	160.32^{b}	2.91

ab Means with different superscripts are significantly different ($p<0.05$).

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Experimental Title: Evaluation of phytochemicals and enzyme activities of fresh kola (*C. nitida vent*)

Investigators: Ugioro, O.; Oduwole O.; Azeez. O.M; Mokwunye, F.C.and Taiwo, O.

Introduction

Kola nuts are extremely popular due to their high caffeine content. Kola nuts have a bitter taste and contain between 1.0-1.5% caffeine by weight (Clayton, 2002). They are also sources of antioxidants and contain small amounts of theobromine, d-catechin, L-epicatechin, kolatin, phlobaphens, antioxidant pigment, betaine and protein. Kola extract is a popular ingredient in fat loss supplements. It suppresses hunger, aids digestion of food and acts as a diuretic.

The high demand for kola nuts in the domestic and international markets for use in the food and pharmaceutical industries necessitates accurate efficient chemical and biochemical which can characterize and quantify the native constituents in fresh kola nuts for quality determination.

Consumer consciousness and demand for higher degree of quality and safety in food and health care products have increased over the years. This has called for higher quality standards for product ingredients. The biochemical modifications, especially the changes in polyphenol, phytochemicals and enzymatic activities of fresh kola nuts have not been well studied and exploited in assessing kola quality. The aim of the study was to determine the level of polyphenol, phytochemicals and enzymatic activities on fresh *C. nitida* nuts in assessing kola quality.

Materials and Methods

This research work was carried out at Cocoa Research Institute of Nigeria, Idi -Ayunre, Ibadan, Oyo State.

Polyphenol, phytochemical and enzymes analyses of *C. nitida*: Fresh *C. nitida* nuts with three different sizes and colours purchased from Ogunmakin village market, Ogun State were used for this study. The nuts were classified into sizes as follows: 1-10g, 11-20g and 21-40g and into colours: red, pink and white. The nuts of the different sizes and colours were crushed separately into smaller particle sizes using perforated grater and stored in a capped container until they were needed for analysis.

Determination of alkaloids and flavonoid: This was done by the alkaline precipitation gravimetric method described by Harborne (1973).

Tannin: Tannin content was determined by the Folis-Dennis colorimetric method described by Kirk and Sawyer (1998).

Saponin: Quantitative determination of saponin was done according to Obadoni and Ochuko (2001).

Enzyme determinations

Cellulase activity: The enzyme extract was prepared by grinding 1g of nut with 1/10M dibasic sodium phosphate (K_2HPO_4) in a mortar maintained at 5^OC with crushed ice (Norkrans, 1957). The ensuing suspension centrifuged at 18,000g for 30mins at 2^OC using the M.SE ultra-high speed centrifuge. To 1ml of the supernatant was added

1ml of 1% carboxymethyl cellulose in 0.05M phosphate buffer (pH 5.0) and the mixture will be allowed to stand for 1h at 30°C (Singh and Kunene, 1980). The enzyme action was stopped with 3, 5 - dinitrosalicylic acid (DNSA) reagent and the amount of reducing sugar formed was determined by taking the absorbance at 540nm against a blank containing 1ml of boiled enzyme extract which will be similarly treated. (Koelin, 1977).

Total amylase (Æand β activity): Enzyme extract was prepared by grinding 1g of nuts with sodium acetate buffer (pH 5.0) in a mortar maintained at 5°C with crushed ice and the extract centrifuge at 18,000g for 30mins at 2°C. 1ml of the supernatant was added 1ml of 1% soluble starch in 1/10M sodium acetate buffer and the mixture was incubated at 27°C for 1h. The enzyme action was stopped with DNSA reagent and the quantity of reducing sugar formed was determined by taking the absorbance at 540nm against a blank containing 1ml of boiled enzyme extract treated similarly (Swain and Dekker, 1966).

Proteinase activity: Enzyme extract was prepared in a manner similar to total amylase activity except that 0.05M sodium phosphate buffer (pH 6.0) was used as the extracting buffer proteinase activity in the enzyme was determined using the LOWRY FOLIN –CIOCALTEU method of MCDONALD et al (1965).

Lipase activity: Enzyme extract was obtained in the same way as for total amylase activity. Lipase activity in the enzyme extract was determined using the method of Young *et al*. (1977).

Ascorbic acid content: The determination of ascorbic acid was carried out using the indophenol method described by (Association Official Analytical Chemists, (1984).

Caffeine determination: Caffeine content was determined according to Irgolic*et al.,*(1982) methods.

Results and Discussion

Quantitative phytochemical screening of the different sizes of fresh *C. nitida* nuts obtained showed a common trend of increasing order from the smallest weight nut to the biggest weight nut in all the parameters tested (Table1). Quantitative phytochemical screening of fresh *Cola nitida* nuts at different colours showed that the pink value had the highest in saponin and alkaloid (Table2). The presence of secondary metabolites in the kola nuts could be responsible for its antioxidant activity. For example, flavonoid and other phenolic constituents have been shown to play a preventive role in the development of cancer and heart diseases. Potential sources of antioxidant compound have been searched in several types of plant materials such as vegetables, fruits, leaves, oilseeds, cereal crops, bark and roots, spices and herbs and crude plant drugs (Wang *et a*l., 2000; Pourmorad*et al*., 2006; Kumaran and Karunakaran, 2007). In addition, phenols are widely used in the manufacture of resins, plastics, insecticides, explosives, dyes and detergents as a raw material for the production of medicinal drugs such as aspirin (Michael, 2008). Therefore, *C. nitida* can then be of economic importance in these aforementioned areas.

Table 1: Quantitative phytochemical Screening of fresh *Cola nitida* nuts at different Sizes

Nuts weight (g)	Alkaloids	Tannin	Saponin	Flavonoid	Anthraquinone
21-40	2.02^{a}	4.42^{a}	4.25^{a}	3.03^{a}	6.38^{a}
11-20	1.84^{b}	3.97^{b}	3.68^{b}	2.32^{b}	5.38^{b}
1-10	1.44^{c}	2.75^{c}	2.66^{c}	2.04^{c}	3.51^{c}

Means followed by the same letters are not significantly different at 5% probability level using Duncan Multiple Range Test.

Table 2: Quantitative phytochemical screening of fresh *Cola nitida* nuts at different Colours

Nuts colours	Alkaloid	Saponin	Anthraquinone	Flavonoid	Tannin
pink	1.87^{a}	4.01^{a}	5.67^{a}	2.58^{b}	3.23^{c}
Red	1.68^{b}	3.61^{b}	5.17^{b}	3.01^{a}	4.22^{a}
white	1.79^{a}	2.96^{c}	4.43c	1.79^{c}	3.69^{b}

Means followed by the same letters are not significantly different at 5% probability level using Duncan Multiple Range Test.

The chemical composition of fresh *C. nitida* nuts showed a common trend of increase from the smallest weight nut to the biggest weight nut in all the parameters tested and is highly significant with vitamin C having the highest value (Table 3). The chemical composition of fresh *Cola nitida* nuts at different colours showed that the red nuts had the highest values in all the chemical composition tested with the preponderance of vitamin C (Table4). These values were higher than the 1.5% obtained by Ogutuga (1975) and Jaiyeola (2001) for *C. nitida*. Caffeine occurs partly free and partly combined in an unstable complex known as kolatin (tannin) and caffeine glycosides in kola. Pure caffeine is colourless and has a distinctively bitter taste at the temperature, pH and salt concentrations normally encountered in food processing (Graham, 1978). It is also known to produce a variety of biological effects. Thus, caffeine is widely used for its stimulant properties in dietary beverages, self medication with over the counter drugs and in a number of prescriptions drugs containing a combination of acetylsalicylic, phenacetin, caffeine and in Darvon (Graham, 1978).

Table 3: Chemical composition of fresh *Cola nitida* nuts at different sizes

Nuts weight (g)	Caffeine	Theobromine	Kolatin	Phenol	Vitamin C
21-40	5.42^{a}	2.28^{a}	4.78^{a}	2.76^{a}	5.75^{a}
11-20	4.50^{b}	1.97^{b}	4.27^{b}	2.28^{b}	4.80^{b}
1-10g	3.32^{c}	1.65^{c}	3.44^{c}	1.57^{c}	4.21^{c}

Means followed by the same supercript are not significantly different at 5% probability level

Table 4: Chemical compositions of fresh *Cola nitida* nuts at different colours

Colours	Caffeine	Theobromine	Kolatin	Poly phenol	Vitamin C
Pink	4.83^{a}	2.13^{b}	4.55^{b}	1.45^{c}	4.84^{b}
Red	4.46^{b}	2.29^{a}	4.69^{a}	3.61^{a}	5.55^{a}
White	3.97^{c}	1.47^{c}	3.25^{c}	1.55^{b}	4.36^{c}

Means of the same supercript are not significant different at 5% probability level

Enzyme activities increased from the smallest weight nut to the biggest weight nut of fresh *C. nitida*. Enzyme activities of different colours of fresh *C. nitida* showed that the red nuts had the highest in all the enzymes analyzed. Purseglove (1991) reported values of polyphenol in the range of 0.8% to 1.3% for garcina kola and 2.5% to 3.0% for the varieties of *Cola nitida*. Work carried out by Ducksworth and Coleman (1970) showed the white cultivars of most crop products such as bitter kola and kola nuts lack carotene, a polyphenol which is responsible for the pigmentation, noticed in *Cola nitida* especially the red cultivar.

The relative considerable values of polyphenol in this study may therefore explain the incidence of enzymatic browning in Nigeria kola nuts. The levels of polyphenol also vary from variety to variety with the highest value occurring in the red cultivar of *Cola nitida* and the least obtained was pink.

Table 5: Enzyme activities of fresh *C. nitida* nuts at different sizes

Nut sizes (g)	Catalase mg glucose/min/g protein	Polyphenol oxidase mg glucose/min/g protein	Total (α & β) amylase mg maltose/min/g protein	Proteinase mg tyrosine/min/g protein	Glucose-6-phoshatase mg glucose/min/g protein	Lipase ml 0.02NaOH/ min/g protein	Cellulase mg glucose/min/g protein
21-40	0.145^{a}	0.140^{a}	0.148^{a}	0.121^{a}	0.123^{a}	0.134^{a}	0.143^{a}
11-20	0.140^{b}	0.132^{b}	0.145^{b}	0.117^{b}	0.119b	0.121^{b}	0.128^{b}
1-10	0.136^{c}	0.130^{c}	0.137^{c}	0.113^{c}	0.118^{c}	0.119^{c}	0.124^{c}

Means followed by the same letters are not significantly different at 5% probability level using Duncan Multiple Range Test

Table 6: Enzyme activities of fresh *C. nitida* nuts at different sizes

Nut colours	Catalase mg glucose/min/g protein	Polyphenol oxidase mg glucose/min/g protein	Total (α & β) amylase mg maltose/min/g protein	Proteinase mg tyrosine/min/g protein	Glucose-6-phoshatase mg glucose/min/g protein	Lipase ml 0.02NaOH/ min/g protein	Cellulase mg glucose/min/ g protein
Pink	0.130[b]	0.126[b]	0.131[b]	0.115[b]	0.116[a]	0.116[b]	0.121[a]
Red	0.146[a]	0.139[a]	0.149[a]	0.118[a]	0.121[a]	0.122[a]	0.147[a]
White	0.145[a]	0.139[a]	0.149[a]	0.118[a]	0.137[a]	0.122[a]	0.128[a]

Means followed by the same letters are not significantly different at 5% probability level using Duncan Multiple Range Test

Conclusion

The study showed that kola nuts contain some active ingredients which can be useful in the Pharmaceutical and Medical science because of the presence of secondary metabolites to. Considerable amounts of alkaloid and flavonoid suggest their antioxidant potentials and justifies their therapeutic actions, which could be used in drug formulation. It can be useful also in various manufacturing industries as raw material. It also revealed that *C. nitida* contain polyphenol oxidase which can help to reduce the level of astringency and bitterness of kola caused by polyphenol.

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Experimental Title: Identification, selection and establishment of high yielding Kola varieties on/farm and on/station

Investigators: Adenuga, O.O.; Adebiyi, S.; Oduwole, O.O.; Adebowale, L. A.; Oduwaye, O. and Ugioro, O.

Introduction

The Kolanut tree, both *Cola nitida* and *Cola acuminata* remains a source of wealth in West African countries, especially Ghana, Nigeria, Togo and Republic of Benin. The cultivation of kolanut in Nigeria is ecologically limited to the rainforest zones of south as well as some areas of the savannah region. *C. nitida* is internally traded and was observed to be growing abundantly in the bush of Otta by 1854. The cultivation was also noted in Egba Division and Labochi in 1902 after which the cultivation spread to the forest areas such as Ibadan, Osogbo and Otta through the influence of railway line (S, Adebiyi et al 2011). Despite all efforts made by peasant farmers to increase kolanut production, there is low productivity per tree/ha due to the problem of incompatibility.

The most commonly used species are *Cola nitida* [(Vent) Schott and Endlicher], *Cola acuminata* [(Pal de. Beuav) Schott and Endl] and *Cola anomala* (Schott and Endlicher). These, in addition to many uncultivated species are of great importance for their economic, pharmaceutical, confectionery, nutritional, socio-cultural and other uses. The average kolanut production per tree of *C. nitida* is 250 nuts per year, in contrast to annual of 3,000 to 10,000 kolanuts per tree per year recorded in experimental plantings which were hand pollinated (Morakinyo and Olorode, 1984). There is the need to solve the problem of self and cross incompatibilities and inefficient pollination, regarded as responsible for low yield. Solution needs be found to the problem of fruit loss due to pest and disease attack, and untimely harvesting as a result of cryptic green colour of the pod as well as unpleasantly tall height of the trees. There is need to reduce the gestation of the crop. All these will encourage farmers' interest in crop further.

Objectives

The objectives of the study are to :

i. identify existing kola Germplasm collection within the institute so as to know the better performing trees for further improvement activities;
ii. identify and collect good performing kola accessions from farmers' plots across Nigeria;
iii. establish new Germplasm plots from the collected accessions at CRIN headquarters and sub-stations so as to expand the genetic base of the institute's kola Germplasm.
iv. characterize the Germplasm using molecular markers so as to determine their genetic profile; and
v. select superior parents from collections for the development of improved varieties.

Methodology

Purposive random sampling was employed to collect good varieties of Kolanuts from the farmers'farms in western Nigeria, out of the six states in the geopolitical zone, Osun, Ondo and Ogun state were purposively selected for high in kola production. Two local governments were randomly selected for remarkable records in terms of quality and production in each of the state selected.

In each of the two local government areas, 2 kolanut producing communities were randomly selected to give a total of 12 kolanut producing communities for the study. Samples of high yielding Kolanuts with known history both in cola nitida and cola acuminata were collected from farmers' farms. Also, from each kola tree where nuts were collected bud, wood materials were collected for stem cutting propagation.

The nuts collected were pre-germinated and successfully potted in the nursery while the stem cuttings collected were also set in the propagator rooting.

Sample area

State	LGA	Villages	Varieties	Source	No. Introduced
Osun	- Odo-otin	Oke-otun, okuku, idi-obi,	Olokuku (*C.*	Ghana	5
	- Ife-south	Ologiri.	*nitida*)	Okuku	1
	- Atakumosa West	Ikoromaja			3
	- Atakumosa East	Saga and Iyemogun	*C. acuminata* varieties		4
Ondo	- Ile-oluji/oke-Igbo	BamkemoDagbaja Alade-idanre	Olokuku (*C. nitida*)	-	9
	- Idanre				1
Ogun	Shagamu	Sobulo (Ode Lemo)	*C. nitida*	-	3

Results and Discussion

Figure 1 showed the total *C nitida* nuts, indicating the proportions that were good for pre-germination. The germination percentage is also shown in the figure above. DLM 001 had the highest germination percentage (100%), though it ranked among those with the least amount of nuts available for planting. This is followed by BKM 015 (90%), LGR 008 (87.5) and KOGI 1 (77.78%). KOGI 1 also had very little amount of nuts available for planting. Accessions with very poor germination percentage included KKU 007 (7.89%), BKM 004 (9.26%), BKM 001 (10%), BKM 007 (11.76%) and DLM 003 (12.5 %). The poor germination percentage may be due to inherent genetic factors or due to environmental factors.

Figure 2 revealed the number of *C. nitida* potted from the pre-germination exercise and the survival percentage. KOGI 1, DLM 003, KKU 007 and KKU 008 all had 100% survival by mid January, 2015 (approximately 10 weeks after potting). Accessions with the poorest survival included DLM 004(20%), KKU 001 (22.22%), KKU 006 (25%) and BKM 001 (30%).

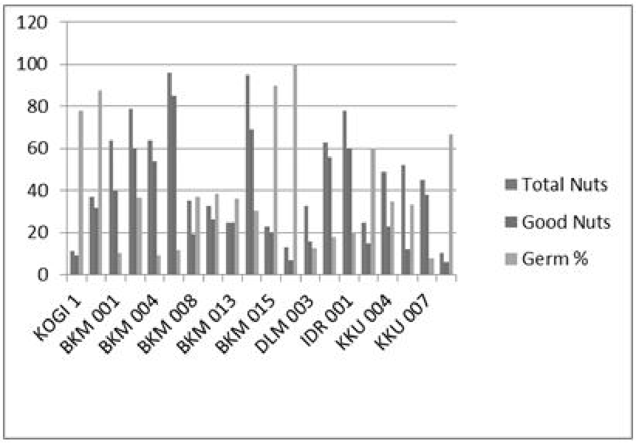

Figure 1: Bar chart showing the proportion of good *C nitida* nuts from the total nuts collected and the germination percentage

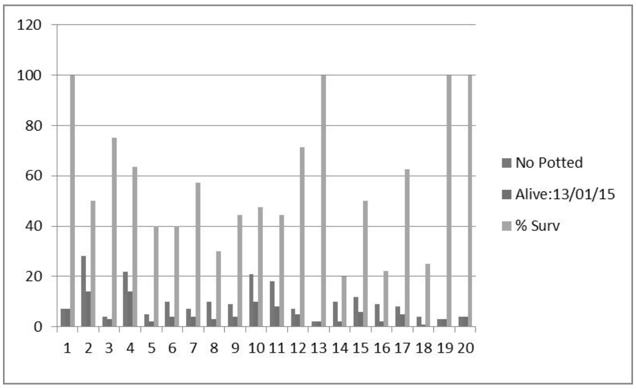

Figure 2: Bar chart showing the survival percentage of *C nitida* seedlings from the total seedlings potted

1= KOGI 1; 2 = LGR 008; 3 = BKM 001; 4 = BKM 003; 5= BKM 004; 6= BKM 007; 7= BKM 008; 8= BKM 009; 9 = BKM 013; 10 = BKM 014;
11 = BKM 015; 12 = DLM 001; 13 = DLM 003; 14 = DLM 004; 15 = IDR 001; 16 = KKU 001; 17 = KKU 004; 18 = KKU 006; 19 = KKU 007; 20 = KKU 008

Figure 3 showed the total *C acuminata* nuts, indicating the proportions that were good for pre-germination. The germination percentage is also shown in the figure. Though SAGA 002 had the least amount of nuts, it however had the highest germination perentage (100%). Accessions with relatively high germination percentage also included IYMG 002 (92.86%), IYMG 001(80.95%) and SAGA 001 (73.08%). Had the least germination percentage (33.96%).
Figure 4 also shows the number of *C. acuminata* potted from the pre-germination exercise and the survival percentage. At approximately 10 weeks after potting, accession IKM 001, though with one of the least germination percentage (36.11%), however had the highest survival percentage (100%). It was closely followed by SAGA 001 (94.74%). Other *C. acominata* accessions with reasonably high survival percentage included IKM 004 (90.90%) and IYMG 002 (83.33%). Accession IYMG 001had the least survival percentage (29.41%).

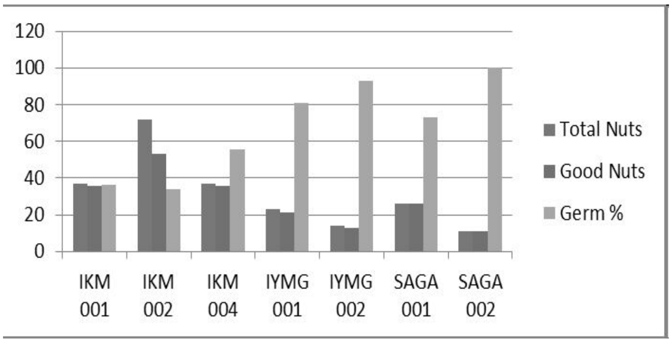

Figure 3: Bar chart showing the proportion of good *C acuminata* nuts from the total nuts collected and the germination percentage

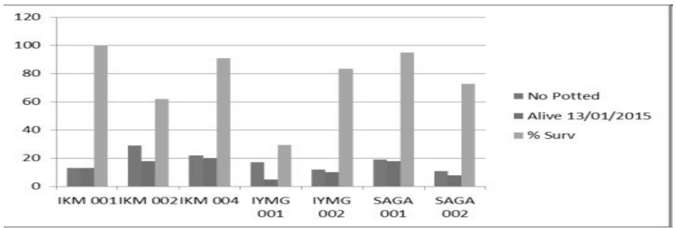

Figure 4: Bar chart showing the survival percentage of *C acuminata* seedlings from the total seedlings potted.

It was generally observed that, though fewer in number, the *C. acuminata* accessions showed higher germination percentages as compared with their *C. nitida* counterparts. The *C. acuminata* accessions also exhibited higher survival percentage at ten weeks after potting the seedlings. This may be adduced to inherent genetic variations between the two species.

Major Obstacles: The major obstacles encountered in the execution of this project include:

a. Late release of fund: the late release of fund made it impossible to proceed to the fields for Germplasm prospection and collection for *C acuminata*. The fund was released late June, 2014, a time that fruiting in *C. acuminate* was declining. Presence of fruits on trees is certainly a pre-requisite for the selection of such tree for Germplasm collection; hence Germplasm prospection was cancelled in the collection of the *C. acuminata* accessions. This also accounts for the fewer *C. acuminata* accessions included in the collection.
b. Insufficient funding: As the fund released was far less than a quarter of the amount submitted in the budget for the first phase of this project, very little

could be achieved in terms of locations to cover in Germplasm prospection and collection. The *C acuminata* collections were made predominantly from self funding in order for the meagre fund released to be concentrated on covering more locations to collect the *C. nitida* accessions. This is another reason for having fewer *C. acuminata* accessions in the collection. The meagre fund made prospection to be given little or no place at all in the execution of the project. The low level of funding also made it impossible to successfully raise cuttings from the accessions collected, as this is more capital intensive.

c. Unavailability of fund for field establishment: At present, there is no fund made available for the establishment of the seedlings being raised in the nursery from the Germplasm collection exercise. There is the fear of losing all these promising accessions unless something urgent is done to open up the field and ensure their successful establishment in the field during the rainy season of 2015.

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COFFEE PROGRAMME

Experimental Title: Establishment of current status of coffee production in two ecological zones at Kogi and Taraba in Nigeria**.**

Investigators: Famaye, A. O.; Famuyiwa B. S.; Oyedokun, A. V.; Oloyede A. A.; Ogunjobi M.A.K.; Okeniyi, M. O.; Daniel, M. A.; Mofolasayo, A. S.; Keji D.; Adepoju, A. F.; Anagbogu C. F.; Taiwo O.; Idirisu, M.; Abdkarim I. F. and Obatolu B. O.

Introduction

The main purpose of the tour was to establish the current status of coffee production in two ecological zones which comprised Kogi and Taraba States. Specifically to identify the main challenges facing coffee production stakeholders (Farmers, Processors, and Marketers). The trip was also to assist the Team in designing areas of interventions in order to improve the production and coffee farmers' livelihood.

Objective(s)

- Collection of sample materials from farmers
- Assessment of germplasm and seed garden plots in Mambilla
- Examining the incidences of Pest/diseases in the study area
- Administration of Questionnaire to update coffee database
- Evaluating marketing problems
- Investigating coffee processing problems

PROGRESS SUMMARY

a. Describe report period progress.

- *Collection of sample materials from farmers*
  At each location, samples of soil, leaves, weeds, coffee beans, insect pests and disease plants were taken
- *Assessment of germplasm and seed garden plots in Mambilla*
  The germplasm and seed garden plots in Mambilla were in a devastating situation and need urgent attention
- *Examining the incidences of Pest/diseases in the study area*
  Incidences of pest/diseases were identified through physical, Group Discussion and questionnaire administration
- *Administration of Questionnaire to update coffee database*
  Three States were visited instead of two initially budgeted for; Ekiti, **Kogi** and **Taraba**.
  At Ekiti State – At Ekiti, our contact man (the Chairman Coffee Association) Chief Otelubi received us and took the Team to the then Commissioner of Agriculture were we had a successful discussion with him on the roles of the Government in encouraging coffee farmers in the State. He realized the State Government had not been supporting farmers on issues of coffee and promised that he would make representation on how to enhance coffee farmers' production. We presented two bottles of coffee wine on behalf of the Institute to the Commissioner and two to the farmers. They were happy to know that some other products can be produced from coffee. Sixty structured copies of questionnaires were administered among coffee farmers in the State.
  Kogi – Our contact farmer, Rev. Ibimode had earlier sensitized the coffee farmers in Kogi State of our intension to visit. The coffee farmers gather at the King's Palace where we had two days interaction with seventy-eight farmers among which were six female, four processors and three marketers. Sixty structured questionnaires were administered; Focus Group Discussion took place among farmers,

processors and Marketers. Samples were taken from three farm locations. The Team on behalf of the Institute presented 22 bottles of coffee wine to the groups which were distributed among the farmers and the King.

Taraba – We paid homage to the King in Mambilla. The Team had interactions with 108 farmers at the Substation in Mambilla. The first activity at Mambilla was the inspection of germplasm plot, where notes and recommendations were made for the improvement. Two processing machines were discovered at the Sub Station by the Engineer and plans were put in place to bring one to the Headquarters for closer look. Three other locations were visited by the Team: farmer's farms in Gembu, Maigoga and Ngoroje. Twenty bottles of coffee wine were also distributed to farmers' groups and the Chiefs, while 60 questionnaires were administered and two Focus Group Discussion sessions were held. Detailed report will be made in a Compendium to be submitted.

- *Evaluating marketing problems*

  From our interactions with all the farmers in each location, we were able to deduce that market is not actually the problem of coffee rather processing. It was discovered that when the marketers call for coffee, because of improper processing, they meet something different from what they came for hence they down price and cease to patronize again.
- *Investigating coffee processing problems*

  The processing methods were investigated and discovered not appropriate.

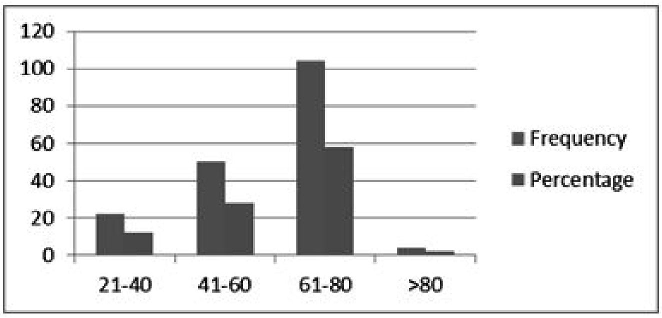
b. Results and Discussion based on discipline

1. Extension and Economics

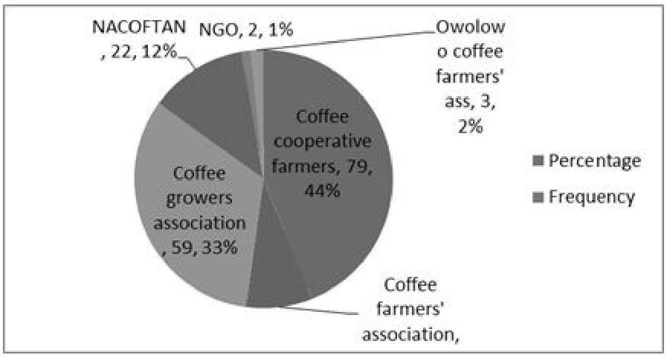
1. Some socioeconomic characteristics from the total 180 questionnaires administered, the following results were extracted to describe the farmers

- Age

  The result showed that majority (57.22%) of the farmers were in their old ages between 61 –80 years



- Membership in coffee groups



It was observed that majority (84.6%) were literate; being able to read and write hence ability to understand instructions was guaranteed. About 16.67% source their inputs from research institute while 32.78% source their information from Extension agent however, 70% had relationship or contact with extension agent.

From the Focus Group Discussion, it was iterated that most of the farmers abandoned their farm for lack of market. After thorough investigation, we all reached a conclusion that their method of processing contributed highly to marketing as the quality of coffee collected as samples did not meet market standard.

The farmers attitude to farming is high but complained of low market as some farmers still had harvest of three years in stock due to lack of marketing.

2. Pathology and Entomology:

Coffee production can be boosted in Nigeria if some challenges in production line are promptly tackled. One of the major challenges in coffee production is the insect pest species that reduce the quality and quantity of coffee in Nigeria. Myriads of insect pests attack coffee plant (Robusta and Arabica) from seedling to fruiting stages and even during storage. Observations during the research survey of Kogi State (where Robusta coffee is planted) showed that defoliators like *Cephonodeshylas*, *Epicampopterastrandii* and *Zonocerus variegatus*; berry borer- *Hypothenemushampei* and Termites species (*Macrotermisbellicosus* and *Macrotermisnatalensis*) were serious problem of coffee in the areas visited. Also, some ant species (neutral insects) were found to be associated with some coffee stands. Although, the levels of damage were below Economic Injury Level (EIL) may be due to presence of some Braconids species (parasitoids) but precautions have to be taken so as to prevent insect pests' population surge. Some of the precautions include farm sanitation by weeding and pruning of coffee trees as well as the surrounding trees in the plots to increase sunlight intensity. By this, the relative humidity of such plots will be reduced and thereby reduce the population build-up effects of insect pests. Also, alternate and/or alternative hosts of these insect pests should be removed from the plots. Use of non-persistent insecticides can be introduced in case of population surge of the pests. Indiscriminate use of insecticides alters the agro-ecological systems negatively and should be discouraged on coffee plots. On the Mambilla Plateau (where Arabica coffee is planted), three major insect pests observed were Zonocerus sp., Mealybugs and Termites. The berry borers were not prevalent on the plateau may be due to climatic variation compared to Kogi State. The three major insect pests found on plateau have better generational success when compared with species like berry borer. Many insecticides are being used to control insects (target and non-target) on the plateau ranging from Organo-phosphates to Carbamates. Some old cans of Organic Chlorine insecticides were also displayed by some farmers. Generally, farmers should be trained on when and when not to apply insecticides, the types and quantity of insecticides to be used if the need arises and the impact of the chemicals on their health and crops produced.

Most of the farms visited were ravaged with pests and diseases. Amongst those seen were coffee leaf rust, Coffee Berry disease, die-back, and leaf blight disease. On the Mambilla Plateau most especially on the estate, the coffee germplasm was severely affected that the coffee stand could not bear.

The soil samples collected during the trip for assay in the laboratory revealed the presence of different genera of plant parasitic nematodes these includes; Nematodes recorded from soil samples were predominantly endoparasitic species, *viz*. *R.reniformis*, *Meloidogyne* spp., *P. coffeae*and *R.arabocoffeae*. Other endoparasitic nematodes were present at low densities and low frequency levels *viz. P. brachyurus.* Ectoparasitic species identified from soil samples were mainly represented by *Xiphinemadiffusum*, *Helicotylenchusdihystera* and *Macroposthoniamagnifica.* Other ectoparasites found were *Macroposthonia rustica*, *Diphterophoraperplexans*, *Discocriconemellalimitanea*, *Helicotylenchuscavenessis*, *H.rotundicauda*, *H. coffeae*, *Hemicriconemoidesmangiferae*, *Hoplolaimuschambus*, *Longidorus*sp.,*Xiphinemabrasiliense*and *X. elongatum.*

It was also observed that most of the chemicals used by farmers included CRIN banned pesticides such as gammaline 20 etc

Conclusion

There is urgent need to bring down the threshold of Coffee leaf rust and Coffee berry disease through an appropriate management practices and regular training of farmers on ways of controlling these diseases especially on the Mambilla Plateau.

3. Agronomy and Farming System

Observations by the Agronomists and Farming system Scientists are;

1. Low yield of coffee on plantation as a result of old age and abandonment of plot
2. Spacing on farmers plots were haphazard(about 2m x 1.5m)
3. Some coffee plantations already removed for arable crop cultivation
4. Polyculture practiced at Yamoye with tree crops like kola, oil palm, cocoa and citrus. Also none tree crops like pineapple, banana, cocoyam, ginger with no definite pattern or arrangement
5. Predominant cropping system at Mambilla includes coffee with banana, avocado, mango, kolanut and dacryodis. Also coffee plus maize, cocoyam, sweet potato, melon, bitter leaf and trifoliate yam.
6. The Substation coffee plots (Agronomy and germplasm plots were aged (over 40 years old).
7. Many stands were dead.
8. The remaining stands were intercropped with maize and cocoyam which are heavy feeders on soil nutrients.
9. there was heavy infestation by bryophytes
10. the stands at the new coffee germplasm plot were stunted in growth
11. goat and cattle invasion thereby destroying the stands

Dominant weeds observed in Yamoye and Mambilla

The three dominant weeds are provided below

S/N	Yamoye	Mambilla
1	*Chromolaena odorata*	*Commelinaspp*
2	*Pouzolziaguineensis*	*Impereta cylindrical*
3	*Sidagarckeana*	*Panicum maximum*

Recommendations

1. There is need to organize a coffee summit to address all identified problems
2. Also, development of farmers is very germane whilelocation-based coffee cropping systems should be encouraged.
3. Rehabilitation of old abandoned coffee plantations on the Mambilla plateau and Yamoye, Kogi State is very important.
4. Further research work on the above identified weed species in terms of best control measures is urgently needed.
5. Concerning the Mambilla Substation plots:
   a. There is the need to rehabilitate the surviving stands and establishment of adaptable leguminous crops/shrubs to bring back plots to full productivity.
   b. A stop should be put to annual loading of the plantation with arable crops like maize, cocoyam etc that deplete the soil of essential nutrients
   c. There is urgent need for resuscitation of coffee germplasm and agronomy plot through vegetative propagation of the existing genotypes.

4. **Breeding**

Observations

Iyamoye, Kogi state

First farm: It was observed that only one clone was planted, and the yield was poor. Also, the clone was susceptible to diseases and pests. Poor farm sanitation was also observed.

Second farm: Disease infestation on this farm was great. The plot was unkept. Though mixed cropping was adopted in haphazard way.

Third farm: From mere physical appearance of coffee trees, one could conclude that the clone planted on this farm was different from the first two even though it was claimed to be planted with planting materials from the same source, the same year. Coffee planted looked like quillou. The yield is fairly good. Incidence of disease was not much.

Taraba state

Coffee germplasm at KusukuMambilla plateau.

All the clones were old and more than half of it had been lost. Even among the stands that remain, many of them had dried. There was alsopoor soil fertility. There is difficulty in establishing of new coffee germplasm.

Observations

First farm: Scanty stands that were neglected remain. The whole plot filled arable crops and tea occupies a part of the plot.

Second farm: The farm was like an experimental plot. The stand height is not more than 1.5m (standard height). High yielding and well maintained. The clone planted could be said to be good

Recommendations

- Raising of five clones that are cross compatible
- Distribution of clonal materials to farmers in Ekiti and Kogi states
- Exploration to centre of origin and diversity of coffee especially Kenya and Ethiopia for materials for the germplam and breeding purposes
- Collection of materials from farmers' farms
- Characterization of the materials and quality assessment at molecular level

5. **Processing**

In N**igeria** primary processing is performed manually the processors and farmers have inadequate skills and use inappropriate processing methods. The coffee processed under these methods were either graded as of low quality beans or simply failed to sell on the international market. They also had limited accss to information on the link between premium price of coffee and high quality coffee beans. Upgrading of skills among farmers and processors was normally done by extension workers, who themselves face similar constraints in terms of limited knowledge andinformation. **here is need to provide information on the appropriate processing techniques that will produce green coffee of high quality to the coffee farmers and processors in Nigeria** Hence, an improvement in coffee quality will translate to more income and this has a direct impact on the livelihoods of a large number of resource-poor people in the rural populations.

Though research on coffee has been conducted nationally for more than four decades by Cocoa research Institute of Nigeria (CRIN), the target of the research was to develop high yielding varieties, disease resistant varieties and control of coffee beans pes for major coffee growing areas of the country. There has never been any significant study focus attention on the problem of coffee quality with respect to primary post harvest processing method in Nigeria despite its importance to the coffee Industry. Ths vital information is needed by the International organization on coffee (ICO) for the proper classification of our green coffee because ability to obtain a good premium on green coffee depends very much on the ability to sell a story on the intrinsic qulities of the coffee.

ISSUE THAT ENSUED

1. Proposal to be written to Ekiti State on establishment of coffee demonstration plot and capacity building for farmers
2. Carmers in Yamoye resolved that they have a piece of land they want to hand over to CRIN to serve as demonstration plot and as a training center for the farmers. Hence, the Team plans to visit the state again and organize **offee innovation platform** his we believe will solve the issue of processing and marketing by giving the farmers a voice to make right decision.
3. Critically looking into Processing and marketing of coffee
4. Suggestion to the Management, of a CRIN business venture that will be autonomous.

Constraints

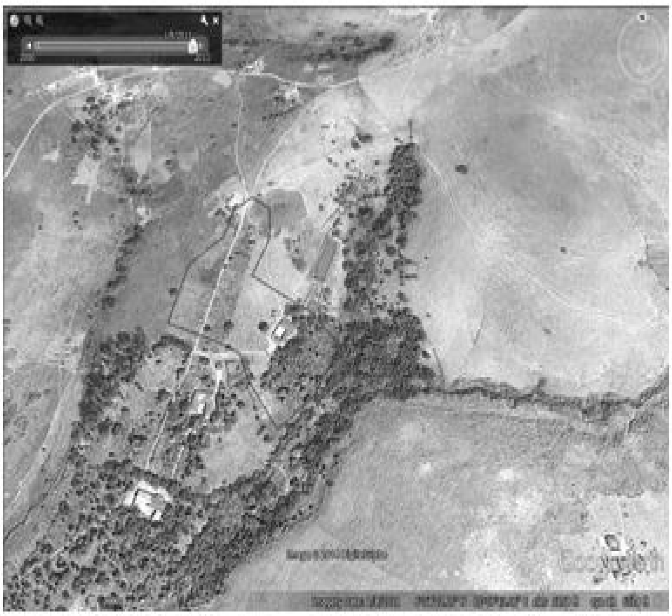
1. The major problem that hindered the Team from achieving her optimum objective is fund. We did not have enough funds to allow us some more days to visit other important areas.
2. Farmers' attitude towards Government approach to farmers need was area of challenge.

Attachments

1. Video DVD of the program
2. VD containing photogram
   Photographic and GIS representations

Coffee germplasm – Mambila

Some farmers in group photograph in Kogi



Maigoga farm area – One of the farms visited

Farmers discussion at Mambila


Photograph with Gago in Mambila


Agronomists collecting samples at Kogi


Farmers in Group photograph in Mambila


Infested coffee plant


Pathologist and Entomologist collecting samples


A Breeder collecting sample

CASHEW PROGRAMME

Experimental Title: Vulnerability of cashew farmers to climate change and their coping strategies in Nigeria

Investigators: Shittu, T. R.; Lawal, J. O.; Oluyole, K. A. and Taiwo, O.

Introduction

Cashew (*Anarcadiumoccidentale* L.), since its introduction into Nigeria by early Portuguese explorer in the 16th century is one of the most important export cash crops in Nigeria and is the major source of cash income to many holder's farmers in the central and northern parts of Nigeria Federation (Aliyu 2007).

Over the years, there has been geometrical increase in the hectares of land, cultivated to the crop from 1990 till date, producing up to 636,000 metric tonnes in 2006 (FAO, 2007). The average yield of cashew trees in Nigeria is as low as 2.0kg per annum as against 20-25kg nuts per tree often obtained in the event of favourable climatic conditions. One of the reasons attributed to this has been the devastating effect of climate change.

Nigeria agriculture is highly climatic dependent thus being at its mercy as well as other climate change-induced danger of desertification, erosion and ecological desertification. Nigeria is therefore vulnerable in the area of food and nutrition, security, poverty and hunger.

Small scale farmers like cashew farmers are disproportionately vulnerable to the impacts of climate change as a result of poverty, marginalization and reliance on natural resources.

Climate change is likely to lead to decreasing crop yields negatively impacting agricultural sector and reducing food security in developing countries. In Nigeria climate change will compound the existing vulnerability of small holder farmers, as a result of poverty, sensitivity of their geographical locations, high dependence on natural resources and limited capacity to adopt new strategies (ADB et al 2003).

Climate change may pose problem for cashew cultivation since it is grown in ecologically sensitive areas such as coastal belts, hilly areas and areas with high rainfall and humidity. The flowering, fruiting, insect pest incidence, yield and quality of cashew nuts and kernels are more vulnerable to climate change.

Given the importance of agriculture to the economies of Nigeria, climate change could significantly constrain economic development as it will disrupts farm families, increase migration from agriculture and displacement and produce climate refugee (Adetimirin et al 2012). Vulnerable households are therefore those that have moved or are likely to move into a state of poverty or destination as a result of the cumulative process of risk exposure and response.

Objectives of the study

The broad objective of this study was to examine the extent to which cashew farmers are susceptible to devastating effect of climate change. While specifically, the study looked into:

i. The perception of changing climate by the cashew farmers in Nigeria.
ii. Determination of economic impact of climate change on cashew production and
iii. Assessment of the adaptation strategies employed by the cashew farmers to deal with the change.

Methodology

This study made use of structured questionnaires to elicit information from respondents randomly selected from two states (Oyo and Kogi) using multistage random sampling technique. Two Local Government Areas each was randomly selected from the two selected states with selection of two hundred cashew farmers to collect the primary data.

In addition to the primary data, secondary data on weather and yield were sourced for the purpose of explaining the trend of the weather, yield and the relationship between the two variables as well as their effects on the farmers themselves.

Statistical analysis was done using descriptive statistics such as frequency and percentages to describe the social and demographic data as well as Parvin model of decomposing yield variation into technology and weather effects (Parvin 1973). The Parvin model showed the overall effect of composites of weather on the cashew yield.

The four functional forms of the equation from which the lead equation was chosen are as stated below:

$Y_1 = \text{Æ}_1 + \beta_1 Wtv + \text{ä}_1 Lo + \text{Ł}_1 T + \mu_1$ Linear (I)

$Ln\,Y_1 = \text{Æ}_1 + \beta_1 Wtv + \text{ä}_1 Lo + \text{Ł}_1 T + \mu_1$ Experimental (ii)

$Y_1 = \text{Æ}_1 + \beta lnWtv + \text{ä}_1 lnLo + \text{Ł}_1 lnT + \mu_1$ Semi log (iii)

$Ln\,Y_1 = \text{Æ}_1 + \beta lnWtv + \text{ä}\,lnLo + \text{Ł}_1 lnT + \mu_1$ Double log (iv)

Where $\text{Æ}_1, \beta_1, \text{ä}_1$ and Ł_1 = parameter estimates

Y_1 = Cashew

Wtv = Weather variables in year t.

Rd = Rainfall (days)

Rn = Rainfall (min)

Tp = Temperature (^{0}c)

Rh = Relative Humidity (%)

Sh = Sunshine (hours)

Lo = Lagged cashew yield in year t (tons)

T = Trend value (1 30)

μ = Stochastic disturbance term

while the second step involved the estimation of weather induced on cashew yield deviation as follows:

$$Y^* = Y_t Y_p$$

Where Y^* = Yield deviation

Y_t = Observed level of cashew yield in year t

Y_p = Predicted cashew yield

Results and Discussions

The age distributions of cashew farmers, sex, educational level attained, farming experience, type of farm holding, type of cashew variety planted, were some of the issues treated under socio-economic characteristics of the cashew farmers (table 1). The male gender represented 76.1% while female counterpart constituted 24 % of the respondents.

On age distribution of respondents, cashew farmers of between 41-50 and over 50 years were in high proportion in the study area. They constituted 27.96% and 46.77% of total respondents in cashew farming. This may also have negative impact on their farm size as young me are capable of cultivating more land than older ones which may also have negative implication on the productivity of the cashew farmers. Majority of the cashew farmers were married and occupied 91% of the total respondents thus implying more labour availability for farming households. The single respondents were just about 9 percent. The farmers planted jumbo, medium and small size nuts on their farm and through freehold (88.28 %) inheritance (10.22%) or cooperative 31.50%; many (64%) of who have more than 10 years farming experience. This long experience in farming would be made to bear in dealing with recent change in climate that is likely to affect them. Educationally, 73.65% of the respondents had no formal education or incomplete primary education while only 2.15% have tertiary or incomplete post-secondary education. Their past experience in the business is what will sustain them as only very few (2.15%) are literate to understand the issue of climate change and its mitigation strategies.

Weather Variables and Cashew Production: The cobb douglas (double log) function gave the best fit with the R^2 of 0.68 which means that 68 percent of the variation in quantity of cashew produced was accounted for by the weather variables and other parameters included in the equation. The F-value (P<0.01), was significant at one percent level meaning that the model was fit. Parameterestimates of five of the endogenous variables (rainfall, temperature, relative humidity, sunshine, farming experience and farm size) included in the regression were statistically significant and could affect the productivity of the farmers in the study area (table 2). Their coefficientswere positive except that of rainfall and relative humidity which implies that cashew production in the study area would increase as the farmers experiences more of these. The reverse is the case for rainfall and relative humidity with negative coefficients as too much of them will cause flower abortion in cashew and also increases the pests and diseases incidence thus reducing the yield hence farmers income, health condition and their standard of living.

Climate change perception and effects on the respondents: 87 percent of the respondents (cashew farmers) in the study area had knowledge of change in climate but not all these set of farmers had fallen victim of climate change in terms of devastating loss. There are two major seasons (wet and dry) and depending on the climate change, wet season lasted eight months while the dry spell period spans over four months. Effects of the climate change on cashew farming households and their farms include: low productivity, low income, starvation, poor health and poor standard of living. When there is prolonged rainy season spraying of pesticide to control pests and diseases incidence that could cause inflorescence die back is affected hence increase in cashew farming expenses while drought affects productivity of food crops and their cashew negatively and as well exposed them to fire incidence directly from their farm or from neighbouring dry bush. This could turn to famine, population displacement, suffering of untold hardship and loss of life.Besides, erratic rainfall pattern was found to distort farmers' ability to plan correctly for their farm operations.

Coping Strategies/Adaptation: To adapt to change in climate, farmers in the study area had been relying on their skills and knowledge to deal with climate variability such as making fire tracing round the farm during the dry season, control burning of dried, dead or pruned branches and leaves. Others include the imposition of total ban on smoking or hunting on any land around their farm areas especially in the dry season to prevent fire outbreak. Based on their knowledge of weather forecasting, they employed timely pruning and spraying of pesticides to control pest and diseases incidence that could cause inflorescence die back as a result of prolonged rainy season (that is practice of good agricultural practices).

Conclusion and Recommendations

Although small holder (cashew) farmers have considerable experience in dealing with climate variability and possess local knowledge to cope during difficult periods, the unprecedented and sustained levels of variability associated with long term climate change are outside the realm of what their traditional coping strategies are able to manage.

The potential yield losses that could occur as a result of climate change could be worsen thereby negatively impacting on agriculture and worsen the prevalence of hunger in the rural areas where this crop is grown and the economy because of its income and foreign exchange generating potential for both the farmers and the country respectively.

For cashew farmers to adapt to climate change, small holder producers will need new improved technologies, skills and knowledge or in many cases to be linked to existing technologies which are currently inaccessible thus the researchers and the policy makers should accord climate change a serious attention as reducing farmers vulnerability to climate change is closely linked to poverty reduction and economic agenda since poverty is both a condition and determinant of vulnerability.

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Table 1: Socio – Economic Characteristics of Cashew Farmers

Socio – Economic Variable	Frequency	Percentage (%)
Age of the farmers (years)		
21 – 30	29	15.59
31 – 40	18	9.68
41 – 50	52	27.96
>50	87	46.77
Gender		
Male	142	76
Female	44	24
Marital Status		
Married	170	91.40
Single	16	8.60
Tenureship of Farm		
Freehold	127	68.28
Inherited	19	10.22
Cooperative	40	21.50
Farming Experience		
1 – 5	22	11.83
6 – 10	45	24.19
11 – 15	47	25.27
16 – 20	38	20.43
21 – 25	34	18.28
Educational Level		
No formal Education	73	39.24
Incomplete Primary Education	64	34.41
Completed Primary Education	19	10.22
Incomplete Secondary Education	26	13.98
Incomplete Post-Secondary Education	13	1.61
Tertiary	1	0.54

Table 2: Climate change and Cashew Production

Variables	Coefficients	Standard Error	Prob.
Constant	0.709	0.482	0.243
Age	0.492**	0.551	0.034
Rainfall	-0.325**	4.57	0.042
Rel. Humidity	-0.822*	2.71	0.061
Temperature	0.754*	1.18	0.072
Sunshine	1.241***	2.77	0.000
Farming Experience	0.026	0.28	0.142
Education	0.042	0.011	0.184
Gender	-0.545	0.021	0.164
Farm size	0.424**	0.189	0.522
Lagged output	-0.634	0.175	0.154
R^2	0.6821		
Adjusted R^2	0.6511		

Source: Computer printout

*=Significant at 10%; **= Significant at 5%; ***=Significant at 1%

Experimental Title: Sesame and bambara ground nut intercrop: effects on soil properties and crop mixture productivity in a cashew-based inter cropping system
Investigators: Nduka B.A.; Adewale B.D.; Adeniyi and Akanbi O.S.O

Introduction

Cashew (*Anacardiumoccidentale* L.), often referred to as 'wonder nut' isa crop with tremendous potential, especially in the dry zone, where no other competing perennial crop can be grown successfully on marginal soils, under conditions of water scarcity. The tree can grow as high as 15 meter or more (Aliyu, 2006). Cashew is modest in its soil requirements and can adopt itself to varying soil conditions without impairing productivity. It can grow on poor or stony soils likely due to its extensive root development. Various studies have demonstrated that the cashew tree responds to the application of mineral nutrients, though the responses are significantly affected by plant age, the genotype utilized, the conditions of cultivation (soil and climate) and of the crop management (Barros et al., 1984; Glosh, 1989; Ximenes, 1995; Bezerra et al., 1999; Crisóstomo et al., 2005). However, research results show that tremendous positive response can be obtained through regular applications of fertilizers, and the recommendations were developed and standardized which could give two to three fold yield increases (Fernandopulle, 2003).From literature, there is a dart of information on the physiological response of cashew under an intercrop / organo-mineral combination condition. Howeverresearch on intercropping has shown that several field crops could be intercropped successfully in cashew plantations during the early stages (4 to 5years) of establishment, among them, maize, ginger, ground nut, cowpea, black gram, green gram, pigeon pea, and few vegetables have shown promise under Sri Lankan conditions (Abeysinghe, 2003), while Yadukumaret al, (2003) recommended intercropping cashew with pineapple, turmeric or elephant foot yam under normal density planting system during the first five years.
The present study is therefore proposed to understand the science of adaptability of cashew with some selected arable crops (Bambara and Sesame) for enhanced productivity.

Justification

As remarked by Ekanade (1990), intercropping of trees or mixed planting produces better soil quality. Hence, the wider inter-row space in sole cashew plantation can be used for raising intercrops until cashew canopy covers the inter-row space and additional income would be generated by the cashew farmers.The overall goal of the present study was to identify the feasibility of utilizing sesame/Bambara as an intercrop and mineral / organic fertilizers application to understand responses of cashew to intercropping in a guinea savannas' agro ecological zone of Nigeria.

Objectives

The specific objectives were to: Quantify growth parameter responses of cashewand associated arable crops in an intercropping system.

Materials and Methods

The study was conducted at an establishedcashew plot on an Experimental Farm of the Cocoa Research Institute of Nigeria (CRIN) Ochaja Sub-station, Kogi state. Treatments areof RCBD factorial combinations (3X2) with three replicates(Cashew, Sesame and Bambara ground nut) and Fertilizer applications (mineral fertilizer (NPK) and organic fertilizer (Cocoa pod husk)).
Soils between trees were hand weeded and ploughed then the seed bed was prepared. Seeds of both arable-Sesame and Bambara ground nut were sown on ridges and all trees and arable received the same cultural treatment and fertilizer application at 2.5t ha^{-1}. Observations were made for vegetative growth characters (plant height, girth, leaf area and numbers of leaf) and soil samples before and after sowing were subjected to chemical analysis.
The data obtained were analysed using Statistically Analysed System (SAS) variance and the effects were tested according with Duncan Multiple Range Test (DMRT).

Results and Discussion

Table 1:The result of the chemical properties of the soil, fertilizer and cocoa husk

Physical properties	Soil	NPK fertilizer	Cocoa husk
Sand	60.80 g kg^{-1}	-	-
Silt	9.00 g kg^{-1}	-	-
Clay	30.20 g kg^{-1}	-	-
Textural class	Sandy loam	-	-
Chemical properties			
Soil $P^H(H_2O)$1:1	5.25	-	-
Organic matter	0.70%	-	-
Nitrogen	1.13g	15	0.48%
Available Phosphorus	2.38mg kg^{-1}	15	0.11%
Exchangeable Bases			
K^+	0.46cmol/kg	15	4.08mg kg^{-1}
Ca^{2+}	1.12 cmol/kg	-	1.20 mg kg^{-1}
Mg^{2+}	0.78 cmol/kg	-	0.46 mg kg^{-1}
Na^+	0.46 cmol/kg	-	2.40 mg kg^{-1}
AL	0.59 cmol/kg	-	-
CEC	2.03 cmol/kg	-	-

The results of the physico-chemical properties of the soil and the chemical compositions of cocoa husk (CPH) before the experiment were presented in Table 1. The soil is acidic with $_pH$ of 5.25(Table 1) and low in organic matter (0.70%). The available P in this study is adequate for crop production. Table 2 shows the treatment combinations and the various rates of the applied materials used for the experiment.

Table2. Treatment code and combination as applied.

Treatment code	Treatment	
T1	Cscn (Control)	Cashew/sesame sole
T2	Cscph	Cashew + sesame + cocoa husk
T3	Csnpk	Cashew + sesame + NPK fertilizer
T4	Csbnpk	Cashew + sesame + Bambara + NPK
T5	Csbcph	Cashew + sesame + Bambara + cocoa husk
T6	csbcn	Cashew + sesame + Bambara

Table 3: Effect of organic and inorganic materials on the growth of Sesame, Bambara intercrop in cashew plot at4,8 and 12 weeks after sowing

	Leaf count			Stem girth (cm)			Plant height (cm)			Leaf are a (cm)		
	4WAS	8WAS	12WA S	4WAS	8WAS	12WAS	4WAS	8WAS	12WAS	4WAS	8WAS	12WAS
T1	8.23^{a}	18.97^{c}	28.63^{a}	0.44^{a}	0.59^{a}	0.6^{a}	14.07^{e}	20.32^{e}	27.93^{e}	17.49^{c}	25.08^{c}	25.77^{c}
T2	8.47^{a}	20.67^{c}	46.93^{a}	0.39^{a}	0.57^{a}	0.66^{a}	20.95^{c}	33.39^{d}	39.53^{d}	20.37^{bc}	37.72^{bc}	38.74^{bc}
T3	8.40^{a}	23.37^{bc}	41.10^{a}	0.46^{a}	0.57^{a}	0.62^{a}	22.76^{bc}	38.19^{c}	47.28^{c}	23.24^{abc}	45.14^{b}	47.00^{a}
T4	8.40^{a}	25.53^{abc}	49.73^{a}	0.44^{a}	0.66^{a}	0.69^{a}	27.26^{a}	72.54^{a}	87.28^{a}	32.29^{a}	63.71^{a}	65.81^{a}
T5	9.00^{a}	31.63^{a}	41.05^{a}	0.50^{a}	0.51^{a}	0.69^{a}	24.38^{b}	38.82^{bc}	90.77^{a}	28.60^{ab}	36.56^{bc}	37.36^{bc}
T6	8.93^{a}	28.23^{ab}	31.60^{a}	0.49^{a}	0.60^{a}	0.73^{a}	17.77^{d}	42.73^{b}	62.67^{b}	28.03^{ab}	31.42^{bc}	41.15^{bc}
Mean	8.57	24.73	39.84	0.45	0.58	0.66	21.19	40.99	59.24	25.00	39.94	42.64
(CV)	7.93	15.53	38.86	21.93	13.68	15.81	5.98	5.54	6.61	19.52	18.75	19.17

Note.WAS-Week after Sowing.CV-Coefficient of Variation. Means with the same letters are not significantly different.

There were increases in plant height, stem girt and leaf area of all the seedlings of cashew when given single and combined treatments obtained as the number of weeks after sowing increases (Table3). No significant different was obtained among the treated and control seedlings except for 8WAS for leaf count.The highest value of plant height of 49.73 was obtained at 12 WAS in seedlings treated with cashew + sesame + Bambara nut + NPK (T4). For stem girth, the highest value (0.73) was obtained for cashew +sesame + Bambara nut (T6), no significant difference was obtained. Cashew + sesame + Bambara nut + NPK (T4) had the highest value of 65.8 for leaf area at 12WAS. This was followed by Cashew, Sesame + NPK (T3) (47.00) and the least was observed for control Cashew, Sesame without fertilizer treatments (T1) having a value of 25.77 (Table 3).

The chemical properties in the residual soil after the experiment were presented in table 4. From the result, all the chemical compositions analysed were significantly different from each other except for K and Na. as shown in Table 4.Nitrogen had the highest value in T3 (1.26). For organic carbon, T5 had the highest with value 1.76 and highly significant. Similar result was observed for organic matter (2.71) for T5 (Table 4). T6 had the highest value in calcium and magnesium with values 2.68 and 1.55, followed by T4 with values 1.92 and 1.18 and the least was obtained for T2 with values 0.98 and 0.72 respectively.

Table 4: Chemical composition of residual soil

Treatments	PH	OC	OM	N	P	K	Na	Ca	Mg	AL	CECS
T1	7.65^{b}	0.67^{e}	0.84^{e}	1.14^{b}	3.88^{a}	0.46^{a}	0.46^{a}	1.38^{c}	0.92^{d}	0.61^{a}	2.51^{d}
T2	7.65^{b}	1.08^{c}	1.77^{b}	1.00^{c}	3.51^{b}	0.46^{a}	0.46^{a}	0.98^{d}	0.72^{f}	1.01^{a}	1.80^{e}
T3	7.25^{d}	0.88^{d}	1.19^{d}	1.26^{a}	2.04^{d}	0.46^{a}	0.46^{a}	1.72^{b}	1.08^{c}	0.57^{d}	2.85^{c}
T4	7.45^{c}	1.08^{c}	1.53^{c}	1.00^{c}	3.51^{b}	0.46^{a}	0.47^{a}	1.92^{a}	1.18^{b}	0.59^{c}	3.20^{b}
T5	7.85^{a}	1.76^{a}	2.71^{a}	1.14^{b}	3.23^{c}	0.46^{a}	0.46^{a}	1.18^{d}	0.72^{e}	0.61^{a}	3.20^{b}
T6	7.25^{d}	1.12^{b}	1.62^{bc}	0.99^{c}	3.48^{b}	0.46^{a}	0.46^{a}	2.65^{a}	1.55^{a}	0.60^{b}	4.42^{a}

Means with the same letter are not significantly different using Duncan multiple range test
Key: OC-Organic carbon; OM-Organic matter.

Discussion

Cashew intercrop (Sesame and Bambara nut) responded well to both organic and NPK fertilizer treatments, indicating higher growth rate in the intercrop duringthe vegetative growing period. This result was inline with Hammed et al., (2011).The use of coffee husk as an organic amendment has been reported and reccommended by Veekenet al. (2005), Janvier et al. (2007), Lazcano et al. (2009) and Yadessa et al. (2010). According to them, amending agricultural soils with coffee husk as compost supplies plant nutrients and helps to improve the physicochemical and biological properties of the soil. Nutrient composition of the soil in this study was significantly enhanced and in line with MoyinJesu (2007) who remarked that cocoa pod husk increased soil OM, N, P, K, Ca, Mg and pH. HoweverMiller and Miller (2000) reported that the effect may not be apparent, as nutrients are released gradually into the Soil, with its presence positively affecting the immediate soil properties. Ibiremo et al (2012), Opoku-Ameyaw and Appiah(2000)allreported that the responses of cashew trees to minerals fertilizer are dependent on the management practices.The cocoa husk and NPK applied was significant on soil parameters except with K and N.

Conclusion

The scope for improving sesame/bambara growth may not be achieved simply by intercropping without improving the nutrient regimes in the system. This is because the study area had very low level of Nsuggesting improvement of soil management foroptimum growth with the used of both minerals (NPK) and organic fertilizers (CPH).

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Experimental Title:Poverty alleviation and increased food consumption through enhanced cashew processing in Nigeria.

Investigators: Yahaya, L. E.; Ogunwolu, S.O.; Jayeola C.O. and Shittu, T.R.

Introduction

Cashew is a tree that belongs to the family of Anacardacea. It has its origin from Portugal. The fruit of cashew is the edible apple, which is sweaty, pulpy, and juicy. The apple also consists of nut, which embedded the kernel, a very nutritious part of the fruit. Cashew is widely cultivated across the ecological zones of Nigeria. This is because it thrives in most soils of these ecologies.

It has been estimated that an average Nigerian live below the poverty line. In fact, many go to bed hungry each day. There is therefore need for intervention that the average Nigerian will be able to live above the poverty line more than 10 dollars per day. Nigerian is blessed with a crop, cashew whose potential have not been fully tapped over the years. It is against this backdrop that this project is emanating with the intent of solving poverty and increasing food products by harnessing potentials of this crop through processing.

Objective

To reduce poverty among cashew farmers through enhanced cashew processing.

Materials and Methodology: Cashew kernel oil production: Three methods extraction were carried out according to the procedures of AOAC (1990). In a typical experiment, known mass of cashew kernel meal was introduced into a thimble an n-hexane was used as the extracting solvent and this was done for 7-8 hours. At the end of the extraction, the oil was desolventized and the oil yield was determined based on the weight difference of the sample. The resulting oil was characterized using the AOCS methods of analysis. Gross margin (GM) analyses, cost benefit ratio, and internal rate of return of the process were carried out for the study. Cashew butter, cashew jam, and juice were also produced and analyzed according to standard methods of analysis.

Results and Discussion

The Physical and chemical Characteristics of Cashew Kernel Oil is depicted in Table 1. The specific gravity is commonly used in conjunction with other figures in assessing the purity of oil. The specific gravity of cashew kernel oil falls within the narrow range of 0.900 – 0.925 for vegetable oils and is close to those of some well known edible oils like sesame, soya beans and corn oils of 0.16 – 0.921 and cotton seed and sunflower oils of 0.916 – 0.9180 (Josyln 1979). The value of the free fatty acid is also shown in the table. Although, refined oils are largely devoid of free fatty acids, but considerable amount of this constituent may be present in the crude oil and this in fact is an index of purity of the oil. The value in the table revealed high value for aqueous extracted oil (2.607%).

Table 1: Physical and chemical Characteristics of Cashew Kernel Oil

Parameters	Soxhlet Method	Aqueous Method	Mechanical Method
Colour	Golden yellow	Golden yellow	Dark yellow
Yield (%)	48.81	29.41	33.81
Moisture content (%)	2-2.5	4-6	2-3
Specific gravity (at 20^{o})	0.903	0.920	0.916
Melting Point (0^{o}C)	16-17	16-17	17-19
Refractive index (at 20^{o}C)	1.466	1.466	1.490
Viscosity Ratio	1.12	1.16	1.18
Acid Value (Mg KOH(g))	4.76	5.049	5.01
Free Fatty acid (% oleic acid)	2.4386	2.607	2.31
Saponification value (Mg KOH/g)	159.9	165.49	178
Peroxide Value (Meq/Kg)	4.087	10128	3.16
Iodine Value (Meq/Kg)	87.63	93.047	85.46

The benefit cost analysis of this method for cashew oil production for a five-year period is shown in table 2. The results indicate a positive NPV at both low and high interest rates of 21 and 32 % respectively. At 21% interest rate, the NPV value is N31, 116.93 while it is N132, 678.4 at 32 %. A benefit cost ratio (BCR) of 0.98, which is less than unity, was obtained. The result therefore showed that cashew oil production from this method is viable since the BCR is near unity and the internal rate of return is positive at 23.03 percent. The results for cashew butter and jam are shown in table 3 and 4 respectively.

Table 2: Investment profile for cashew oil production by Mechanical method

Year	Cost (N)	Revenue	Increm. Benf.	Disc. cost	Disc.benf.	21% factor	32% factor	(NPV (21%)	NPV (32%)
0	197,000	-	(197,000)	197,000	(197,000)	1	1	(197,000)	(197,000)
1	2,077,026	2,409,750	332,724	1,715,623.5	1,990,453.5	0.827	0.758	274,830	253,205
2	2,330,423.2	2,536,237.5	199,814.3	1,591,671	1,728,152.2	0.683	0.574	136,473.2	114,693
3	2,614,734.8	2,656,749.4	42,014.6	1,474,710.6	1,498,406.7	0.564	0.435	23,696.23	18,276.4
4	2,933,732.4	2,789,586.9	(144,145.5)	1,370,053	1,302,737.1	0.467	0.329	(67,315.90)	(47,424)
5	3,291,647.7	2,929,066.24	(362,581.6)	1,270,576	1,130,619.6	0.386	0.250	(139,956.5)	(9,072)
T0TAL	**13,477,475.14**	**13,315,390.04**		**7,619,634.1**	**7,453,369.1**			**31,116.93**	**132,678.4**

BCR = 0.98

IRR =23.09

Table 3: Nutritional composition of cashew jam

Parameters	Nutrient value
Moisture content (%)	68.41
TTA	0.12
pH	3.60
Brix (0)	56
Vit. C (mg/100g)	230

Table 4: Composition of cashew nut butter

Elements	Nutritional value
Carbohydrate	27.87 g
Fat	49.81 g
Protein	17.55 g
Dietary fiber	2.12 g
Ash	2.50 g
Calcium	43 mg
Iron	50.2 mg
Magnesium	250 mg
Zinc	5.61 mg
Water	2.90 g

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Experimental Title: Growth of cashew as influenced by leguminous crops

Investigators: Iloyanomon, C.I. and Adeyemi E.A.,

Introduction

Cashew is an export crop and one of the most important tree nuts in international trade. However, soil nutrient management in cashew is a challenge. Cashew is often grown on poor soils due to its adaptation to a wide range of soil and climatic conditions. This coupled with nutrient mining due to harvesting of cashew nuts without adequate nutrient replenishment has led to the need for nutrient supplementation. Though nutrients are returned through leaf litter, the amount returned is not sufficient to replace the lost nutrients.

Low external input agriculture without fertilizer is a common place in Sub-Saharan Africa. Many cashew farmers in Nigeria do not use fertilizer. Reason ranges from lack of knowledge of the nutrient status of the soil, to scarcity of the conventional inorganic fertilizer and high cost where available, among other reasons. This has made inorganic fertilizers beyond the reach of small holder resource poor farmers. This coupled, with the detrimental effect of continuous use of inorganic fertilizers has necessitated the search for a sustainable and environmentally friendly alternative.

The use of leguminous cover crops is a viable and sustainable alternative. Leguminous cover crops have been extensively used in the tropics for plantation crops such as rubber and oil palm in countries like Malaysia. Apart from some of these cover crops being sources of food and fodder. Their nitrogen fixing potentials has made them an attractive alternative. Leguminous cover crops such as pigeon pea *Pueraria phaseoloides, Mucuna prorren, Calopogoniummucunocides*, Fix 46-122kgN/ha

(Tian et al. 1995), increased soil available Phosphorous by 3-15% and also increase yield. Cover crops also increases soil organic matter which is also essential in soil fertility management. In addition to improving soil fertility, they smoother weeds, reducing the drudgery of hand weeding and the use of expensive herbicides and environmental problems associated with use of these herbicides. Cover crops, also reduces soil degradation due to erosion and conserves soil moisture (Salako and Tian, 2005). Beneficial effects of some cover crops in improving growth and yield of cocoa has also been reported.

Despite the benefit of cover cropping it has not been properly integrated into the farming system on Nigeria. Hence it is not a common practice in Nigeria. There is therefore need to study the impact of cover cropping on cashew with the aim of incorporating these leguminous cover crops in cashew plantations to enhance their benefits.

Objective

1. Determine the effect of leguminous cover crops on early field establishment of cashew.

Methodology

Field experiment was conducted in Ibadan. The treatments consisted of:

i) Cashew alone
ii) Cashew+ Pigeon pea
iii) Cashew+ Soybean
iv) Cashew+ cowpea

The treatments were arranged in a Randomized complete block design with three replications. Cashew was planted at a spacing of 6m X 6m. The legumes were planted at the rate of two seeds per hole and latter thinned down to one plant per hole Prior to the establishment of the experiment, composite soil sample will be taken at 0-30cm for laboratory analysis to determine some of the physical and chemical properties of the soil. Growth data was taken on plant height, stem diameter, number of leaves leaf and leaf are from one month after planting and monthly afterward until termination of experiment.

Data collected were subjected to statistical analysis and significant means separated using Least significant difference at 5% level of probability.

Results and Discussion

The effect of leguminous intercrops on no of leaves of cashew was significant (P<0.005) (Figure 1).

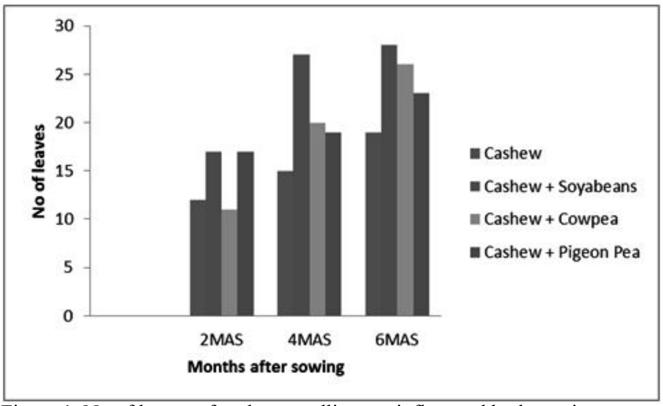

Figure 1: No of leaves of cashew seedlings as influenced by leguminous crop intercrop

At 2 months after sowing (MAS) of cashew, the number of leaves of cashew intercropped with legumes was higher than sole cashew, however the increase was not significant. At 4MAS only cashew in cashew + soyabeans intercrop had significantly higher number of leaves when compared with sole cashew with increases of 80 % . However, at 6MAS both cashew in cashew + soyabean and cashew + cowpea intercrop had higher number of leaves when compared with sole cashew with increases of 47 % and 37 % respectively. The better performance in no of leaves of cashew in cashew + soyabean and cashew + soyabean intercrop over sole cashew could be attributed to increased nitrogen availability due to nitrogen fixation.

Cashew plant height was not significantly (P<0.005) enhanced by the presence of legumes at all the sampling periods (Figure 2).

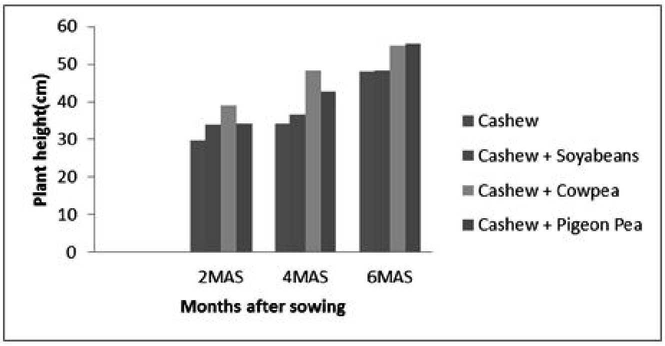

Figure 2: Plant height (cm) of cashew seedlings as influenced by leguminous intercrop

Though cashew intercropped with legumes had taller plants when compared with sole cashew. the increase was not significant. Similar trend was observed for stem diameter (Figure 3)

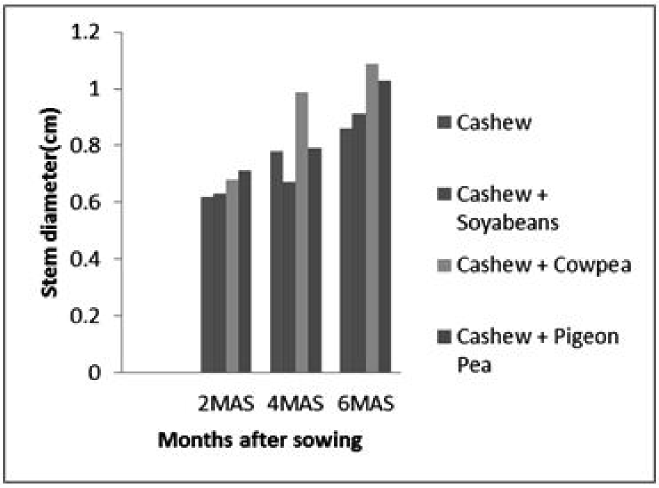

Figure 3: Stem diameter (cm) of cashew seedlings as influenced by leguminous intercrop and number of branches (Table 4).

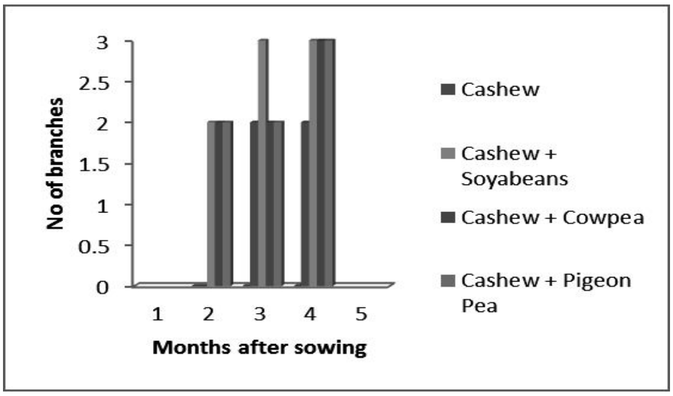

Figure 4: No of branches of cashew seedlings as influenced by leguminous intercrop. The presence of leguminous intercrops except pigeon pea decreased soil temperature significantly when compared with sole cashew at 2MAS with decreases of 8,95-17.8% (Figure 5).

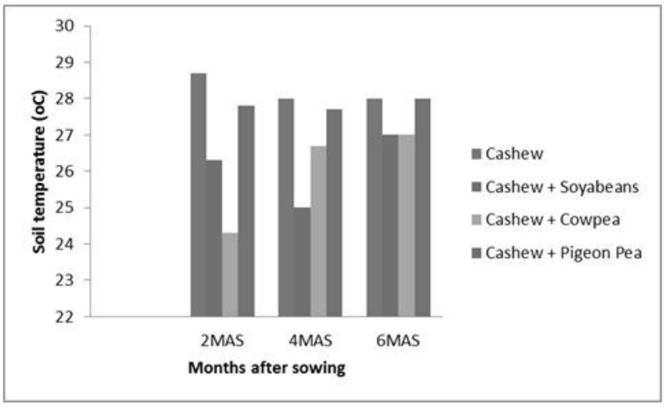

Figure 5: Soil temperature(^{o}C) as influenced by leguminous intercrop

Though pigeon pea lowered soil temperature the decrease was not significant. Cowpea also decreased soil temperature by 15% when compared with pigeon pea. This trend was maintained at 4MAS with soyabean and cowpea decreasing soil temperature significantly by 12% and 4.95% respectively when compared with sole cashew. At 6MAS all legumes decreased soil temperature but the decrease was not significant. The decrease of soil temperature by cowpea and soyabean at 2 and 4MAP could be attributed to the fact that these legumes covered the soil and shielded the soil from direct sunlight. This effect was not observed at 6MAS because cowpea and soyabean had been harvested.

Summary and Conclusion

Intercropping cashew with legume is beneficial as it enhances the growth of cashew.

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Experimental Title: Assessment of the effect of postharvest handlings on cashew nut and kernel quality

Investigators: Adeniyi, D. O. and Adedeji, A. R.

Introduction

Excellence and thoroughness of postharvest handlings affect the quality of the cashew nut, which in turn affects the reputation of the export country. Cashew nut quality influences the price and safe consumption of the product. Nigeria receives the lowest international prices in Africa for its raw nuts due to concerns over production, processing, post-harvest handling. This study is to ascertain the quality of the cashew nut and kernel by evaluation of the microbial status and potential mycotoxins contamination of the produce relating to the postharvest handling techniques employed by farmers.

Objectives

Evaluate farmers'postharvest handlings practices and determine their effect on microbial status and mycotoxins infestation potentialof the nut and kernel quality.

Methodology

The nut samples from study locations were subjected to physical observation to assess the disease expressionson the nut, the apples remain in some cases were neatly detached, nut defects/abnormalities prior to opening of kernel for further cotyledon assessment and microbial assay. The nut counts of the samples were recorded and the moisture content also determined as follows:

$$Moisture\ Content = \frac{Initial\ weight - Oven\ dry\ weight}{Oven\ dry\ weight} \times 100$$

The kernels were cut into two equal halves using a sterile cutting device and the cotyledons were assessed by visual observations for colour, deformity and infection status of the nuts. The nut samples were separated into the kernel, testa and cotyledon and were assayed separately for associated mycoflora by pour plate method with colony count taken at 10^{-5} dilution factor.

Results and Discussion

Kogi I: Cashew nut samples were dried under direct sun for several days, packed, bagged and kept in water proof sacks in store and the nut is a year in storage at the time of collection.

Kogi II: The nut samples were dried for several weeks and packed as a heap on water proof sacks in an enclosed environment for storage in a farmer's store. The nuts have also been stored for a year at the time of sampling.

Oyo I: The nut samples were picked and subjected to different drying techniques (direct sun drying and shade drying). The nuts were dried on the concrete platform for three days prior to storage and stored in jute bag.

Kwara I: The cashew apples were allowed to rotten and the nuts picked or the apples harvested for consumption. The nuts collected were dried by heaping them in one part of the farm till a buyer was gotten for the produce or heap under a shed in cases of no buyerson time.

Oyo II: The cashew apples were allowed to drop, rotten and the nuts picked. Nuts dried briefly and packed in water proof bag in storage.

Differences were observed in the methods and techniques employ by farmers in the handlings of cashew nut especially in the harvesting, drying and storage. Most farmers allowed the apple to rotten on the ground and pick the nuts thereafter while some other harvest the nut on observation of its ripeness, but some however observed routine and regular picking of apples prior to rotten. More farmers packaged their nut in waterproof bags in store on bare floor, some heaped on the farm and some other ones dried briefly on bare floor and put in storage. Some farmers still heaped the nut on concrete floor in their warehouse. The cotyledons are commonly creamy-white in cases they wereintact, but some rotten ones were observed in nut samples from Kabba and Ilorin. The nut count of cashew nuts from Ibadan, Kabba and Ochaja ranged from 112 to 258 nuts, the moisture content of the nut samples from 2.67 to 7.55% and the colony count at 10^{-5} dilution factor is had the least recorded at Ibadan.. The highest nut count of 258 was recorded in Ochaja, followed by 230 in Ilorin and the least nut count of 112 in Kabba. The moisture content of the nut samples was highest (12.61%) in Ilorin while the lowest of 2.67% was recorded in Kabba, and the colony count also ranged from 1.0 to 52.0 x 10^{5}withthe highest colony count found in Ochaja nut.

Table 1: Characteristics of nut samples from study locations

*Sample source	Initial weight (g)	Final weight (g)	Moisture content (%)	Nut count//100g	Colony count (cfu/ml@10^{-5})
Ibs	61.65	57.32	7.55	171	3.0
Iba	58.14	54.12	7.43	170	1.0
Kab	95.47	92.99	2.67	112	7.0
Och	41.58	39.50	5.27	258	52.0
Ilr	43.5	38.63	12.61	230	17.0
Ogb	45.0	40.76	10.40	220	4.0

*Ibs-Ibadan (sun-dry); Iba-Ibadan (air-dry); Kab-Kabba; Och-Ochaja; Ogb-Ogbomoso; Ilr-Ilorin

Eleven identified mycoflora were isolated from the samples, identity of some others could not be established while some others still require further identification to specie level had variations were observed in their morphological features of the isolates. Most of the isolated mycoflorawere toxigenic species belonging to the genera *Aspergillus, Penicillium, Lasiodiplodia*and *Fusarium*across the five study locations indicating the potential mycotoxin contaminations in the nut samples.

Table 2: Occurrence of mycoflora associated with cashew nut

Sample source	*Aspergillus*spp.	*A. niger*	*Penicillium*spp. 1	*Lasiodiplodia*spp.1	*A. fumigatus*	*A. flavus*	*A. parasiticus*	*A. repens*	*Penicillium*spp. 1	*Lasiodiplodia*spp.2	*Fusarium*spp.	*UI
Ochaja	+	+	+	+	+	+	+	+	-	-	-	+
Kabba	+	+	-	-	-	-	+	-	-	+	-	+
Ibadan (air-dry)	+	-	-	-	+	+	+	-	-	-	-	-
Ibadan (sun-dry)	+	-	-	-	+	-	-	+	+	-	-	+
Ilorin	+	-	+	+	-	+	-	-	-	-	+	+
Ogbomoso	-	-	+	-	+	+	-	-	-	-	+	+

Present (+); Absent (-); *Unidentified organism

Conclusion and Recommendations

Toxigenic potential of the mycoflora observed in the cashew nut samples showed that postharvest handling techniques adopted by various farmers is not appropriate and mycotoxins contamination potentials in the nut pose a serious health risk to consumers. However developed technologies on best practices in cashew production need be made available and farmers be trained on its application.

Experimental Title: Field establishment of cashew as influenced by shade plant, phosphate fertilizer and *Arbuscular mycorhizal* inoculation in a changing climate
Investigators: Ibiremo, O. S. and Adeyemi, E. A.

Introduction

Cashew has a result of its wide adaptation is often grown in very poor soils and this has affected its survival and establishment (Topper, *et al.* 2001). Tree crops generally require shade particularly cocoa and coffee for good establishment. However, this is not true with cashew as shade is hardly used. Shade is necessary for good establishment of tree crops; specifically the use of shade plants for cashew establishment is rarely done. Plantain has been used as shade/nurse plant in cocoa and coffee establishment. Recent observations indicated that plantain could not perform this function especially in the dry season when the shade requirement is most critical. The need to search for alternate shade crop that will provide adequate shade during the stress period (dry season) becomes imperative. In addition, cashew cultivation is variously limited by both biotic and abiotic agents particularly in poor soils. Phosphorus is of most critical nutrient elements required for root and flower development which are fundamental to productivity. In particular P is limited due to fixation, crop removal and leaching. The objective of this study was to enhance cashew establishment through use of natural rock phosphate (Sokoto RP) and pigeon pea as a shade crop.

Materials and Methods

The project was sub-divided into two components namely: (1) Influence of phosphate fertilizer and pigeon pea (*Cajanus cajan*) on the field establishment of cashew (Ochaja) and (2) Field establishment of cashew as influenced by pigeon pea (*Cajanus cajan*), phosphate fertilizer and Arbuscular mycorrhizal inoculation (Ibadan). The two sites were slashed and the tree felled. The debris was packed and layout of the experiments in the two locations was done. The cashew and pigeon pea were planted directly on the field at the same time. The initial soil samples of the sites were taken and processed for physical and chemical analyses. The project was established at CRIN Ibadan along second gate (Zone 3/4) and CRIN Ochaja substation. The cashew seedlings and accompanying shade crop, pigeon pea (*Cajanus cajan*) were established in 2014. Data collection on at both locations commenced on cashew height, stem diameter, number of leaves, leaf area and number of branches. The experimental design was a randomized complete block (RCBD) with three replications. The soil samples were analyzed for both physical and chemical properties according to procedures as outlined by IITA (1982). Data was analyzed using ANOVA and means separated by LSD at 5% level of probability.

Results and Discussion

The results reported here contained mostly the data obtained from Ochaja substation while the Ibadan data is under processing. The soil of Ibadan contained 718, 129, 149gkg-1 soil sand, silt and clay respectively while Ochaja had 858, 20 and 124 gkg-1 for sand, silt and clay fractions respectively (Table1). This implies that the higher sand fraction in Ochaja soil would not allow water to be retained during the dry season which has serious implications on the survival of young cashew seedlings in the field. Conversely, the silt fraction in Ibadan soil was 85% higher than the value obtained for Ochaja soil. However, the soils in both locations contained enough clay that would be sufficient for the survival of cashew.

The average organic carbon of Ibadan soil at 0-30cm was $10gkg^{-1}$soil while Ochaja soil had $6gkg^{-1}$soil. It is known that organic carbon plays a pivotal role in the fertility of tropical soils, hence Ibadan soil is more suitable than that of Ochaja soil. The pH of Ibadan soil was 7.6 while that of Ochaja was 5.9. This indicates that Ochaja soil was more acidic compared to Ibadan. In Ibadan soil, the total N at 0-15cm was $0.15gkg^{-1}$ while that of Ochaja was 0.08 gkg^{-1} at the same depth. However, the total N at 0-15cm in Ibadan soil decreased sharply by 53% at 15-30cm while that of Ochaja decreased by only 25%. The exchangeable bases (K, Ca and Mg) were higher in Ibadan soil than Ochaja soil (Table 1). This showed that the matrix of Ibadan soil is better supplied with bases than Ochaja which is an indication of fertility. The height of cashew seedling was not significantly affected by shade plant and SRP at 1 MAP. However, at 3MAP SRP application without pigeon pea (shade crop) significantly ($P<0.05$) enhanced the height**of**cashew seedling in the field. At 3 and 4 MAP, SRP application and shade plant did not show significant effect on the height of cashew seedlings in the field. Conversely, the height of cashew at 5, 6 and 7 MAP was significantly ($P<0.05$) promoted by SRP application without shade crop in the field. In Table 3, phosphate fertilizer and shade crop did not significantly affect the stem diameter of cashew in the field at 1 to 4MAP. At 4MAP, stem diameter ranged from 1.18 to 1.43cm under the control and phosphate fertilizer application with shade crop respectively. However, phosphate fertilizer application and shade crop significantly ($P<0.05$) enhanced the stem diameter of cashew seedlings in the field. The effect of SRP and shade crop followed similar trend of what obtained between 1- 4MAP. The number of leaves of cashew was not significantly affected by phosphate fertilizer application and shade crop at 1 to 7MAP in the field (Table 4). The number of leaves ranged from 29 to 56 per plant at 7MAP. SRP and plant did not affect the leaf area of cashew at 1 MAP. However, at 2 and 3 MAP phosphate fertilizer applied with shade crop significantly ($P<0.05$) enhanced the leaf area of cashew (Table 5). Conversely, SRP and shade crop did not affect the leaf area of cashew at 4, 5, 6 and 7 MAP. At 7 MAP, cashew leaf area ranged from 63 to $76cm^2$ per plant in the control and SRP with shade crop respectively. Phosphate fertilizer and shade crop did not significantly affect the number of branches per stand of cashew in the field at 1 to 3MAP (Table 6). However at 4 MAP, cashew under shade crop produced more branches than those without shade crop. In addition, cashew branched more under shade and phosphate fertilizer application. However, at 5, 6 and 7 MAP, the effect of shade crop and phosphate fertilizer application was not significant on the number of branches of cashew in the field. The number of branches per plant ranged from 5 to 7 in the control and phosphate fertilizer application and shade crop respectively. The interim inference is that phosphate fertilizer and shade crop enhanced the growth and field establishment of cashew.

Table 1: Pre-cropping physical and chemical characteristics of the soils of Ibadan and Ochaja

Ibadan	Soil Parameters	Unit	Soil Depth 0-15 cm	15-30cm	Mean
	Sand	gkg^{-1}	728.00	708.00	718.00
	Silt	gkg^{-1}	126.00	132.80	129.40
	Clay	gkg^{-1}	149.60	149.20	149.40
	pH		7.65	7.65	7.65
	Organic C.	gkg^{-1}	1.28	0.73	1.01
	Total N	gkg^{-1}	0.15	0.08	0.12
	Avail.P	$mgkg^{-1}$	17.09	9.81	13.45
	Exch. K	$cmolkg^{-1}$	0.33	0.19	0.26
	Exch. Ca	$cmolkg^{-1}$	13.70	8.61	11.15
	Exch. Mg	$cmolkg^{-1}$	2.53	1.52	2.02
	Fe	$mgkg^{-1}$	7.75	11.30	9.52
	Zn	$mgkg^{-1}$	0.83	4.32	2.57
	Cu	$mgkg^{-1}$	0.57	0.52	0.54
	Mn	$mgkg^{-1}$	78.15	97.37	87.76
Ochaja					
	Sand	gkg^{-1}	848.00	868.00	858.00
	Silt	gkg^{-1}	22.80	17.80	20.30
	Clay	gkg^{-1}	129.20	119.20	124.20
	pH		6.15	5.70	5.92
	Organic C.	gkg^{-1}	0.73	0.54	0.63
	Total N	gkg^{-1}	0.08	0.06	0.07
	Avail.P	$mgkg^{-1}$	9.82	9.36	9.59
	Exch. K	$cmolkg^{-1}$	0.06	0.05	0.05
	Exch. Ca	$cmolkg^{-1}$	6.76	5.85	6.30
	Exch. Mg	$cmolkg^{-1}$	0.71	0.50	0.60
	Fe	$mgkg^{-1}$	16.12	9.93	13.02
	Zn	$mgkg^{-1}$	2.45	0.78	1.61
	Cu	$mgkg^{-1}$	0.37	0.26	0.31
	Mn	$mgkg^{-1}$	56.97	26.65	41.81

Table 2: Cashew height as influenced by shade crop (*Cajanus cajan*) and phosphate fertilizer in the field (Ochaja)

Treatment	Months after Planting 1	2	3	4	5	6	7
P_0S_0	21.08	29.2ab	38.20	40.40	42.67b	47.80b	50.00b
P_0S_1	20,58	28.50b	35.10	47.7	39.20b	43.70b	45.60b
P_1S_0	25.58	37.10	49.10a	54.90	61.37a	67.90a	71.80a
P_1 S_1	23.75	32.90ab	46.09	51.83	49.03ab	45.70ab	58.o0
SE (0.05)	5.44	12.30	13.60	27.70	9.34	7.79	6.80
CV (%)	12	7.85	16.20	28.50	15.76	18.60	14.80

P0S0 = no P fertilizer and plant shade, P0S1= no P fertilizer with shade plant, P1S0= P fertilizer with no shade plant and P1 S1= P fertilizer with shade plant

Table 3: Effect of shade crop (*Cajanus cajan*) and phosphate Fertilizer on stem diameter of cashew in the field (Ochaja)

Treatment	Months after Planting 1	2	3	4	5	6	7
P_0S_0	0.75	0.83	1.11	1.18	1.34b	1.40	1.47
P_0S_1	1.02	1.11	1.37	1.43	1.38b	1.44	1.57
P_1S_0	0.83	1.00	1.34	1.42	1.60ab	1.83	1.90
P_1 S_1	0.80	0.96	1.19	1.43	1.69	1.56	1.75
SE (0.05)	0.20	0.12	0.17	0.16	0.16	0.19	0.19
CV (%)	29.10	15.50	17 .40	14.40	14.40	15.2	13.70

P0S0 = no P fertilizer and plant shade, P0S1= no P fertilizer with shade plant, P1S0= P fertilizer with no shade plant and P1 S1= P fertilizer with shade plant

Table 4: Effect of shade plants and phosphate fertilizer on number of leaves of cashew in the field (Ochaja)

Treatment	Months after Planting 1	2	3	4	5	6	7
P_0S_0	17.40	23.60	32.50	27.30	24.70	30.40	29.30
P_0S_1	15.60	30.20	34.50	31.00	26.30	31.30	32.80
P_1S_0	18.50	31.90	39.80	32.00	43.70	47.20	56.00
P_1 S_1	17.30	28.10	37.80	37.30	30.90	34.20	33.70
SE (0.05)	3.48	5.30	5.57	5.88	9.15	8.18	14.05
CV (%)	24.80	22.80	18.90		35.70	35.70	45.30

P0S0 = no P fertilizer and plant shade, P0S1= no P fertilizer with shade plant, P1S0= P fertilizer with no shade plant and P1 S1= P fertilizer with shade plant

Table 5: Effect of shade crop and phosphate fertilizer on the leaf area (cm^2) of cashew in the field (Ochaja)

Treatment	Months after Planting						
	1	2	3	4	5	6	7
P_0S_0	37.20	42.20b	46.60b	63.70	059.6	58.80	62.90
P_0S_1	36.17	44.80b	55.00b	61.80	50.60	64.80	64.70
P_1S_0	32.09	64.20a	77.20a	70.30	65.20	77.40	75.80
P_1 S_1	38.42	56.00ab	69.70a	108.20	77.30	68.40	69.80
SE (0.05)	5.03	6.88	3.67	18.24	15.22	7.47	10.09
CV (%)	17.10	16.30	7.20	29.40	29.50	13.60	18.10

P0S0 = no P fertilizer and plant shade, P0S1= no P fertilizer with shade plant, P1S0= P fertilizer with no shade plant and P1 S1= P fertilizer with shade plant

Table 6: Effect of shade crop and phosphate fertilizer on the number of branches of cashew in the field (Ochaja)

Treatment	Months after Planting						
	1	2	3	4	5	6	7
P_0S_0	2.83	3.50	4.67	3.00b	5.67		5.50
P_0S_1	3.75	4.33	4.00	5.00a	5.00		5.67
P_1S_0	2.58	4.00	4.33	3.67ab	5.67		7.00
P_1 S_1	3.18	3.25	3.33	4.33ab	6.33		6.67
SE (0.05)	0.60	0.80	0.73	0.61	1.19		1.17
CV (%)	38.00	26.00	22.00	18.60	25.80		33.90

P0S0 = no P fertilizer and plant shade, P0S1= no P fertilizer with shade plant, P1S0= P fertilizer with no shade plant and P1 S1= P fertilizer with shade plant

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A.K.; Boamab Ayodele, E.A. and Adebola, P.O. (2001). West African Regional Cashew Survey Report (Guinea, Guinea Bissau; Cote d'Ivore; Ghana and Nigeria. *Sustainable Tree Crops Programme.* STCP and Biohybrids Agrisystem Ltd., UK, 1, 110.

Level of Completion: 70%

Locations of the Experiment: CRIN Ibadan and CRIN Ochaja substation

TEA PROGRAMME

Experimental Title: Tea production and processing status in Nigeria

Investigators: Adedeji A.R.; Olaniyi O.O.; Ipinmoroti R.R.; Aroyeun S.O.; Oloyede A.A.; Adebowale B.A.; Oluyole K.A.; Ndagi I.; Akanbi O.S.O.; Adeosun S.A.; Aderolu I.A. and Yahaya A.T.

Introduction

Tea was introduced into the country by de Bouley from West Cameroon in 1952 (Adedeji, 2006, Kassbol-Smith, 1965). The first commercial clones were imported into the country (specifically, Mambilla plateau) in 1975 (Hainsworth, 1981). Nigeria began tea production on a commercial scale in 1982on the Mambilla Plateau of Taraba State. Hence, the production of this valuable crop in Taraba State is concentrated on Mambilla plateau. Apart from the production, value is being added to the crop in terms of processing. In view of this, different tea processing companies have sprung up to add value to the crop to the consumption stage. However, it is quite germane to identify some of these processing companies as well as the farmers, to know their problems and find ways of proffering solutions to the problems scientifically. It is therefore the objective of this study to survey tea production and processing in Nigeria.

Materials and Methods

The study was carried out in Taraba as well as Lagos States. In Taraba State, the study was carried out on Mambilla plateau in Sadauna Local Government Area and the communities that were selected for the study are Kusuku, Mayo-Kusuku, Kakara and Nyiwa. From the study area, random sampling technique was used to select 86 tea producers on Mambilla plateau while purposive sampling technique was used to select two processors, one from Mambilla plateau-Mambilla Tea Company and the other one from Lagos- Emiva Investment Company. Two sets of questionnaire were used to elicit information from the respondents, one for tea farmers and the other one for tea processors. The data retrieved from the information collected were analyzed using descriptive statistics such as frequencies and percentages.

Results and Discussion

Table 1 showed the socio-economic characteristics of the farmers. The table revealed that 87.2% of the farmers were males while 12.8% were females. This is obvious in as much that males were more involved in farming while females were more engaged in the sales of proceeds from the farm as well as general trading. Majority (90.7%) of the respondents were married. This has a great implication on the family labour supply as the spouse and children would be assisting on farm work and hence reduces the problem of labour unavailability. Table 1 also showed that 82.6% of the farmers were members of association while only 17.4% did not join any association. However, of the members that joined association, 60.5% were members of Mambilla Real Tea Association. The remaining 22.3% belonged to any of the following associations: Cooperative societies (1.2%), CRIN Tea Association (4.7%), Mayo-Kusuku Tea Farmers Association (3.5%), Nacoftan (1.3%), O.G.S. (1.3%) and Small Scale Farmers Association (10.5%). Regarding the educational status, 17.4% of the total respondents had no formal education while 22.1% had a maximum of primary education. However, 38.4% of the total respondents had secondary school education and above. The result showed that majority of the respondents (61.6%) might not be able to read and write very well. This was however reflected during the administration of questionnaire to the respondents as majority of them claimed that they could neither read nor write. The development is not good for an efficient production of tea as most farmers would not be able to read or interpret the result findings. Concerning the farming experience, 63% of the total farmers had more than 15 years of farming experience while 3% had less than 16 years of farming experience. Meanwhile, 20% of the total respondents had no response. The result revealed that most of the farmers were highly experienced in tea farming. This is a positive pointer towards an increased tea production as farmers with high experience would be able to apply their huge experience to improve their production. As regards the age of the farmers, 55.7% of the respondents were below 40 years of age and below while 38.37% of the total farmers were within the age bracket 41-60 years. Only 5.93% of the respondents were above 60 years of age. The result however shows that 94.07% of the total respondents were still in their active age (≤ 60 years). This is a positive indicator towards increased tea production. The result on the nature of ownership of farm showed that 62.8% of the farms were self-established while 17.4% were inherited and just 2.3% were purchased. This is a quite deviation from the other tree crops in which the substantial proportion of the respondents inherited their farms. Table 1 also showed the age of the farm. The Table showed that some farms (27.9%) were aged between 11 and 20 years while just 5.8% of the farms were of age 10 years and below. It could be observed that most farms were not young. In fact, 66.3% of the farms were above 20 years. Hence, most farms are old. Majority of the respondents in the study area were small scale farmers. This is because 70.9% of the farmers were having 5 hectares of farm and below while just 2.3% were having above 10 hectares of farm. This showed that the farmers were not working in line with the principle of economies of scale and this will have a negative impact on the income derivable from tea production. As regards the sources of fund, majority of the farmers (69.6%) utilized only their personal money as the source of funding their farming business. Some (10.5%) of the farmers sourced their funds from friends and family while only 3.5% got their fund from bank. However, none of the farmers sourced their funds from either government of non-governmental organization. A high proportion of the farmers (54.7%) sold their produce at N22.00 per kilogramme while 33.7% sold at N24.00 per kilogramme.

Only 7.0% of the farmers sold above N24.00 while 3.6% of the respondents sold below N22.00. The result of the analysis showed that most farmers (56.9%) sold their produce to local processors while 34.9% sold their produce to Mambilla Beverages Nigeria Limited. Hence, most farmers prefer to sell their produce to local than to Mambilla Beverages Nigeria Limited. This might be due to the fact that local processors offered a higher price than Mambilla Beverages Nigeria Limited.

Table 1: Socio-economic characteristics of the farmers

Variable	Frequency	Percentage
Gender		
Male	75	87.2
Female	11	12.8
Marital status		
Married	78	90.7
Single	8	9.3
Association membership		
Mambilla Real Tea Association	52	60.5
Co-operative	1	1.2
CRIN Tea Association	4	4.7
Mayo Kusuku Tea Farmer	3	3.5
Nacofflan	1	1.3
O. G.S.	1	1.3
Small Scale Farmers Association	9	10.5
Educational Status		
No response	19	22.1
No formal education	15	17.4
Primary education	19	22.1
Secondary education	21	24.4
Tertiary education	12	14.0
Farming experience (years)		
0-15	3	3.4
16-30	55	63.9
31-40	4	4.7
> 40	4	4.7
No response	20	23.3
Age of farmer		
≤ 20	4	4.6
21-40	44	51.1
41-60	33	38.37
> 60	5	5.93
Nature of ownership of farm		
No response	15	17.4
Inherited	15	17.4
Purchased	2	2.3
Self established	54	62.8
Sources of fund		
No response	11	12.8
Bank	3	3.5
Friends and family	9	10.5
Cooperative	4	4.7
Personal money	58	69.6
Government	0	0.0
Non-Governmental Organisations	0	0.0
Price at which tea leaf is sold N/Kg		
10	2	2.
20	1	1.2
22	47	54.7
23	1	1.2
24	29	33.7
25	5	5.8
No response	1	1.2
Tea leaf buyer		
Mambilla Beverages Nigeria Ltd	30	34.9
Local processor	49	56.9
Real Tea factory	4	4.7
No response	3	3.5
Type of labour used		
Hired labour	41	47.7
Family labour	10	11.6
Communal labour	2	2.3
No response	33	34.8
Farm size (Ha)		
1-5	61	70.9
6-10	15	17.4
> 10	2	2.3
No response	8	9.4
Age of the farm (Years)		
≤ 10	5	5.8
11-20	24	27.9
21-30	37	43.0
> 30	20	23.3

Table 2. Analytical result on the survey of tea processors in Nigeria

Variables	Mambilla Tea Company	Emira Investment Company
Nature of ownership	Government	Private
Year of establishment	1982	2000
Products manufactured	Black and green tea	Black tea
Estimated annual capacity	1.6 million Kg	2000 Kg
Selling price (Black tea)	N70/packet	N105/packet
Source of raw materials	Local	Local
Where the material is got from?	Farmers and the factory's farm	Mambilla plateau
Quantity of tea leaf requiredper annum	1.6 million metric ton	2 tons
Do you always get this quantity?	No	Yes
Do you source your raw materials from farmers?	Yes	No
At what price do you buy from farmers?	N24	-
Other source of raw materials apart from farmers	CRIN	-
Do you have tea plantation?	Yes	No
If yes, what is the size of the plantation in hectares?	603	-
What percentage of your total leaf requirement is being supplied by your tea plantation?	64%	-
Constraints/problems and insect infestation scale industry	Finance, obsolete machine govt policy on small	Finance, marketing,

Source: Field survey, 2014

Conclusion

Presently, tea is facing some challenges which require the efforts of all research disciplines to tackle. Meanwhile, through the research activities, the problem of tea marketability was alleviated through the encouragement of the farmers to be involved in small scale tea processing. It could also be concluded that the volume of tea leaf produced is below its demand especially by the processing companies. This therefore calls for the encouragement of tea farmers to increase their production. Also, there's a need to extend the growing of tea to lowland.

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Experimental Title: Development of drought tolerant tea (*Camelia sinensis*) for Nigerian marginal ecology.

Investigators: Olaniyi O.O.; Adenuga O.O.; Muyiwa A.A and Oloyede A.A

Objectives

To screen the available germplasm materials with a view to

(i) Identify clones in the germplasm that can survive moisture stress

Introduction

There are two methods to improve crop productivity in marginal environment. These are either to improve the physical environment where crops grown or to improve the genetic potential of the crop. The physical environments are either increasing the total water supply or by reduction of the evaporative demand through the adoption of practices that minimize wastage of available water resources. Genetic improvement involves increase yield within the limits of the available water supply by increasing water use efficiency (WUE).

Materials and Methods

8 lowland tea genotypes were used in this experiment. The genotypes were raised in the nursery for 8 months. 40 cuttings were raised per genotype and replicated 3 times.

2 water regimes were employed for 3 months.

(ii) No water

(iii) Watered

200cm^3 of water was applied every 2 days interval in a plastic pot filled with homogenous forest soil until the treatment with no water got to permanent wilting point.

Five cuttings of each genotype will be planted into the soil-filled poly pots. The planted pots were arranged in a CRD with three replications in a screen house. This was done in order to prevent external water supply into the experiment.

Data collection

Quantitative data were collected on the following traits

No of leaf

Leaf length

Leaf breadth

Canopy area

Number of nodes

Internodes length

Plant height

Stem circumference

Results

NGC 19 recorded 6 branches which was the highest and significantly different from NGC 11 with 1 branch. There was no significant difference for internodes length, leaf bud, leaf length and leaf breadth for all the genotypes. NGC 19 had the highest stem diameter (8mm a) followed by NGC 10 (6.5mm ab) which were not significantly different from each other. NGC 19 dropped more leaves (14.8 a) which was not significantly different from NGC 28 and NGC 31 with average values of (6.9 ab) and (7.1 ab) respectively. The genotype with highest plant height was NGC 10 (48.5cm a) followed by NGC 7 (46.6 ab) and the lease was recorded for NGC 11(26.63 d).

Table 1: Mean separation of 8 agronomic characters among 8 NGC genotypes

Genotypes	NB	SD (mm)	IL (cm)	NLD	LB	PH	LL (cm)	LB (cm)
NGC 19	5.8a	8.0a	3.37a	14.5a	0.00a	45.66ab	7.14a	4.09a
NGC 10	4.6ab	6.5abc	3.17a	2.7b	0.66a	48.85a	7.45a	2.6a
NGC 7	3.0bc	6.4abc	2.2a	6.1b	0.33a	46.69ab	7.39a	3.20a
NGC 28	3.0bc	4.5bc	1.7a	6.9ab	0.66a	29.00cd	6.68a	2.4a
NGC 31	2.9bc	5.9bc	2.61a	7.1ab	0.33a	41.82ab	8.2a	2.85a
NGC 35	2.5bc	6.0bc	2.5a	1.75b	0.33a	42.46ab	7.8a	2.4a
NGC 30	2.3bc	5.7bc	2.81a	2.9b	0.16a	36.94bc	7.22a	2.79a
NGC 11	1.0c	4.6bc	2.3a	1.7b	0.5a	26.63d	6.8a	2.0a

Note: Number of branches (NB), Stem Diameter (SD), Internodes length (IL), Number of leaf dropped (NLD), Number of leaf bud (LB), Plant Height (PL), Leaf Length (LL), and Leaf Breadth (LB)
The average number of leaf recorded for the set of experiment watered was (30.15a) while the average recorded for unwatered was (25.5b) and statistically different from each other table 2.
There was no significant different from watered and unwatered for all the traits measured except for plant height with (41a) and (37b) and number of leaf (30.15a) and (25.58b) respectively.

Table 2: Mean separation of 9 agronomic characters between watered and unwatered

	Number of leaf	No of Branches	Stem Diameter	Internodes length	Droppe d leaf	Leaf bud	Plant height	Leaf length	Leaf breadth
Watered	30.15a	3.47a	6.2a	2.5a	7.79a	0.3a	41a	7.48a	3.0a
Unwatered	25.58b	3.04a	5.87a	2.6a	3.20a	0.4a	37b	7.43a	2.6a

Discussion
Accession 10, 19, and 7 showed significant drought tolerance. Numbers of leaf and plant height among other characters evaluated were directly influenced by water loss in the plants. This is as a result of the ability of the genotypes to adjust to shortage of water by stopping new leaf production and shoot development. The three genotypes are further recommended for screening of prolin, carbohydrate, polyamine, glycine, betanine and trehalose which are associated with drought resistance.

PLANNING & TRAINING DEPARTMENT (Dongo, L. N.)

Introduction
The Planning and Training department is one of the five technical departments of the Cocoa Research Institute of Nigeria that is responsible for developing research and training policies of the institute for efficient management of resources. The department liaises with Human Resources Department to ensure compliance of the policies.

The department is responsible for collating capacity building activities and recommending staff to participate in relevant field of training and learning that may enhance their productivity. This is achieved through collation of the work plans of the institute, define their fiscal implication and mainstream them into available funds. The department coordinates knowledge sharing from trained personnel through seminars and also organises workshops for different stakeholders of the institute's mandate crops. It liaises with other technical departments to develop training modules for use in such workshops.

Part of the roles of the department is to plan and implement institutes activities such as the production of hybrid pods for free distribution to farmers under CocTA and the 50th anniversary celebration of the institute.

It is involved in the coordination and monitoring of both externally and internally funded research projects including the screening of agrochemicals for recommendation to cocoa farmers. The department anchors the placement of students from various tertiary institutions on industrial attachment to the institute.

Also, the planning and monitoring of major events in the institute is an important responsibility of the department. The department's activities for 2014 are highlighted below.

Industrial Attachments: The institute hosted several tertiary institutions for the industrial attachment of their students. A total of 199 students from twenty one institutions of higher learning did their industrial attachment. The table below gives an analysis of this.

Table 1: List of Students on Industrial Training

S/N	Institutions	No of Students
1	Federal School of Statistics	1
2	University of Ibadan, Ibadan	91
3	The Polytechnic, Ibadan	5
4	College of Agriculture, Iguoiakhi, Edo State	1
5	Bowen University, Iwo	41
6	Lead City University, Ibadan	2
7	Ekiti State University, Ado Ekiti	4
8	Moshood Abiola Polytechnic, Abeokuta	16
9	Federal Polytechnic, Offa	1
10	Federal Polytechnic, Ede, Osun State	1
11	Les CoursSonou University, Cotonou	1
12	Federal College of Agriculture, Moor Plantation, Ibadan	4
13	Adekunle AjasinUniveristy, Akungba-Akoko	15
14	Ladoke Akintola Univeristyof Technology, Ogbomosho	3
15	Federal College of Forestry, Jericho, Ibadan	4
16	Federal College Of Education (Special) Oyo	2
17	Federal University, Oye-Ekiti	1
18	Kogi State Polytechnic	1
19	Federal University of Agric, Abeokuta	1
20	Federal Polytechnic, Offa, Kwara State	1
21	Abraham Adesanya Polytechnic	3
	Total	199

Training Workshops: A total of 44 staff attended trainings within and outside Nigeria as shown in table 2. The local workshops were organised by different institutions of learning notably: Administrative College of Nigeria (ASCON), Public Administration and Management Development Institute (PAMDI), Agricultural and Rural Management Training Institute (ARMTI) and Centre for Administrative and Secretariat Management (CASEM).

Table 2: Training workshops attended by staff

S/N	Names	Topic	Venue	Date	Mode of Sponsorship
1	Dr. Aroyeun, S.O.	Wasd Conf	Montreal Canada	12-16 Aug	Self Sponsored
2	Mr Musa Samuel Ojo	Conversion Training Of Chief Driver	Mechanical/ Electrical Engineering Development Centre	July-Dec 2014	CRIN Sponsored
3	MrAjiroba Adeniyi	Conversion Training Of Chief Driver	Mechanical/ Electrical Engineering Development Centre	July-Dec 2014	CRIN Sponsored
4	MrOgundeji, B.A.	Training On Lab Procedures And Analysis Of Soil, Crop & Agric Products	NISLT, Samonda, Ibadan	03-09 August, 2014	Self Sponsored
6	Prof. M. Akoroda	Public Policy Anaylsis&MgmtWkshop (Pasd)	ASCON, Badagry Lagos	4-8 Aug 2014	CRIN Sponsored
7	Dr Dongo, L.N.	Public Policy Anaylsis&MgmtWkshop (Pasd	ASCON Badagry Lagos	4-8 Aug 2014	CRIN Sponsored
8	Mrs P.A. Ubebe	Public Policy Anaylsis&MgmtWkshop (Pasd	ASCON, Badagry Lagos	4-8 Aug 2014	CRIN Sponsored
9	Mr K.W. Fabawole	Public Policy Anaylsis&MgmtWkshop (Pasd	ASCON, Badagry Lagos	4-8 Aug 2014	CRIN Sponsored
10	Mr O.O. Onifade	Public Policy Anaylsis&MgmtWkshop (Pasd	ASCON, Badagry Lagos	4-8 Aug 2014	CRIN Sponsored
11	Ayoade Oluwole	Computer Application For Project Management (Arm 251)	ARMTI, Ilorin	7-11 July 2014	CRIN Sponsored
12	Dr C.O. Jayeola	Team Building & Leadership Skills	ASCON, Badagry, Lagos	11-15 Aug 2014	CRIN Sponsored
14	Dr Orisajo	Team Building & Leadership Skills	ASCON, Badagry, Lagos	11-15 Aug 2014	CRIN Sponsored
15	Dr Agbeniyi, O.	Team Building & Leadership Skills	ASCON, Badagry, Lagos	11-15 Aug 2014	CRIN Sponsored
16	Mrs O.A. Adepoju	Managing The Boss &Organising The Office For CoroporateEfficency	Centre For Admin & Sec. Management (CASEM)	1-4 July 2014	CRIN Sponsored
17	Mrs T. Adeagbo	Managing The Boss &Organising The Office For CoroporateEfficency	Centre For Admin & Sec. Management (CASEM)	1-4 July 2014	CRIN Sponsored
18	Dr Famaye	Team Building & Leadership Skills	ASCON, Badagry, Lagos	11-15 Aug 2014	CRIN Sponsored
19	MrFagbami,O.O.	Team Building & Leadership Skills	ASCON, Badagry, Lagos	11-15 Aug 2014	CRIN Sponsored
20	MrAkhidime.S.	Advance Mgmt Course (Msd 700)	ASCON, Badagry Lagos	7-19 Sept	CRIN Sponsored

21	MrsOluwadare, S.	Advance Mgmt Course (Msd 700)	ASCON, Badagry Lagos	7-19 Sept	CRIN Sponsored
22	Mrs A.O. Olayinka	Managing The Boss,Official Schedule And Office/Document	Centre For Admin & Sec. Management (CASEM)	16-19 Sept 2014	CRIN Sponsored
23	Mrs Olayinka Sanni	Managing The Boss,Official Schedule And Office/Document	Centre For Admin & Sec. Management (CASEM)	16-19 Sept 2014	CRIN Sponsored
24	Mrs Oladimeji, L.T.N.	Managing The Boss,Official Schedule And Office/Document	Centre For Admin & Sec. Management (CASEM)	16-19 Sept 2014	CRIN Sponsored
25	Mr. Ibe Osita	Facilities Maintenance	Public Admin & Mgt Dev Inst (PAMDI)	5-8 Aug 2014	CRIN Sponsored
26	Agbebaku Endurance	Community Driven Dev Approach In Agric & Rural Dev	ARMTI, Ilorin	22-26, 2014	Self Sponsored
27	Bello Babajide	Application Of Statistical Tools For Research In Agric & Rural Dev	Ibadan	01-05 Sept, 2014	CRIN Sponsored
28		Application Of Statistical Tools For Research In Agric & Rural Dev			
29		Application Of Statistical Tools For Research In Agric & Rural Dev			
30		Application Of Statistical Tools For Research In Agric & Rural Dev			
31	MrsOlumini	Strategies For Revenue Generation	Badagry	6-10 Oct, 2014	CRIN Sponsored
32	MrKuforiji	Strategies For Revenue Generation	Badagry	6-10 Oct, 2014	CRIN Sponsored
33	Mr Shittu Abu	Strategies For Revenue Generation	Badagry	6-10 Oct, 2014	CRIN Sponsored
34	MrOgunkua	Strategies For Revenue Generation	Badagry	6-10 Oct, 2014	CRIN Sponsored
35	MrOkasabor, J.	Participalory Management of Community Devlopment Groups Based Organisation	Ilorin	13-17 Oct 2014	CRIN Sponsored
36	MrEnagu, Victor	Participalory Management Of Community Devlop Groups Based Organisation	Ilorin	13-17 Oct 2014	CRIN Sponsored
37	Engr. Bakare, A.T.	Leadership & Management Skills	Enugu	8-11 July 2014	CRIN Sponsored
38	Mr. Ebulu Sunday	Maintenance of Visual Aids Equipment for optimum performance	PAMDI, Lagos	7-10 Oct, 2014	CRIN Sponsored
39	Mr Patrick Farinola				
40	Mrs Loveth Ikokoh				

41	Olasupo F.O	Cocoa Borlang Fellowship Programme/Award	Miami, Florida, USA	Oct-Dec 2014	Fellowship
42	Babafemi, I B	Information and Communication Technology (ICT) Professional Certificate Programmes	Dubai, United Arab Emirate (UAE)	Oct 2014-August 2015	Self Sponsorship
43	Mr Kolawole, O.O				
44	MrsIdongesitMokwunye				

Excursions: The institute played host to 12 institutions of higher learning on excursion to encourage the students study agriculture and especially develop interest as agripreneurs. The table below shows the details.

Table 3. List of Institutions that came for excursion at CRIN

S/N	Name of Institution	No of Students
1	Federal College of Forestry, Ibadan	145
2	Oluyole Private School, Ibadan	45
3	Emmanuel Alayande College of Education, Oyo	85
4	Federal College of Agriculture, Akure	40
5	Straight gate College, Ishara-Remo, Ogun State	9
6	Tai Solarin College of Education. Omu Ijebu-Ode	69
7	Lagos State Polytechnic, Ikorodu	112
8	FUNNAB, Abeokuta	900
9	Kogi State University	184
10	UNIBEN, Benin Edo State	58
11	Osun State College of Education, Ilesa	08
12	Department Of Forestry, University ofUyo	26
	Total	1680

Seminar Coordination: Twelve in-house seminars were held this year. The presenters were drawn from technical and non-technical departments of the institute covering research and non-research topics. This is with the view of disseminating relevant information to all CRIN staff. Table 6 shows the details of the activity.

Table 4. Details of seminars held in year 2014

S/N	Date	Topic	Presenter
1	09 June, 2014	Breeding value of cocoa (*Theobroma cacao* L.) for pod and bean traits: a consequential advance in Nigerian cocoa breeding programme	Dr Adewale, B.D.
2	23 June, 2014	Effect of National Reforms in Financial and Economic sectors on research	MrOnifade, A.O.
3	21 July, 2014	Cultural elements and women subservient roles among cocoa farm families in Southwest Nigeria: Implication for HIV prevention strategies	Mrs Williams, O.A.
4	04 August, 2014	Consumers' perception of Cocoa Research Institute of Nigeria Cocoa Bread	Mr. Agbongiaruoyi, A. E.
5	11 August, 2014	Role Play in Teamwork: You style with others	Mr. Adeniyi, D.O.
6	25 August, 2014	Electronic Media Resources and Effective Publication output of Research in Agricultural Institutes in Southwest, Nigeria	Mrs. Ogunjobi, T.E. Ag. H. (Lib. Division)
7	08 September, 2014	Evaluation of Hypoglycemic Properties of Ethanolic extract of green Tea (*Camelia sinensis*L.Kuntze).	Dr Aroyeun, S.O.
8	22 September, 2014	The Public Service Rule and Divided Loyalty.	Mrs. Ubebe, P.A. (Head of Admin & Supplies)
9	13 October, 2014	Energy and Transport at CRIN: Past, Present and Future	Engr. Bakare A.T.
10	27 October, 2014	The Assessment of host Plants Resistance for the control of Cephonodehylas (*Lepidoptera sphingidae*) on *Coffeacanephora*	Mr. Adeniyi, D.O.
11	10 November, 2014	Internal Audit Division: It's Roles and Limitations	Mr K.M. Fabowale
12	24November, 2014	Analysis of Input Use Efficiency among Cocoa Farmers in South-West Nigeria	Mr. Olayinka Taiwo

Dr. Adewale opined that understanding the value of generated hybrids gives a measure of probable advances in a breeding programme. In his work, four cocoa genotypes (Testers) were crossed with two distinct Lines (T65/7 and T86/2). The parents and the hybrids were separately established in randomized complete block design with six replications. The fourteen genotypes were evaluated for pod length (PL), pod weight (PW), Number of beans/pod (NoB) bean length (BL), bean weight (BWi) and bean thickness (BT). Result showed that the treatment, parent, crosses and Lines x Tester sources of variation were significant. Contribution to the total variance of PL, PW and BWi were in the order of Tester > Line x Tester > Lines. He finally declared that increased productivity in cocoa can be achieved through hybrid breeding programme.

The four areas of reforms as considered by the second presenter, Mr. Onifade, A.
where: the Macroeconomic Environment, Structural Reforms, Public Expenditure Management and Institutional and Governance Reforms. He stated that the reforms of Financial/Economic sector affect all government units drawing allocation from Federal

Government which include Ministries, Extra-ministerial Agencies, Departments, and other government offices. All research Institutes fall within one government department or the other. These effects were viewed in three ways, Function of Research Institutes, Personnel and Structure.

Function: The performance of Research Institutes is a function of fund release and time of release. It is a known fact that Nigeria Budgets are always considered behind schedule and thus result in low budget performance. With the reform, time lag between budget approval and execution has been removed as the period of cash backing is a thing of the past. Research Institutes can access fund to the limit of each Institute allocation. The performance and productivity of each Institute will increase due to timely availability of funds.

Personnel: The payment of staff salary is now timely and efficient. Payment to ghost workers in Federal Institute has become a thing of the past. Savings from payments to ghost workers have increased available funds for developmental projects. The relevant staff in the operation of the system needs to obtain relevant knowledge and skill to be able to maintain the system.

Structure: The payment system has changed from manual to I.T. system base. The payment cycle has reduced and thereby makes the system more efficient. All reforms are structured in line with the provision of Laws and financial regulations.

The work of Mrs. Williams, O. A. showed low scores in the practice of HIV prevention strategies in spite of the high knowledge of the respondents.

Mr. Agbongiaruoyi, A. E. investigated the perception of consumers of cocoa bread, produced by CRIN to promote value addition, in terms of taste, colour, aroma, texture and packaging. The result showed that consumers liked eating cocoa bread because of its colour and taste. He therefore recommended that the present level of the colour and taste be maintained, and the product repackaged in an attractive manner.

The special seminar by Mr. Adeniyi, D. O. focused on behavioral style which refers simply to how someone acts at any one time. By understanding your style and that of others, you can establish rapport, become more persuasive and avoid miscommunication. He posited that there are no good or bad styles; rather there are only differences among people. Success or failure is unrelated to any style, all styles when used effectively are good. The four behavioral styles of primary interest in his presentation were the Designer/Developer, Motivator/Influential, Team Player and Implementer styles.

Mrs. Ogunjobi, T. E. showed that 93.1% of 334 respondents used electronic media resources (EMR) for research work while 81.1% used the resources for writing papers and proposals and 68% used them for seminar presentation. She revealed that 53.5% use EMR at the comfort of their homes, 51.5% in libraries and 51.2% at cybercafés. She reported a positive relationship between EMR utilization and publication output of researchers, identifying poor funding, irregular electricity, among other things, as constraints to electronic media usage in Southwest Nigeria. In conclusion, utilization of E-Media Resources determines the effectiveness of researchers' publication output.

According to Dr. Aroyeun, the ethanolic extract of green tea (*Camellia sinensis*) possess hypoglycemic activity in alloxan induced diabetic mice. He reported a significant decrease in blood glucose in diabetic mice treated with ethanolic extract of green tea when compared with the untreated group and diabetic mice became hypoglycemic at the 14th day of treatment.

MrsUbebe, P.A. in her special seminar defined the public service as the machinery through which government articulates and implements its policies and programmes noting that the public service rule is aimed at entrenching the issue of transparency, accountability, justice, equity, due process and the rule of law. She further said that public servants who perform their duties contrary to rules and regulations governing Government business are said to have divided loyalty and that divided loyalty in public service can crumble an institution of government.

Among the seven host plants screened for the developmental stages of *Cephonodeshylas*on coffee; *Gardiniaellis* was determined to be the true alternate host plants as reported by Dr. Azeez, O. M. He concluded that Vitamin A, C and K were significantly higher in *G. ellis* which might be linked to its susceptibility compared with other host plants; Oxalate was positively correlated with number of eggs laid and negatively with developmental stages of the moth, showing oxalate is involved with host plant resistance to *C. hylas.*

Mr. K. M. Fabowale defined Internal Auditing as an element of the Internal Control System set up by the management of an organization to examine, evaluate and report on accounting and other controls in operation. According to him, internal audit unit is established to provide complete and continuous audit of the accounts and records of revenue and expenditure. The internal auditor is directly responsible to the chief accounting officer for a comprehensive audit of all the operations and activities of the ministry/extra-ministerial department. He finally observed that the internal audit role is limited to observations, documentations and reporting of findings to the Executive Director.

The last seminar of the year was by Mr.Taiwo Olayinka. He defined efficiency in agriculture as the possibility of farm production to attain optimum level of output from a given bundle of input at least cost. He opined that research on input efficiency is firstly a success indicator and performance measure. Secondly, sources of inefficiency should lead to effective policy formulation for performance of farmers. His research results revealed an inefficient use of inputs by cocoa farmers in SW, Nigeria. He advised farmers to source their planting materials from CRIN so as to reduce production cost. Adequate training on optimal input use would also be necessary to avoid waste of resources. Incentives such as subsidy or credit facilities should be given to farmers to improve input efficiency.

Screening of chemicals: Eleven agrochemicals are undergoing screening at different stages as shown in table 5.

Table 5. Pesticides Undergoing Screening at CRIN

S/N	Pesticides	Company	Status of Screening
	Fungicides		
1	Machechnie Gold	SARO	Field trials completed awaiting residue analysis
2	Proxanil	INSIS	2nd year screening completed
3	Thiram	INSIS	2nd year screening completed
4	Pergado cocoa	Syngenta	First year trial ongoing
5	Cabrio Duo	BASF	Laboratory Screening commenced
	Insecticides		
1	Termicid 200	The Candel	Field & Lab. trials completed awaiting residue analysis
2	Zap	The Candel	Field & Lab. trials completed awaiting residue analysis
3	Capsida	The Candel	Field & Lab. trials completed awaiting residue analysis
	Herbicides		
1	Delsate 360SL	The Candel Company Limited	Field trials completed
	Growth Hormones		
1	Bounty 1	West Africa Cotton Limited	Field trials completed
2	Bounty 2	West Africa Cotton Limited	Field trials completed

COCTA activities: The table below shows the distribution of pods from the headquarters and the substations from October - December, 2014

Table 6. Pods distributed by CRIN from October - December. 2014

Location	Hybrid pods	F3 Amazon	WACRI	TOTAL
Headquarters	38834	5708	5979	50521
Owena	1000	2654	450	4104
Ajassor	12568	13384	2070	28022
Ibeku	800	3234	1140	5174
Total	53202	24980	9639	**87821**

Partnerships: *Establishment of Clonal Seed Garden by CRIN for Multi- Trex farm at Afonja village, Ibadan.*
This project on establishing 10000 clonal materials for Multi-Trex Integrated Foods Ltd commenced February 2013. The project is jointly handled by CRIN and Multi-Trex staff. The clonal seed garden is located at Afonja village, Oyo state. The following activities were executed this year.

* Application of insecticides to control the high incidence of pests on the seedlings
* Application of foliar fertiliser to boost the growth of the seedlings
* Planting of 1820 clonal materials
* Re-budding of 8000 seedlings to make up for the losses.
* Routine inspection of budded materials.

World Cocoa Foundation-Africa Cocoa Initiative (WCF-ACI) project on Fingerprinting of cocoa germplasm and establishment of 11ha Seed garden and 8ha bud wood garden for Improved Cocoa Productivity through Better Planting Materials.
his project is financed by the World Cocoa Foundation-Africa Cocoa Initiative (WCF-ACI) and is being executed by CRIN in collaboration with IITA.
he whole aim of the project is to improve cocoa productivity through better planting materials identified by fingerprinting analysis. One thousand leaf samples were collected from breeders plot at CRIN headquarters in Ibadan and another 1000 leaf samplesfrom the cocoa seed gardens situated at Ondo and Cross River States. In all, 2000 leaf samples were collected and submitted to IITA for DNA extraction and subsequent fingerprinting analysis at K-Biosciences, UK to determine the true to type of the genotyes.

he result of the SNP analysis is out and the selection of promising genotypes which will be used to establish seed and bud wood gardens in some cocoa producing states of Nigeria have been sorted out. The sites for the seed and budwood gardens have been pepared and plantains as shade plants have been established. On-going is the generation of 40,000 Clonal materials to be established next year. A total of 20,000 have been generated so far. The location and size of the gardens are stated herein.

Table 7. Location and size of the seed and budwood gardens

S/N	Location	State	Seed garden	Budwood garden
1	Headquarter	Oyo	2	2
2	Owena	Ondo	1	1
3	Uhonmora	Edo	2	1
4	Ibeku	Abia	2	1
5	Ajassor	Cross River	3	2
6	Mayo Selbe	Taraba	1	1
	Total		11	8

Integrated Management of Cocoa Pests and Pathogens in Africa: Controlling Indigenous Pests and Diseases and Preventing the Introduction of Exogenous Ones (CFC/ICCO/43)

The table 8: Summary of activities carried out so far.

Planned Activities	Targets Set	Present Status
Activity 1.2.1. Upscale farmers' awareness on the disease and its control.	200 farmers trained on the identification and control of endogenous cocoa pests and diseases	245 farmers have been trained in 4 States (Oyo, Osun, Ondo and Edo).
Activity 1.2.2. Train farmers in the safe and efficient application of fungicides	200 farmers trained on the safe and efficient application of fungicides	245 farmers trained on the safe and efficient application of fungicides
Activity 1.3.1 Carry out survey on pathogen distribution	Three farms in each of 12 Local Government Areas in Four cocoa producing States of Nigeria surveyed	36 farms in 12 LGAs of Four cocoa producing States surveyed
Activity 1.4.1 Production and distribution of training materials to farmers	250 training manuals and 1000 posters produced and distributed.	245 training manuals and 600 posters distributed
Activity 1.4.2 Use media to compliment information on training manuals	10 slots each to be broadcast on 2 local FM radios in 4 States.	Planning stage.
Activity 1.5.1 Select, formulate and participatory testing of bio-fungicides	30 farmers in each of the 2 States to be trained in testing bio-fungicides through participatory approach	Two bio-fungicides have been selected.
Activity 1.7.1 Upscale of farmer awareness CSSVD and its control	200 farmers trained on the identification and control of CSSVD	245 farmers have been trained in 4 States (Oyo, Osun, Ondo and Edo).
Activity 1.7.3 Upscale use of existing "Cocoa Link" platform to reach more farmers in other communities.	200 farmers equipped with phones and call credits to enhance feedback from farmers	245 farmers in 4 States (Oyo, Osun, Ondo and Edo) equipped with Phones and call credits.
Activity 1.10.1: Carry out participatory calibration of spraying machines for optimum sizes for control of mirids using insecticides	200 farmers trained on the safe and efficient application of insecticides.	245 farmers have been trained in 4 States (Oyo, Osun, Ondo and Edo).
Activity 1.10.3: Training of farmers on safe application of insecticides including disposal of pesticide containers.	200 farmers trained on the safe and efficient disposal of insecticides.	245 farmers have been trained in 4 States (Oyo, Osun, Ondo and Edo).
Activity 1.11.2: Train farmers on mirids identification and their damage on cocoa	200 farmers trained on mirid identification.	245 farmers have been trained in 4 States (Oyo, Osun, Ondo and Edo).
Activity 1.11.4: Establish and use threshold levels to control mirids. Educate farmers on how to use this to control mirids.	200 farmers trained on mirid threshold level establishment.	245 farmers have been trained in 4 States (Oyo, Osun, Ondo and Edo).
Activity 1.15.2: Train farmers on stink bugs (*Bathycoeliathalassina*) identification and damage.	200 farmers trained on stink bug identification.	245 farmers have been trained in 4 States (Oyo, Osun, Ondo and Edo).
Activity 1.17.1 Determination of geographical distribution and incidence of parasitic plants and epiphytes on cocoa.	Three farms in each of 12 Local Government Areas in Four cocoa producing States of Nigeria surveyed	36 farms in 12 LGAs of Four cocoa producing States surveyed

CRIN 50th Anniversary: The institute celebrated its 50th anniversary from 01-07 December, 2014. Several activities were carried out during this period which included exhibition of products and by-products by CRIN, Ile Oluji Cocoa LTD and Multi-Trex Integrated Foods PLC. Other input providers such as West African Company LTD (WACOT) and Harvest Field Industries were part of the exhibition.

There was a health walk from Molete, Ibadan to cocoa house followed by free health test by WHO and CRIN Medical Centre personnel. On Wednesday 03 December, 2014, CRIN played Novelty match with Tai Solarin University and other institutions of higher learning.

The anniversary ceremony proper which took place on 04 December, 2014 witnessed a lot of fun fair with different cultural displays from South South, South West and Esan Dance Troupe. The event included the launching of the 50th anniversary book that featured significant events and research developments of CRIN in the past 50 years.

FARMING SYSTEMS RESEARCH AND EXTENSION DEPARTMENT

(Orisajo S. B.)

1.0 Mandate: Farming System Research and Extension (FSR&E) Department makes use of an interdisciplinary, integrative, problem-oriented and farmer-centered approach in the conduct of our research. Our main function borders on generation of appropriate technologies for studying existing farming systems and involving the technology users - usually the small farmers in the planning and evaluation process. To improve a farm system, it must be studied and understood. FSR&E uses an interactive stepwise process that has three actors - the researchers, extension agents and farmers - in the conduct of the four basic functions:

1.1 **Characterization**: which involves an understanding of the structural and functional relationships of current farming systems in specific geographical areas and an identification of the endogenous and exogenous constraints to achieving farmers' goals;

1.2 **Design**: of technological alternatives which involves an x-ante evaluation and selection of strategic interventions, components, inputs and/or practices that results in a well-defined and effective agenda for follow-up research with respect to farm monitoring, component experimentation and/or technology testing;

1.3 **Testing:** which involves evaluation, on farmers' fields and under partial or exclusive farmer management, of the assumptions, decisions and expected performance of the technological alternatives as designed in the previous phase;

1.4 **Diffusion**: which usually refers to the dissemination of tested innovations to credit and extension personnel or to small groups of farmers, usually through intensive assistance.

2.0 Staff Strength: The department is made up of a total of 43 staff from Extension and Economics Division, Farming Systems Research Division and Marketing Unit.

2.1 Personnel Structure

Table 1. Personnel structure of Farming Systems Research and Extension Department

Office of The Director (Fsr&E) / Head of the Department					
S/N	Name	Designation	Pf. No	Date of Birth	Date of 1st Appt**.**
1.	Dr. S. B. Orisajo	Head (FSR&E)	291	15/01/72	24/12/02
2.	Olugbesan, A. R.	SCS	355	08/02/79	05/02/09
3.	Oyebanjo, T. O.	CO	1752	22/05/82	20/01/11
Office of Assistant Director (Farming Systems Research &Extension					
1.	Dr. Oduwole, O.	AD	108	01/07/57	25/05/87
2.	Babatunde, M, O,	SA	1760	27/11/70	03/03/11
3.	Ajiboye,Adebola	CO	1898	05/02/76	06/12/11
Farming Systems Research Division/Section					
1.	Adeyemi, E. A.	PRO	205	20/02/66	07/06/99
2.	Oloyede, A. A.	PRO	235	28/05/66	25/12/99
3.	Iyadunni, K. A.	HAS	400	31/03/73	02/09/10
4.	Adeyemo, A.	CO	1364	03/03/62	18/12/00
Extension Section					
1	Uwagboe, E. O.	PRO	251	25/12/65	11/12/01
2.	Agbongiarhuoyi, A.	PRO	258	10/04/70	02/01/02
3.	Adebiyi, S.	SRO	255	02/11/68	02/01/02
4.	Ndagi, I.	SRO	269	01/02/67	02/04/02
5.	Famuyiwa, B. S.	SRO	392	29/11/63	01/07/10
6.	Williams, O. A.	ROI	445	10/08/77	06/12/10
7.	Abdulkarim, I, F,	ROI	450	17/03/71	07/03/11
8.	Ajirotutu, S. M.	SA	1749	12/07/81	20/01/11
9.	Owolabi, J. M.	SCO	1568	13/05/82	02/01/09
Economics Section					
1.	Shittu, T. R.	PRO	217	07/06/69	14/06/99
2	Oluyole, K. A.	PRO	253	07/05/62	02/01/02
3.	Lawal, J. O.	PRO	263	24/09/76	08/02/02
4.	Obatolu, B. O.	PRO	260	13/08/71	05/02/02
5.	Taiwo, O. A.	SRO	399	25/02/70	02/09/10
6.	Yahaya, A. T.	ROI	418	01/08/80	04/10/10
7.	Babatunde, A. S.	ACEO	231	26/04/73	20/09/09
Statistics Section					
1.	Ogunbosoye, B. B.	Stat. I	413	13/09/78	29/09/10
2.	Abulele, L.	Stat. II	408	18/02/81	14/09/10
3.	Bello,B. O.	Stat. II	453	26/08/81	15/03/11
4.	Ayere, Cletus	Stat. II	454	02/12/86	15/03/11
5.	Busari, L.A.	ACSO	129	04/04/60	03/11/90
6.	Pelemo, A. A.	PSO I	296	01/07/75	10/02/03
7.	Otunoye, T. C.	PSO II	1330	21/10/73	19/11/99
8.	Suleman, A.S.	HEO	348	24/02/74	02/02/09
9.	Adebiyi, O. S		1591	10/01/82	02/01/09
10.	Olaleye, Dele	SCO	1395	19/01/75	18/06/01
11.	Onifade, Wasiu	AFA III	1834	14/09/88	01/12/11
Marketing					
1.	Olumini, O.M.	ACEO	211	27/07/70	07/06/99
2.	Olayinka, S. O.	PEO I	280	12/06/72	16/08/02
3.	Imasogie, M. O.	SEO	398	23/09/79	02/09/10
4	Ezebuiro, P.	HEO	452	02/07/78	09/03/11
5.	Otitoloju Omosalewa	SSA I	1453	01/08/77	02/06/03
6.	Olutade, B.O.	CO	1577	05/10/82	02/01/09

SN	Date	Name of School	Number of Students
1.	23/01/14	O & A Academy, Ikenne	Not specified
2.	20/02/14	Saint Anne's Comprehensive College, Ibadan	Not specified
3.	21/02/14	GraceLand International Colege, Ibadan	Not specified
4.	05/03/14	AL/Barka Kiddies College, Ibadan	Not specified
5.	10/03/14	Federal College of Agriculture, Moore Plantation, Ibadan	Not specified
6.	19/03/14	Heritage International college, Modakeke, Osun state	Not specified
7.	30/04/14	Osun State College Of Education, Ila Orogun, Monatan Study Centre, Ibadan.	Not specified
8.	14/05/14	Wesley University of Science and Technology, Ondo	Not specified
9.	22/05/14	Kwara State Polytechnic, Ilorin, Kwara state	Not specified
10.	23/05/14	TOBSEY Nursery and Primary School, Ikorodu, Lagos	Not specified
11.	01/07/14	University of Nigeria, Nsukka	65
12.	14/07/14	Federal College of Forestry, Ibadan	60
13.	15/07/14	Federal College of Forestry, Ibadan	48
14.	18/07/14	Federal College of Forestry, Ibadan. Department of Crop Production Technology	27
15	22/07/14	Oluyole Private School, Ibadan	45
16	22/07/14	University of Nigeria, Nsukka	84
17	05/08/14	Emmanuel AlayandeCoillege of Education, Department of Agriculture Education, Oyo	75
18	11/08/14	Federal University of Technology, Akure, Ondo State	40
19	12/08/14	Straitgate College, Ishara-Remo, Ogun State	9
20	28/08/14	Lagos State Polytechnic, Ikorodu	70
21	25/09/14	TASCE, Omu, Ijebu-Ode, Ogun state	69
22	25/09/14	LASPOTECH, Ikorodu, Lagos State	42
23	13/10/14	FUNAAB, Abeokuta. Ogun State	300
24	14/10/14	FUNAAB, Abeokuta, Ogun State	300
25	15/10/14	Kogi State University, Kogi State	184
26	15/10/14	FUNAAB, Abeokuta, Ogun State	300
27	16/10/14	FUNAAB , Abeokuta, Ogun State	300
28	29/10/14	UNIBEN, Benin, Edo State	58
29	30/10/14	Osun State College of Education, Ilesa	8
30	09/12/14	University of Uyo, Department of Forestry	26
31	11/12/14	Young Farmers Club, Evangelism College, Ibadan	65
32	11/12/14	Olabisi Onabanjo University, Ago –Iwoye, Ogun State	20

2.2 Retirement and Redeployment: Dr. E.O. Aigbekaen (Director) retired on 27 March, 2014, Mr. Leo. A Emaku, (Assistant Chief Statistician) retired July, 2014. while Akhidime, M.O. (Higher Executive Officer, Marketing Section), Mr Asein Frederick (Clerical Officer, Marketing Section), Ogunleye, B.O. (Senior Clerical Officer, Extension Section), Mrs Olutade, A. O. (Chief Clerical Officer) and Mr Onigbinde Adeniyi John (Clerical Officer, Economics Section) were redeployed to other units/sections of the institute.

3.0 Achievement/Progress

3.1 Students' Visit to CRIN in 2014: A peaceful situation in CRIN has encouraged visitations by students of several institutions in 2014 (see table below). During 15-26 Sept. 2014, I.T. students of Dept of Agric. Extension & Economics, University of Ibadan were in CRIN. CRIN's Extension Section coordinated their 2-week stay***and* were *accommodated free of charge.* They were exposed to the theory and practice of CRIN's** mandate crops covering: History and mandate of CRIN; Extension dissemination methodologies; Research proposal writing; Formation of farmers' Cooperative Societies; Statistical analysis, data management, data collection and project analysis; Cocoa Transformation Agenda (COCTA) and CRIN cocoa hybrid for farmers; Career opportunities in Agriculture; and Demonstration of Cocoa Rehabilitation techniques. They followed nursery operations of cocoa, cashew, kola, coffee and tea and technologies for adoption. The students were satisfied and commended CRIN's products: cocoa bread, cocoa powder, wine, cashew nuts and soap and wished they were on sale in open markets. CRIN is now a choice place for excursion. Numerous students on excursion made us happy that great awareness on our mandate crops is being developed and we all at CRIN are assisting to assure a future supply of workers.

Table 2. Students' visit to CRIN in 2014

Mr Samson Odedele is demonstrating skills of how to graft and bud mandate crops of CRIN to many students on excursions to CRIN from tertiary institutions of Nigeria.

Students of FUNAAB and Kogi State University on excursion to CRIN

3.2 CRIN Technology Transfer: As part of efforts in extending CRIN-developed technologies, the Extension Team freely disseminated some developed technologies to cocoa farmers in Ilare and bread bakers in Ijebu-Ijesa, Osun State in October, 2014. HRH Oba Emmanuel AdejoroOtedolaku (JP), Ogidan III, commen-ded CRIN for this project and pledged his support to building more capacity. He promised CRIN free plot of land for a cocoa project in Ilare. The next in rank to the Oba, High Chief Akanbi Awomiwe Fabumi thanked CRIN for adding value to cocoa—a right step in the right direction.

Group photograph of CRIN Team with HRH Oba of Ilare

1.3 Good Agricultural Practices (GAP) on Cashew: 21 lead farmers and 11 Extension Agents were trained on nursery and field establishment, management of soil, pest and diseases, processing and marketing of cashew in November, 2014. The training was to improve quality and quantity of the cashew nut production in five Ogbomoso LGAs of Oyo State. The building of trust for participatory rural approach among cashew farmers in Ogbomoso was the aim. Farmers were advised to form cooperatives to improve produce marketing. Also, cooperatives will avail them the opportunity to assess credit facilities from banks.

Cashew women farmers and their facilitators at the event

3.4 National Agricultural Show 2014

CRIN's Stand at the Exhibition of 12-16 Oct. 2014 National Agric. Show at Tundun Wada, Karu LGA, Nasarawa State near Abuja was well visited by many who bought most of our displayed items.

3.5 Akonko Community Agricultural Outreach: The outreach was attended by 220 farmers from 12 villages besides 32 officials (staff of Federal Ministry of Agriculture and Rural Development (FMARD), CRIN, NIHORT, Department of Cooperative, Abuja, Odeda LGA, Ogun State, Ogun State Ministry of Rural Development, Cocoa Association of Nigeria (CAN) and journalist from Agricultural Magazine on 12 December, 2014.

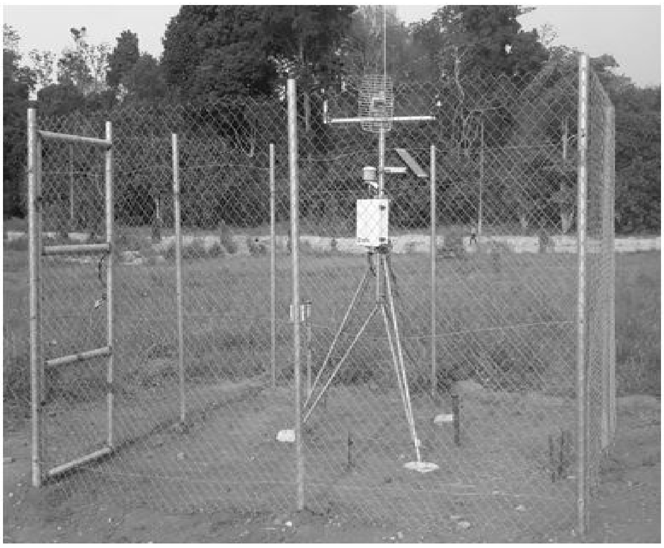
CRIN Team trained the participants on *Farmers' behavioral change for increased cocoa production*; farmers should take cocoa farming as a business; *cocoa rehabilitation by side grafting*; *Good Agricultural Practices (GAP) for Sustainable Cocoa Production*:application of available knowledge to the use of the natural resource base in a sustainable way for the production of safe & healthy cocoa so as to achieve economic viability and social stability. CRIN donated 600 hybrid pods to registered farmers who agreed to establish a joint nursery to be sited in Akonko. If nurtured, they would have over 18,000 cocoa seedlings to plant by May-June 2015.

3.6 Participation at FADU-CONTINAF Kokodola Project Stakeholder Forum

The 2014 Annual Stakeholders Meeting of the FADU-ContinafKokodola Project was held on Thursday, 11th December, 2014 at the Ibadan Business School, Old Bodija Estate, Ibadan, Nigeria. Participants were drawn from the entire spectrum of the Nigeria cocoa value chain - research, farming, trading, and processing. CRIN was represented at the event by the Head (FSR&E Dept), Dr Samuel Orisajo.

3.7 New Acquisitions

Newly Acquired WAAPP Toyota Hilux Vehicle by CRIN in January, 2014



Newly Constructed Automatic Weather Station

4.0 Internally Generated Revenue (IGR) in 2014 from Marketing Unit of the FSRE Department:

The sum of Five million, seven hundred and ninety-eight thousand, five hundred and eighty Naira (₦5,798,580) was generated as internally in the year 2014 as supplied by the Marketing Unit of the Department. The details are given in the table below:

Table 3. Internally Generated Revenue in 2014.

S/N	Product/Produce	Amount (₦)
1	Cocoa Powder	350,090
2	Cocoa Bread	312,330
3	CRIN Liquid Soap	17,600
4	Palm Oil	380,320
5	Chocolates	10,700
6	Green Tea	161,500
7	Cocoa Beans	2,242,400
8	Cocoa Pods	54,240
9	Cocoa Seedlings	980,000
10	Kolanut	5,850
11	Plantain	106,800
12	Cashew Seedlings	209,300
13	Plantain Suckers	10,000
14	Firewood	9,000
15	Banana	15,100
16	Water	3,600
17	Star Apple	26,000
18	PKO	6,250
19	Metrological Data	6,400
20	Vegetable	15,550
21	Plantain (Flour)	4,200
22	Cashew Nut	10,200
23	Kola Seedlings	496,850
24	Cassava	3,000
25	Coffee Berries	7,700
26	Black Soap	27,400
27	Wine	170,400
28	Palm Kernel Shaft	11,450
29	Coffee Seedlings	700
30	Cream	1,400
31	Cocoa Bud wood	35,000
32	Banana Sucker	2,000
33	Iyere Leaves	600
34	Cashewnut Processed	44,450
35	Cashew Juice	15,100
36	Maize	20,100
37	Plantain chips	25,000
	Total	**5,798,580**

Table 4. Internally Generated Revenue January to December in 2014

Month	Total Sales (₦)
January	665,370
February	562,520
March	310,490
April	154,860
May	1,609,350
June	136,410
July	678,380
August	107,900
September	529,900
October	177,400
November	157,990
December	708,010
TOTAL	5,798,580

SUBSTATIONS

MambillaKusuku (Chila, F.N.)

1. **Plantation Management**: Field maintenance of the Substation's mandate crops of Cocoa, Coffee Arabica, and Tea plots were effectively carried out during the year, as there were chemicals (herbicides) available for plantation use.
   - i **Tea:** A total of 818.1kg of tea leaves were harvested from the tea plots and sold to Mayo-Kusuku tea factory in the month of December 2014, during the year.
   - **ii. Coffee Arabica:** During the year a total of 250 kg of coffee Arabica berrieswere harvested during the period under review.
   - **iii. Cocoa:** A total of 300 cocoa seedlings were gapped up on the field at Mayo-selbe Experimental station.
   - **iv. Banana:** a Total number of 4 bunches were harvested and sold to staff.
2. **Pest/Diseases:** The incidence of coffee berry Diseases (CBD) has been a threat on Mambilla Plateau year in year out. During the year the effect was still high due to lack of fungicides for its control.
3. **World Cocoa Foundation/Africa Cocoa Initiatives/Crin (Cocoa Seed Garden) Mayo-Selbe:** Two (2) ha of cocoa seed garden were newly established during the year and planted with shade crops (plantain suckers) and the plots are presently under going maintenance. Irrigation of the shade crops, which would have started in October 2014 could not due to lack of fund and some crops are wilting
4. **Nursery**
   - **i. Tea:** During the period of the year, 4,530 tea cuttings were selected from the elite varieties and raised in the nursery to increase the tea holdings and gapping up in the field.
   - **ii. NGC (Nigeria/China) Tea:** 109 seedlings were raised in the nursery during the year.
   - **iii. Coffee Arabica:** During the year a total of 3134 coffee seedlings were raised in the nursery for rejuvenation of the coffee plot.
   - **iv. Cocoa:** During the period under review, a total of 1,000 cocoa seedlings were raised at Mayo-selbe nursery for continuity.

Research Activities: The substation maintained seventeen (17) research experiments during the year. Data collection, organization and maintenance of research plots were improved as a result of available chemicals (herbicides) supplied to the substation by the CRIN-Headquarters

The list of ongoing Research activities are shown in appendix 1 below:-

S/N	TITLE OF EXPERIMENT	SIZE	YEAR ESTB.	RESEARCHER	REMARK
1	The effect of spreading, fixing, rolling times and drying methods on the quality of infused green tea.	-	2012	Dr.S.O.Aroyeun	In progress
2	Hybridization study on tea	0.01	2006	Dr.S.S.Omolaja	In progress
3	Quality assessment of black tea processed using farmers local methods	-	2011	Dr.S.O.Aroyeun	In progress
4	Assessment of the chemical and sensory qualities of natural tea hybrids from the Mambilla highland.	-	2011	Dr.S.O.Aroyeun	In progress
5	Effect of environment on quality of green tea processed from Chinese clones in Nigeria	-	2011	Dr.S.O.Aroyeun	In progress
6	Screening of 24 clones of tea on quality potentials of green and black tea.	-	2009	Dr.S.O.Aroyeun	In progress
7	Effect of tea/eucalyptus intercrop on antioxidant and phenolic components of green and black tea.	-	2009	Dr.S.O.Aroyeun	In progress
8	Tea/Maize intercrop on processing potentials of black and green tea	-	2009	Dr. S.O.Aroyeun	In progress

9	Screening between high and lowland tea varieties on quality components of infused green and black tea.	-	2009	Dr.S.O.Aroyeun	In progress
10	The effect of organo-minerals fertilizers on tea/maize intercrop	0.5	2009	Dr. Ipinmoroti	In progress
11	The effect of varying levels of organic and inorganic fertilizers on growth of coffee arabica seedlings	0.5	2009	Mr. M A Daniel	In progress
12	Evaluation of nutrients supplement on tea production	0.5	2009	Mr. M A Daniel	In progress
13	Effect of fermentation time on quality parameter of black tea	-	2011	Dr .S.O. Aroyeun	In progress
14	Setting of 75 Nigeria China (NGC 1-5) tea clone, (15-cuttings each)	-	2012	Mr. Olaniyi	In progress
15	Evaluation of China, natural and artificial hybrids of tea clones	0.02	2012	Dr.S.S.Omolaja	In progress
16	China Tea Adaptation in Nigeria effect on quality of processed Black and Green Tea	-	2012	Dr .S.O. Aroyeun	In progress
17	Simultaneous selection and genotype x environment interaction of tea in Nigeria	0.048	2014	Mr. Olaniyi O.O.	In progress

2. **Green Tea:** The green tea activities started in April 2010 and is still ongoing to boost the internal generated revenue of the Institute and the Substation. A total of 1,041.6 kg of green tea leaves were harvested and processed for the year. Green tea sales is shown in appendix II below.:-

3. **Revenue:** The total amount generated for the year 2014 is N237, 480 and the revenue generated on quarterly basis are stated on appendix III below:-

1. **Personal:** The substation maintained 30 staff during the period of the year. Mr. M. A. Daniel HOS CRIN-Mambilla substation was called back to CRIN-Headquarters Ibadan and Mr. F. N. Chila was appointed to head the substation in the capacity of Acting HOS.

2. **Dispensary:** Timely supply of drugs to the substation was maintained during the year. Patients were treated from various common ailments that were found on the Mambilla Plateau. This was quite satisfactory (Appendix IV).

3. **Laboratory:** The laboratory of the substation was regularly maintained by sweeping/mopping. Though, it condition was not bettered up since relevant equipments are not available for conducting meaningful research experiments. The walls and the roof/ceilings are bad and need total renovation to improve the outlook.

4. **Library:** The substation library was functional during the year. There is need to improve the library by equipping it with scientific literatures and text books from different fields.

5. **Office & Residential Quarters**: General maintenance work which involved weeding, sweeping and shaping of the ornamental plants (flower) around the office premises were carried out during the year. The roofs and the walls of the residential buildings (quarters) need complete renovation to give it a very good outlook.

6. **Mobility:** The Toyota Hilux Reg. N0. FG 10 V03 for the substation had engine problem and a new Toyota Hilux was attached to Mambilla Substation with Reg. N0. 03M09FG during the year.

7. **Security:** The Substation maintained 7 securities during the year. Though inadequate to complete 3 shifts, there is high need to increase the number of securities in other to improve surveillance at the substation's premises.

8. **Weather Records**: The total rainfall for the year 2014 was 2276.4 and the quarterly breakdown is shown in appendix (V) below:-

9. **Visitors To Crin Mambilla Substation 2014:**
The following visitors were received on the Substation during the year as stated in Appendix VI below:-

Date	Name	Address	Purpose
9/1/2014	Adeyemi A.R.E.	CRIN-Headquarters Ibadan	Physical stocking for 2013
“ “ “	Akinwande O.O.	” “ “ “	” “ “ “
“ “ “	Oguntona Y. O.	” “ “ “	” “ “ “
22/1/2014	Mr. Ayedepo H.O.	” “ “ “	” “ “ “
“ “ “	Mr. Fabowale K.M	” “ “ “	External Audit Exercise
“ “ “	Mr. Femi Adedeji	” “ “ “	” “ “ “
“ “ “	Mr. Ajiroba	” “ “ “	” “ “ “
12/2/2014	Hon. Yau S. Danfulani	Supervisory councilor for Education Gembu	Official
25/2/2014	Mr. Ibrahim Wasiu	CRIN-Headquarters Ibadan	IPPIS Registration
26/2/2014	Mr. Ogundipe Dare	OAGF Abuja	IPPIS Registration
9/5/2014	Mr. Kenneth A. G.	IPPIS Staff	O. AGF Abuja
22/5/2014	Hon. Rashida Abubakar	Visit (official)	Member Nguroje constituency)
11/6/2014	Agwimah J. A.	CRIN Headquarters Ibadan	Pension Parade
19/6/2014	Dr. Famaye A. O.	CRIN Headquarters Ibadan	Official (coffee Tea Research)
“ ‘ “	Okeniyi Michael	“ “ “ “	“ “ “
“ ‘ “	Ogunjobi M. A. K.	“ “ “ “	“ “ “
“ ‘ “	Oloyede A. A.	“ “ “ “	“ “ “
“ ‘ “	Anagbogu C. F.	“ “ “ “	“ “ “
“ ‘ “	Taiwo Olayinke	“ “ “ “	“ “ “
“ ‘ “	Dr. OyedoKun A. V.	“ “ “ “	“ “ “
“ ‘ “	Eng. A. S. MofoLasayo	“ “ “ “	“ “ “
“ ‘ “	Abdulkarim I. F.	“ “ “ “	“ “ “
“ “	Dr. FamuyiwaB. S.	“ “ “ “	“ “ “
“ “	Idrisu Mohammed	“ “ “ “	“ “ “
20/6/2014	Yahaya A. I.	CRIN Headquarters Ibadan	Official (Tea Team Research)
20/6/2014	Dr. Adedeji	CRIN Headquarters Ibadan	Official (Tea Programme)
20/6/2014	Dr. RR Ipinmoroti	CRIN Headquarters Ibadan	Official (Tea Programme)
20/6/2014	Mr. K. A. Oluyole	CRIN Headquarters Ibadan	Official (Tea Programme)
20/6/2014	Mr. Ndagi I.	CRIN Headquarters Ibadan	Official (Tea Programme)
20/6/2014	Adebowale B. A.	“ “ “	“ “ “ “
20/6/2014	Dr. Aderolu I.A	CRIN Headquarters Ibadan	Research (Tea)
20/6/2014	Akanbi O.S.O.	CRIN Headquarters Ibadan	Research (Tea Programme)
20/6/2014	Adeosun S.A.	CRIN Headquarters Ibadan	Research (Tea Programme)
20/6/2014	Anthony I. E.	CRIN Headquarters Ibadan	Tea group
20/6/2014	Oloyede A. A.	CRIN Headquarters Ibadan	Tea group
1/7/2014	Stephen I. Ukan	Gembu	Private
7/7/2014	Yahya A. T.	CRIN,Ibadan	Official
7/7/2014	Ajiroba A. T.	CRIN, Ibadan	Official
1/8/2014	Maxwell O. Kanu	Taraba State University	SIWES
22/8/2014	Fabowale K. M.	CRIN, Ibadan	Auditing
22/8/2014	Abel J. Njebu	Board of Internal Revenue Gembu	Tax collection
15/9/2014	Hassan Usman	Kakara Village	Private
15/9/2014	Idi Gaji	Kakara Village	Private
15/9/2014	James S. Manasis	Kusuku	Private
15/9/2014	Ahmadu Kawa	Kakara Village	Private
15/9/2014	Hon. Yau S. Danfulani	Gembu Town	Private
17/9/2014	Dr. Anne Muyiwa	CRIN, Ibadan	Official
17/9/2014	Dr. Ogunlade M.O.	CRIN, Ibadan	Official
17/9/2014	Mr. Olasupo F. O	CRIN, Ibadan	Official
25/9/2014	TakyiSraha	WCF?ACI	Official
25/9/2014	Dr. LeliaDongo	CRIN, Ibadan	Official
25/9/2014	Dr. Anne Muyiwa	WCF/CRIN,Ibadan	Official
13/10/2014	Isaiah Joshua Kasari	Part Harcut	Visitor
“ “ “	Monday Philip	Kusuku	” “

18/10/2014	Adeosun S. A.	CRIN-Headquarters Ibadan	Official
23/10/2014	Adamu A. Uba	” “ “ “	Official
27/11/2014	Wilfred Jimon	MDG'S Presidency	Visitor
12/12/2014	A.S.Mofotasayo	CRIN-Headquarters Ibadan	Visitor
19/12/2014	DR. S.O. Aroyeun	CRIN-Headquarters Ibadan	” “ “ “
12/2/2014	Hon. Yau S. Danfulani	Supervisory councilor for Education Gembu	Official
25/2/2014	Mr. Ibrahim Wasiu	CRIN-Headquarters Ibadan	Official
30/12/2014	Oliver James	Imman	Visitor

10 **SUBSTATION NEEDS**

1. 2 Computers for Account/HOS Offices
2. 2 Printers for HOS/Account offices
3. 2 Motorcycles needed for effective field supervision for Agric. Superintendents.
4. There is need for monthly overhead fund for running the substation.
5. The conditions of the substation's residential quarters and Laboratory block are still bad and hence there is high need for renovation.
6. There is need to construct a new processing room for the 2 newly installed depulping machines in the substation.
7. Most of the office furniture are bad and need replacement.
8. Green Tea processing machines is highly needed to faster green tea processing.
9. Complete renovation of the station's store roof

CONCLUSION

On the behalf of the staff of the substation, we thank you for tireless efforts for making the substation grow and develop the more wishing you a happy new year 2015.

OCHAJA SUBSTATION

Staff Strength: The Substation's staff strength stands at 30 with the following breakdown;

Agric Superintendents		
Senior Executive Officer (Accts)		3 (including the Ag. HOS)
Foreman		1
Assistant Executive Officer (Accts)	-	1
Secretarial Assistant		1
Agric Field Overseer		1
Agric Field Attendant		2
Health Attendant		12
Watchman		1
Driver/Mechanic		
Field		

The Substation has an existing plantation coverage of 45 hectares, consisting of both commercial and research plots, the routine maintenance of the plots and data collection are carried out as at when due.
The details of the Substation's 45 hectares existing cashew plantation and their coverage, purpose of establishment, planting distance, plot title and year of establishment are as follows:

1. DEMONSTRATION PLOT
SPACI G: 9M X 9M
ORO SELECTION CASHEW
YEAR ESTABLISH: 1997
PURPOSE: COMMERCIAL
HECTARAGE: 3.0

2. DEMONSTRATION PLOT
CROP: COCOA
HECTARAGE: 0.45
SPACING: 3.1M X 3.1M
YEAR ESTABLISHED: *201112012*

3. PLOT NE2INW2
EXPT:COCOA/OIL PALM PLANTING GEOMETRY
SPACING: 3.1M X 3.1M
OIL PALM: 9M X9M
YEAR ESTABLISHED: 2009
HECTAGE: 2.0

4. PLOT SE 5
TITLE: CASHEW NUT SIZE TRIAL
VARIETY: ORO COLLECTION
SPACING: 9M X9M
PLANT POPULATION: 840
YEAR ESTABLISHED: 1999
HECTAGAGE: 7

5. **PLOT SW 1**
PURPOSE: COMMERCIAL
SPACING: 6.2M X 6.2M
YEAR ESTABLISHED:
HECTARAGE: 3.2

6. **PLOTNW 1**
PUPOSE: COMMERCIAL
SPACING:6.2M X 6.2M
YEAR ESTABLISHED: 1976
HECARAGE: 3.2

7. **PLOT SW/7**
TITLE: GERMPLASM COLLECTION
SPACING: 6.2M X 6.2M
YEAR ESTABLISHED 1977
HECT ARAGE: 2.2

8. **PLOT SW /2E**
EXPT. FERTILIZER TRIAL
SPACING: 6.2M X 6.2M
YEAR ESTABLISHED: 1977

9. **PLOT NW/9**
TITLE: INTER CROPPING EXPT.
SPACING: 3.2M X 3.2M
YEAR ESTABLISHED: 1988
HECTARAGE: 0.45

10. **MILLENNIUM PLOT**
EXPT: SYSTEMATIC SPACING EXPT.
SPACING: 9M X 9M, 8M X 8M, 6M X 6M
HECARAGE: 4.0

11. **PLOT *SW/3***
TITLE: PRUNNING EXPT.
SPACING: 6.2M X 6.2M
YEAR ESTABLISHED: 1976/1977
HECTARAGE: 6.4

12. **EXPERIMENTAL PLOT SW */4***
SPACING: 9.1M X 9.1M
YEAR ESTABLISHED: 1982
EXPERIMENTS:
    1. THE EFFECT OF FERTILIZER APPLICATION ON THE INCIDENCE OF INFLORICENCE BLIGHT DISEASE AND YIELD OF CASHEW
    2. EVALUATION OF CULTURAL PRACTICES ON MANAGEMENT OF CASHEW PLANTATION
    3. EVALUATION OF SPRAY CHEMICAL APPLICATION ON CONTROL OF INFLORESCENCE BLIGHT DISEASE OF CASHEW
    4. FURTHER WORK ON PATTERN OF FLOWERING OF CASHEW IN PLOT Sw4.
    HECTARAGE: 2.0

13. **PLOT SW/*5***
TITLE: GERMPLASM
SPACING: 6.2M X 6.2M
YEAR ESTABLISHED: 1976/77
HECARAGE: 4.1

14. **PLOT NW/4**
TITLE:
SPACING: 6M X 6M
YEAR ESTABLISHED 2011
HECTARAGE: 2.0

15. **PLOT: HIGHER DENSITY**
YEAR ESTABLISHED: 2001
SPACING: 9M X 9M, 8M X 8M, 6M X 6M
HECTARAGE: 5ha

16. **PLOT: GERMPLASM (ORO COLLECTION)**
YEAR ESTABLISHED: 2009
SPACING: 6M X 6M
HECTARAGE: 5 ha
YEAR ESTABLISHED: 2000

17. **PLOT *NW/3***
TITLE: EFFECT OF NUT SIZE AND PLANTING DISTANCE
SPACING: 4M X 4M
YEAR ESTABLISHED: 2001
HECTARAGE: 1.5ha

18. **CRIN PLOT AT ACHARU**
TITLE: DEMONSTRATION
CROP: KOLA SPACING: 9M X 9M
HECTARAGE: 2.5
POPULATION: 308
YEAR ESTABLISHED: 20112012

Records were dully collected on all the on-going research experiment in the station within the quarter under review.

The entire scientist concerned shall be informed to furnish the Executive Director with up to date report on all the on-going experiment for this quarter.

ACTIVITIES ON THE FIELD FOR 2014

i Field activities started with preparatory, slashing of the plots for cashew picking, throughout January 2014 to early February.

ii Middle February 2014 cashew picking commenced and continue through March 2014 to early May.

iii. After cashew picking cultural maintenance of all the existing plots commenced. These includes slashing sanitizing of the plots by gathering and burning dead wood earlier pruned branches and other damaged branches by analeptic, elimination of built up colonies and application of insecticide, picking and strangulating analeptic.

iv. The activities of the year closed up with cutting of fire traces all round the entire plantation and thereafter routine burning to prevent fire outbreak in the plantation,

RESEARCH

The list of the on-going experiment, Titles and Names of the Scientist in the station are as follows;

1. Physical effect of inter-cropping of cashew with some arable crops - Mrs N duka B.A.
2. Growth and yield of cashew as influenced by leguminous cover crops - Mrs Iloyanomon C.I.
3. Preliminary studies on yield differential and soil nutrient status of cashew plantations of different nut sizes in Ochaja Substation, Kogi State - Mrs Iloyanomon C. I.
4. Leaf litter fall and soil nutrient dynamics of cashew plantations of different ages in Ochaja Substation, kogi State - Mrs Iloyanomon c.1.
5. Field establishment of cashew as influenced by shade plants and phosphate Fertilizer - Dr. Ibirimo O. S.
6. Effect of coppicing period and height on cashew rehabilitation - Mrs Adeyemi
7. Cashew Clonal Multiplication through Air-layering - Mrs Adaigbe .0.0

The above is the total numbers of days put into cashew juice factory in 2014 production year, numbers of workers and total number of bottles produced

PROJECTS EXECUTED/ACHIEVEMENT WITHIN 2014

i. RENOVATION OF THE STATION REST HOUSE

GROUND MAINTENANCE

The office complex and the residential quarters were well maintained and fire tracing of the office and residential quarters was also done to avoid fire entering into them.

CASHEW NUT PROCESSING FACTORY

Due to lack of work force in the station much could not be done in the factory in the year under review.

The processed cashew nut were packed and sent to the marketing unit of CRIN Headquarters for sales.
The details of sent packets are as follows;

1.	Honey coated	87 packets
2.	White	80 Packets
		167 Packets

CASHEW JUICE FACTORY

The cashew juice Factory is functional and produced some juice in the year under review.
The details records of cashew juice production are;

DATE
4/03/2014
6/03/2014
7/03/2014
11103/2014
12/03/2014
13/03/2014
17/03/2014
18/03/2014
20103/2014
TOTAL

NO. OF BOTTLE PRODUCE
27
25
25
30
39
27
34
33
37
277

NO. OF WORKER USED
5
4
4

4
3
4
4
3
4
35

The rest house since inception has not been touched in tense of maintenance and renovation making it inhabitable but in 2014, money was approved by the Executive Director for renovation. In that light some renovation was carried out in the station rest house, making it habitable and comfortable to stay in now.

i. Total Overhauling Of The Station 50 KVA Generating Plant The 50KV A electricity Generating Plant of the station was given total overhauling in the year under review, the entire Substation now enjoy electricity supply.

ii. Electricity
A Joint letter has been written to the Executive Governor of Kogi State notifying him of the faulty and packed up transformer that supply electricity to Ochaja community, Ochaja Boys Secondary School, Ochaja Girl's Secondary School and CRIN Substation Ochaja by Ochaja Stake Holders forum, CRIN Substation Ochaja is among the Stake Holders. The letter is receiving positive response; the Governor has sent team of engineers for survey and promise to replace the break down transformer.

iii. MOTORCYCLE
A new motorcycle has been approved and purchased for the station to easy field work for the Agric Superintendent and other official work. The grounded Suzuki motorcycle also repaired.

iv. REBUILDING OF COLLAPSE BRDGE
The only bridge which links the office and residential quarters with the Substation's field collapsed late last year. Approval was given for rebuilding of it, within the quarter and has been rebuilt.

v. REPAIRS OF OFFICE COMPUTER
The two computers in the offices of the Secretary and the Accountant crashed last year December, the computers have been repaired and all the accessories put in order.

vi. REPAIRS OF THREE CHAIN SAW
The spoiled chain saws that were laying far row in the store has been refurbished to standard to meet its demands on field for activities such as pruning, cutting down of dealt stands and cross cutting of wood in the plots of proper sanitation.

vii. PURCHASE OF GENRATOR FOR OFFICE USE
A new sumac 3800 generator has been purchased for the office to cope with the supply of electricity to the office complex and replace the old one which is problematic.

ITEM AND EQUIPMENT RECEIVED FROM HEADQUARTER

Items and equipment received from headquarters in 2014 to enhance efficiency and productivity in Substation includes.

1. BAZUKI Tricycle
2. Hand Driven Mower
3. Hand cutting machine
4. Watering Can
5. Wheel barrow
6. CP18 CZARD Sprayer
7. Small Hoes
8. Chemicals (insecticide)
9. Toyota Hilux Pick up.

CASH RECEIVED AND SPENT

Within the year, the station received a cash total of ₦857,000 and spent base on approval granted by the Executive Director as follows:

1.	Plot maintenance	N206,400.00
2.	Agricultural input	N205,260.00
3.	Stationeries	N93,750.00
4.	Imprest/petty cash	N50,000.00
5.	Rest House Renovation-	NI40,000.00
6.	Repair/servicing 50KVA gen.	N17I,000.00

EVENTS / VISITORS OF THE STATION IN 2014

Some of the event that took place in the station and some important visitors received are as follows:

I. BOT MEETING

CRIN Pension Board of trustee was held in the station in the 3rd July 2014, with the Executive Director of CRIN in attendance and other stake holders.

2. STUDENT VISITED THE STATION ON FIELD TRIP

Students from Kogi State University Anyigba and college of Education Ankpa respectively visited the station on Field Trip to learn more about CRIN and its Mandate crops.

3. PERSONNEL FROM THE HEADQUARTERS VISITED THE SUBSTATION FOR

RESEARCH WORK AND OTHER OFFICIAL ACTIVITIES

The includes;

1. Mrs Nduka B.A
2. Mrs Iloyanomon C.I - Scientist
 307497024.Dr. Ogunwolu S. 0 Scientist
 307497025.Dr. Yahaya L. E "
 307497026.Mrs. Adeigbe "
 307497027.Mrs Adeyemi E. A "
 307497028.Dr. Ibiremo O. S "
 307497029.Mr. Odedele "
 307497072.Mr. Onigbide 0.0 "
 10. Mr. Asin Uwaifo Agric Supt. Auditor

INTERNALLY GENERATED REVENUE

The revenue generated in the Substation in 2014 on quarterly bases is shown below. The breakdown of the IGR can be found in the Substation's 2014 accounting.

IGR2014

JAN		
A PRIL -	MARCH 2014 -	N51,500
JULY -	JUNE 2014 -	N30 , 000
OC T -	SEPT	N13 , 000
	DEC	N101 , 350

CHALLENGES

The challenges of the Substation are numerous but to mention few;

(I) Lack of work force both in the office and the field.
(ii) Delay in the release of over head/money for capital project.
(iii) Inadequate working materials both on the field and in the office.

FUTURE PLAN OF THE SUBSTATION INFRASTRUCTURES

(I) Grading of the road that lead to the Station, the residential quarters and field.
(ii) Gradual renovation of the dilapidated residential quarters.
(iii) Replacement of the remaining wooden electric poles with concrete poles to avoid termites attack.
(iv) Fencing of quarters and rest house with wire mesh for safety.
(v) Gradual planting of oil palm at the boundaries of the station's land to avoid encroachment.
(vi) Changing of office furniture due to their obsolete nature.

RESEARCH

1. Renovation of the laboratory space within the office complex and acquisition of small laboratory equipment that could be powered by small generator where some experiment can be done.
2. Stocking of the station's Library for the extension of CRIN finding to student and other stakeholders.

Revenue Generation

(I) Standardization and NAFDAC registration of the cashew juice processing factory and cashew nut processing to enable public sales.
(ii) Refurbishment of the old water tanker for sales of the spring water in the station to the communities. As the business is lucrative in the locality.
(iii) Arable crops farming; this is dependent on labor force.

Personel Management

(I) Training of all categories of staff is required.
 (ii) Staff requirement for the station are:
 a. More field Attendants
 b. Clerical Assistants
 c. Guest house Attendant and Resuscitation of casual labor.

Objectives/Mandates of the Substation

The Substation is established with the responsibility to carry out CRIN objective effectively in the geo - political zone of the part of the country in which it's located.

The mandate of the Substation is to reach as much farmers as possible with CRIN breakthrough in research and innovations that will benefit the farmers in the five mandate crops of CRIN.

LIMIT OF EXPECTATION AND WORK DONE

The expectation of the Substation is to carry out adequate research work in area of farmer's challenges and disseminate within the geo-political zone and make the institute CRI a household name to all and sundry, but the limitation to stated expectation is poor funding, lack of infrastructures improper dissemination of research results and inadequate work force.

Base on the above expectations, the management built a cashew nut processing factory in the Substation, which has created awareness on nuts end uses among farmers within the locality.

Cashew juice processing factory is also not left out of this and farmers have been trained on cashew juice processing to add values to cashew farming.

CONCLUSION

We in Ochaja Substation through this medium wishes to express our gratitude and profound appreciation to the Executive Director for the allocation of brand new Hilux Pick-up and other equipment to the station and other support given so far.

UHONMORA SUBSTATION (Igbinadolor R. O.)

Introduction

CRIN Uhonmora is one of the six substations of CRIN that was established in 1967 on a land area of 268 ha. It was established to serve as an outreach of the Institute to cater for the cultivation of Cocoa, Robusta coffee, Cashew and Kola. Presently, CRIN Uhonmora substation accommodates the growth of the entire five mandate crops by CRIN. The station has large portion of land under reserve.

Staff Strength

For the period under consideration, the Station had a total number of 28 Staff strength comprising of one Research Scientist (HOS), two Agric Superintendents, one Accountant, one Store keeper elevated to Executive officer cadre (Account), three Agric Field Overseers, two drivers, two Clerical officers with one elevated to the position of Executive officer cadre (Account) having acquired an additional certificate of National Diploma in Accountancy, one Health attendant, one clerical Assistance, five security guards, and Nine field attendants.

S/N	Staff	Number
1	HOS	1
2	Accountant	1
3	Higher Agric Supt.	2
4	HEO (Account)	2
5	Clerical Officer	1
6	Field Overseer	3
7	Health Assist.	1
8	Driver	2
9	Agric Field Attendant	9
10	Security	5
11	Secretary (Typist)	- (Transferred)
	Total	**28**

1. **Task Force Workers:** At the commencement of the fiscal year 2014, the station employed the services of about five to six casual workers from time to time throughout the year to complement the few numbers of field workers in the field.
2. **Promotion:** Eight of the station staffers were due for promotion in the fiscal year 2014, Six of them were promoted while two junior staff couldn't scale through. The Staff promoted includes four senior staff and two junior staff respectively.
3. **Inter cadre transfer:** The clerical officer in the Account section was elevated from the post of Chief Clerical Officer to the post of Assistant Executive Officer as a result of her performance in the interview and an acquisition of additional certificate of National Diploma in Accountancy.
4. **Resignation:** One of the Agric Field Attendant Mr. Tope Fatuase voluntarily resigned his appointment from the service of the Institute towards the end of the year 2014.
5. **Drugs** was supplied to the Station dispensary in the fiscal year 2014 from the Institute Health Centre store at Ibadan. The drugs were used for the treatment of Station's staff and their children.
6. **Staff Relationship:** Inter-personal relationship amongst staffers was very cordial throughout the fiscal year 2014. Regular meetings were held with staff on ways to move the Station forward.
7. **Sanitation:** Regular monthly environmental sanitation was observed by all staffers of the Station. This was to keep the streets, building and Quarters at the Station clean and neat all the time for healthy living. The flowers were well trimed to maintain the aesthetic beauty of the station.
8. **New Hilux vehicle:** Towards the middle of the year, the station received a new Hilux vehicle from the headquarters for use at the station while the old one was returned back to the headquarters.
9. **Tax Matters:** Edo State Board of Internal Revenue in Benin City instituted a court case against the Station on 2012 tax matters in 2014. This was an inherited tax case which happened before my tenure as HOS. However, the matter has been closed from the court with the station paying the penalty fee to the Edo State Tax authority and then filling the necessary tax returns for the year 2012 under dispute.

Cash Received: No over head cash was released to the Station throughout the year, however, the Station received Eight hundred and fifty seven thousand naira (₦857,000.00) as capital in the year 2014 and part of this fund was used to pay the inherited Tax penalty for year 2012 as instructed by the management to the Edo State Board of Internal revenue thereby leaving the Station with very little amount to execute other projects.

Physical Development:

New electric poles were bought by the station and installed to replace the bad/falling ones. This was to ensure the steady supply of electricity to the station. All the Security light bulbs were bought and installed at the gate and office complex to ensure security of lives and properties. New Bush cutter machine was also procured for use at the station. Field tools like cutlasses and iron-files were always purchased on regular basis and distributed to field workers to ensure smooth field operations.

Installation of Weather Station: The Station was favoured by the management of CRIN, Ibadan headquarters with the installation of new modern digital and computerised weather equipment at the station towards the end of the year for comprehensive weather data recording to enhance research purposes.

Tricycle: The Station also got one (1) Tricycle (Basuki) supplied from the headquarters, Ibadan towards the end of the year. This has greatly enhanced the station mobility and field activities.

In addition, the Station also received four (4) Bush Cutter machines and two spraying pump from the headquarters for use at the Station.

WCF/ACI/CRIN Project at Uhonmora Station

The Station in collaboration with World cocoa foundation, Africa Cocoa Initiative and CRIN, Ibadan initiated the establishment of three hectares of cocoa plots at the station towards the end of year 2014 with two (2) hectares of the plots designated for Cocoa Seed garden and one (1) hectare for cocoa Bud wood cocoa garden. This project was kick started with the selection of suitable site and conducting all soil test analysis. The WCF coordinator in company of some CRIN staff at the headquarters paid a visit to the Station to asses the level of progress of the project. The plots have been cleared and well planted with plantain suckers and presently being maintained in readiness for transplanting of cocoa in 2015.

Station Land Documents: As directed by the management to secure and transfer all land documents to the Headquarters, series of travelling were made to different bodies' in-charge of land matters including the Edo State Ministry of Land and Survey to search for the station land document. The outcome of this search has been documented and communicated to CRIN headquarters Ibadan with all the available documents at our disposal at the station.

Revenue:

The total revenue generated for the year 2014 has been remitted. The detail is shown below in Table 1.

Table 1: Revenue Generation Analysis for Year 2014

Items	Jan. –March 1st Qtrs	April –June 2nd Qtrs	July –Sept. 3rd Qtrs	Oct. –Dec 4th Qtrs	Total(₦)
Cocoa seedlings	-	7,500.00	33,500.00	-	**41,000.00**
Palm fruit		33,200.00	7,000.00		**40,200.00**
Timber			30,000.00		**30,000.00**
Coconut				100.00	**100.00**
Access fee & Reg.			5,000.00		**5,000.00**
TOTAL					**116,300.00**

Field and Research Activities

(A). Field Activities

1. The old and new cocoa plantations were regularly weeded, pruned, sprayed and gapped up.
2. The oil palms in the oil plantation were pruned to provide good aeration for the palm trees for better fruit bunch bearing.
3. Nursery development was successfully carried out
4. New cocoa hybrid seedlings were raised and used to established 2 hectare plot of the new improved variety, thus increasing the number of viable cocoa plots at the station.
5. Two ha of cashew plot abandoned over the years was opened up, weeded and maintained
6. Hand pollination was also carried out to increase pod production by staff

(B) Research Activities

1. Weeding and regular data collection was continued on the various experimental plots.
2. Data were regularly collected for all the experiments.

Rainfall Data

January – December 2014 rainfall data showed a total of 2151.4mm in 90 days compared to 2121.3 mm in 82 days recorded in year 2013. The distribution is given below (Table 2). The rainfall pattern was well distributed compared to the two previous years.

Table 2: Rainfall data at CRIN Uhonmora Station from January to December 2014

Month	Rainfall (mm)	Number of days
January	11.5	1
February	30.5	2
March	180.4	5
April	214.7	5
May	313.4	12
June	239.2	12
July	255.8	12
August	322.7	19
September	331.8	10
October	176	9
November	75.4	3
December	Nil	Nil
Total	**2,151.4**	**90**

Pension BOT Meeting

The Pension Board of Trustee meeting was held at the Station in May 2014 and the team was led to the Station by the Executive Director, in company of the Acting Head of Admin and Supply, also in attendance were Mrs. Oluwadare, S. (Desk officer for Pension matters), the Acting Head of Account, the Head of Internal Audit and other pension members for the pension BOT meeting for 2014 fiscal year.

Visitors

Lots of visitors came to the Station and were kept abreast of the activities of the station. Most of the visitors express their delight with the progress that have been achieved at the station for the year especially in the plantations maintenance and the aesthetic beauty of the Estate. Observations were also made by the visitors amongst which is the dilapidated staff quarters, farm store, Rest House, cracked wall of the HOS building, the need for perimeter concretion of the new dispensary building, Insufficient labour for field and security sections. Need for perimeter fencing of the station's boundary, having a befiting gate, amongst others. Visititors and their purpose of visit are indicated in the table below.

Table 3: Visitors to CRIN Uhonmora Station from January to December 2013

Date	Names	Address	Purpose	Remark
06/1/14	Mr Ayo Odusote	CRIN Ibadan	Official	Satisfactory
18/1/14	Mr. Aigbedion	Uhonmora	Official	Satisfactory
7/1/14	Engr. OdigieEjeze	Abuja	Official	Enquiry
27/2/14	Pst. OseAletor	Benin City	Official	Enquiry
14/3/14	Dr. Akaraime	Sabo-Oraa	Official	More seedlings required for cocoa farm establishment. The compound was very neat and there were indication that the entire workforce maintain good interpersonal relationship
27/5/14	Prof. Malachy Akoroda	CRIN Ibadan	BOT Pension meeting	Successful
27/5/14	Mrs. Ubebe, P.A	CRIN Ibadan	BOT Pension meeting	Successful
27/5/14	Mr. Onifade, A.O	CRIN Ibadan	BOT Pension meeting	Successful
27/5/14	Dr. A.S Abubak ar	ARCN, Abuja	BOT Pension meeting	Successful
27/5/14	Chief J.O Ogunbayo	CRIN Ibadan	BOT Pension meeting	Successful
27/5/14	Ogunsuyi, O.J	FMA&RD	BOT Pension meeting	Successful
27/5/14	Festus Ogbeide	UB Benin	Official	Successful
4/8/14	Hon FolyOkhamede	AmozireQtrIkhirin	Demand for seedlings	Successful.
12/8/14	Mr. Airende, F.J	Tax office Sabogida.Ora	Staff verification	Satisfactory
25/8/14	Mr. Kuforiji, E.O	CRIN Ibadan	2013 Internal audit	Successful
25/8/14	Mr. Odusote	CRIN Ibadan	2013 Internal audit	Successful
15/12/14	Fr. Churchill Odekhiran	Uromi	Enquiry	Successful
17/12/14	Sheriff	Mooky Ent Ltd, Ilorin	Installation of Met. station	Satisfactory

MAJOR CONSTRAINTS

1. Lack of fund is a major problem
2 Inadequate Labour force (due to mass retirement of Field staff)
3. Lack of adequate security staff
4. Encroachment into CRIN Land by neighbouring community (Uhonmora specifically)
5. Dilapidated structures (Rest House, HOS Building and other residential buildings).
6. Lack of conference Hall
7. Lack of Good access road from gate to the Office complex and Plantations.

IBEKU SUBSTATION (Nmeregini U.N.)

The following activities were carried out in CRIN Ibeku substation during the year 2014, ended on the 31st Dec., 2014.

(01) FIELD ACTIVITIES: Activities such as
   (i) General maintenance of both the Research and commercial plots – slashing, pruning, removal of mistletoes.
   (ii) Chemical spraying of pesticides and herbicides.
   (iii) Hand pollination of NCSG clones
   (iv) Field maintenance of cashew plantation Ugbenu
   (v) Fire trace cutting of roads and avenues boundaries of the plots in both Ibeku and Ugbenu Outstation.
   (vi) The ground maintenance of both the new and old office blocks at Ibeku and Ugbenu were taking care of regularly.

(02) INFRASTRUCTURAL DEVELOPMENT; In the year under review no much development structures than the construction of cocoa fementry box with cement slab and zinc roof.

(03) RESEARCH ACTIVITIES: Research activities have been at a low tempo over the years. However, the year under review, Mrs. Adepoju (Plant Breeder) from the Headquarters hadbeen working with the coffee plot in CRIN Ibeku. Hand pollination of NCSG clones was on for good four months (July-Oct., 2014). Establishment of 2 ha. NCSG and a hectare of Budwood under the guide of Dr. (Mrs.) Muyiwa.

(04) POLLINATION RECORD: In the year 2014, hand pollination carried out in the station was successful, in that we have pods from the clones to give out in the COCTA distribution. The total of (94) ninety four pods was distributed in the first batch. Seasons farms (Abia) 20 pods and Mr. Obed Abel (Rivers State) Ministry of Agric. 74 pods.

(05) COCTA PODS DISTRIBUTION 2014/15: In the year 2014, the number of (61,635) pods, i.e 33,759 (1st quarter), 18,925 (Second quarter), 20 pods (hand pollinated), and 8,931 (4th quarter) was distributed under COCTA pods given to individual cocoa farmers and State Ministries of Agriculture in the our catchment.

(06) NATIONAL COCOA SEED GARDEN / BUDWOOD: The 2hectare NCSG and 1hectare Budwood started in the station since August, 2014. The field operations and planting of the shade crop (plantain suckers). The plantain suckers we record up to 90% survival rate though the plantain is competing seriously with weeds and needed water for survival this dry season.

(07) IGR (INTERNALLY GENERATED REVENUE): We explored all the available resource in the station. The total sum of Three hundred and sixty-five thousand five hundred and fifty naira(N365,550.00) only was realized and paid to the Headquarters Account. The table below shows the analysis:

COCOA RESEARCH INSTITUTE OF NIGERIA
IBEKU SUBSTATION, UMUAHIA

IGR SUMMARY FOR (JAN - DEC, 2014)

S/N	ITEMS	JAN =N=	FEB =N=	MAR =N=	APR =N=	MAY =N=	JUN =N=	JUL =N=	AUG =N=	SEP =N=	OCT =N=	NOV =N=	DEC =N=	TOTAL =N=
1	COCOA BEANS	24,000.00	-	3,000.00	15,000.00	21,750.00	15,300.00	21,900.00	3,300.00	21,000.00	64,050 00	40,800.00	-	230,100.00
2	PLANTAIN	4,400 00	7,60000	4,000 00	10,800 00	14,800.00	-	6,400.00	-	2,800 00	6,000.00	10,500.00	5,600.00	72,900.00
3	BANANA	700 00	20000	900.00	900.00	600.00	-	300.00	-	-	800.00	1,100.00	400.00	5,900.00
4	FIREWOOD	20000	500 00	200.00	200.00	-	-	-	-	-	-	-	500.00	1,600.00
5	CASHEW NUT	-	-	-	-	-	44,100.00	-	-	-	700 00	-	-	44,800.00
6	CASHEW APPLE	-	-	-	-	-	-	-	-	-	-	-	-	-
7	PALM FRUIT	-	-	2,000.00	-	-	-	-	-	-	-	-	-	2,000.00
8	CHERRY	700.00	-	-	-	-	-	-	-	-	-	-	-	700.00
9	BAMBOO TREE	-	-	-	-	-	-	-	-	-	-	-	-	-
10	COCOA SEEDLINGS	-	-	-	-	-	-	-	-	-	-	-	-	-
11	COCOA POD	-	-	-	-	-	-	-	-	-	-	-	-	-
12	ORANGES	-	-	-	-	-	-	-	-	-	1,000.00	-	-	1,000.00
13	RENT(PLOT-FARMING)	-	2,000.00	-	-	-	-	-	-	-	-	-	-	2,000.00
14	PINEAPPLE	-	-	-	-	-	-	-	-	-	-	-	-	-
15	OGBONOR	2,000.00	-	-	-	-	-	-	-	-	-	-	-	2,000.00
16	BREADFRUIT	-	-	-	-	1,050.00	-	-	-	-	-	-	-	1,050.00
17	PLANKS/TREES	-	-	-	-	1,500.00	-	-	-	-	-	-	-	1,500.00
	TOTAL	**32,000.00**	**10,300.00**	**10,100.00**	**26,900.00**	**39,700.00**	**59,400.00**	**28,600.00**	3,300.00	**23,800.00**	**72,550.00**	**52,400.00**	**6,500.00**	**365,550.00**

(08) STAFF DISPOSITION: The staff strength as at 31st Dec., 2014, stood at (19) Nineteen. Seven senior staff, and twelve junior staff in both Ibeku and Ugbenu Outstation. Management should recall that since 2012 the only dispenser of the station died and no replacement has being effected and this is a problem in a station located at the Out-sketch of the town, Umuahia.

(09) UGBENU EXPERIMENTAL PLOT: The outstation is having only one staff since 2012, that Mr. Chiara Innocent retired from CRIN Service. The only watchman and an indigene Mr. Nwakaeze Linus, resigned since July 2013 on health grounds. However, Management instructed the CRIN Ibeku OIC to deploy an Adhoc watchmen (Casual) which I did and Mr. Johnmoor was deployed from Ugbenu up till now that deployment has not be cash backed. Very soon cashew season shall set in, Management should please help us to make good use of the season by increasing the labour in the station and making the place good attractive – one tree can never make a forest.

(10) TRANSPORTATION: In the year 2014, CRIN Ibeku received a brand new corolla Hilux. The first of its kind in the History of CRIN Ibeku. We appreciated the Management and plead that overhead should be considered for us to carry the fuelling and maintenance of the vehicles considering the distance we cover every weekdays. The motorcycle in Ugbenu did not breakdown at all this year under review, fuelling remains the only challenge. CRIN Ibeku got the tricycle with other implements hand mower bought by the Management. We do promise to handle them with utmost care and hope that it will enhance our productivity.

(11) PENSION MATTERS: In the year 2014, CRIN BOT was hosted once in the station Ibeku. The ED/CEO and other key officers from CRIN Headquarters with Government and pension bodies fully represented. CRIN BOT Pensioners Ibeku pay point attended. All Pensions payment for the year under review was paid. 33% increment arrears was paid to respective pensioners expect the two dead pensioners, late Kalu John and late Ukwu Charles whose next of kins are to apply for their respective payments.

(12) INTERVIEW/PROMOTION: Promotion interview (written) was conducted for both Senior and Junior staffers of CRIN Ibeku in the year under review. Their respective promotion letters received for the successful staffers while letters of notification of failure received by the two junior staffers at could not perform. However, Management remember that their DTA's and transport allowances have not been paid to them both the Senior and junior alike.

(13) REPORT ON DEATH OF STAFF AND PENSIONERS: In the year under review, CRIN Ibeku lost two staffers, late Mr. Okoro Emmanuel and late Mr. Uwakwe Young (AFA 11) and two BOT Pensioners late Mr. Kalu John and late Mr. Ukwu Charles, they have since being buried in their respective homes. Management should consider the families of the dead staffers, in the payment of their burial entitlements as they keep on coming to the OIC, to demand for such payments.

(14) ACHIEVEMENT IN 2014 IN BRIEF:

i. Harvesting and distribution of (61,635) pods to farmers under COCTA programme.
ii. CRIN Ibeku has achieved clearing, felling of trees stumping, lining, pegging and planting of plantain suckers of the 2 hectares NCSG and 1 hectare bud wood plots of WCF/ACI/CRIN collaboration.
iii. Successful hosting of the BOT members and pensioners in the station .
iv. Construction of one big farmentry box with cement slab and zinc roof.
v. Cooperate gift of ₦20,000.00 nair only to the family of late Chief Obede Nwachukwu (Community Chairman) Avonkwu Village, in the bid to strengthen friendly existence with our host community.
vi. Collection of the Court CTC (Certified True Copy) of the Court order of the last court case between CRIN Ibeku and Wamens.
vii. Received a brand new vehicle, I tricycle with implements.
viii. Celebrated with the ED/CEO, the 50th anniversary of CRIN on the 4th of Dec., 2014 To God be the glory.
ix. Regular maintenance of plots and office premises as at when do
x. Pollination of NCSG clones and others in the station.
xi. Above all peace was achieved in the substation all through the year by the grace of God.

(15) PROBLEMS:

1) No much fund in the year under review
2) Inadequate work force.
3) No labour, no office in Ugbenu.
4) Hausa herdsmen with their cattles destroying cocoa plants and pods in the NCSG because of incomplete premaster fencing.
5) Number of watchmen station is grossly inadequate.

(16) VISITORS: The year in review witnessed the

presence of the following visitors. Mr.Ettima Udoh from AkwaIbom,Mr. DairoOpiyemi IPPIS Abuja, Akinrinola Akeem CRIN Headquarters,ObinnaOnwuegbu- Isingwu, Dr. Anna Muyiwa- CRIN Headquarters, E.D. Aro – CRIN Headquarters, Emaku L.A. – Asst. Chief Statisticians, Agwumah A (Mrs.) CRIN Headquarters, Adepoju A.F (Mrs.) CRIN Headquarters, Aguiyi D.D. – Farm Manager, Dr. Mike Nwachukwu – Consultant, Mrs. Akinsola A.O. –(Broker), Prof. Malachy Akoroda ED/CEO with his BOT members, Mr. Olasupo Festus (RO 1 WCF project, Dr. Ogunlade M.O. (CRO WCF/ACI/CRIN project, TakyiSraha – (Technical Adviser WCF/ACI, Mba Kalu – (BIR), Onyekachi Hycienth – (HOS NCRI) and Obed Arbel – (Ministry of Agric. Rivers State.

OWENA SUBSTATION (Yahaya L. E.)

Staff Disposition: The staff list at the substation during the year was as shown below

S/N	NAMES	OWENA	ALADE IDANRE	IBULE	ONISERE	TOTAL
1	Chief Research Officer	1				1
2	Principal Agric. Supt. 1	2				2
3	Principal Agric. Supt.	1				1
4	Senior Executive Officer	1				1
5	Chief Clerical Officer	1				1
6	Head Security Guard	1				1
7	Senior Motor Driver Mech.	1				1
8	Senior Health Assistant	1				1
9	Assistant Agric. Field Overseer	1				1
10	Senior Agric. Field Overseer	1				1
11	Clerical Officer 1	2				2
12	Motor Driver	1				1
13	Field Attendant 11	5			1	6
14	Field Attendant 1	1	1			2
15	Security Guard 11	1				1
16	Senior Watchman	2				2
	TOTAL	**23**	**1**		**1**	**25**

The HOS, Dr Ogunlade M.O was transferred back to the headquarters while Dr Yahaya was transferred from the head quarters to the station as the new HOS.

Revenue: A total sum of seven hundred and forty five thousand, one hundred and twenty naira only **(₦745,120)** was realized from sales of farm produce and other services. The breakdown is as shown in the table below:

ITEMS	IST QUARTER	2ND QUARTER	3RD QUARTER	4TH QUARTER	TOTAL ₦
Cocoa Beans	-	318,390	218,480	-	536,870
Agbalumo	1,000	-	-	-	1,000
Illegal tree felling (fine)	-	-	-	10,000	10,000
Rent: Payroll	27,000	18,000	-	-	45,000
Rent: Tenant	27,250	40,750	53,750	15,500	137,250
Rest House	500	5,000	8,500	1,000	15,000
Total	**55,750**	**382,140**	**280,730**	**26,500**	**745,120**

Distribution of Cocoa Pods to Farmers

Distribution of cocoa pods to farmers for year 2014 was into two sections the first one commenced on 10 January to March 2014. Eight thousand nine hundred and forty five (8,945) pods were distributed the second section commence on the 7th of October to December, 2014. Four thousand five hundred and eleven (4,511) cocoa pods were distributed, therefore the total sum of thirteen thousand four hundred and fifty six **(13,456)** pods have been distributed to cocoa farmers in Ondo and Ekiti states up till the end of December 2014.

Plantation Maintenance and other Operations

The cocoa plantations, demonstration plot and cocoa seed garden were maintained with the few field staff and the special task force engaged for the CocTA activities during the year.

Research Activities

Some of the scientists sited their field experiments at the Substation. Some of these field experiments under Substation supervision are:

1. Fungicides and insecticides screening
2. Growth and Early field establishment of cocoa as influenced by organic, inorganic and organo-mineral fertilizer
3. Effects of organic wastes on nutrient uptake, microbial population and growth performance of cocoa (Theobroma cocoa. L.) in South Western Nigeria.
4. Breeding for Enhanced Early Maturing or Precocious Cocoa Hybrids
5. Life mulch weed control system on the development and growth of seedlings of coca
6. Establishment of some cocoa clonal materials recovered from Ibule/Ipinsa

Achievement during the year

1.Distribution of cocoa pods to farmers in Ondo and Ekiti States for planting. Thirteen thousand four hundred and fifty six **(13,456)** cocoa pods were distributed to farmers between 10th of January to March 2014 and 7th of October to December 2014. The breakdown of the cocoa pods distributed to farmers are shown below:

F3 Open pollinated pods	9,019
WACRI PODS	2,437
HYBRID PODS	2,000
TOTAL	**13,456**

These pods were distributed to 978 cocoa farmers in Ondo and Ekiti States.

2.Establisment of 2ha WCF/ CRIN project plot. A 2ha demonstration plot under the auspices of CRIN and World cocoa foundation was established. This land area has been planted with plantain suckers awaiting the plating of hybrid cocoa the following year.

Visitors: Prominent among the visitors to the station during the year 2013, were:

1.	Prof. M. O Akoroda	Executive Director, CRIN, Ibadan.
2.	Mrs. Ubebe P.A	Head (Admin and Supply)
3.	Onifade A.O	Acct
4.	Mrs. Kuforiji A.O	PEO 11
5.	Mr. Odusote	ACEO
6.	Mrs. Oyebode	EO
7.	Mr. Oyedepo H.O	External Audit
8.	Mr. Fabowale K	Internal Audit
9.	Mr. Adedeji Femi	External Audit
10.	Mr. Ajiroba	Driver
11.	Mrs. Oluwadare S.E	PAO
12.	Mr. Adebowale K.M	

Work shop

The cocoa association of Nigeria brought their student (farmer group) for training during the year 2014.

Challenges

1. Illegal tree felling
   This trend has been worrisome to the station. Several reports have been made to various quarters (Police, forest ministry and Commissioner of Agriculture, Ondo state), but it has persisted. We plead to the Institute's management to wave into the matter to have a permanent and lasting solution to the matter.
2. Boundary issue
   The station has also been experiencing boundary problems with FRIN for some years now. Steps by the HOS to secure the land through acquisition of title documents from the state land records bureau are ongoing.
3. Paucity of fund. This affects the station negatively. Station's overhead, which cares for the expenses of the day-to-day running of the station, is no longer forthcoming. The last of it was prior to my assumption of office as the HOS. This situation makes the running of the station sometimes difficult, such that personal emolument are used when it becomes very necessary. The management should revive this overhead so that the station can care for some day to day expenses of the station.
   At present, the station has been disconnected from electricity power source due to sudden increase in the bill. We plead to the management to come to our assistance in upsetting the bill. Now, we have a bill of approximately N370, 000.00 settle.
4. Considering the enormity of the work in our plantation, the present field staff is inadequate hence the need for casual labour force to compliment the number.
5. Security staff of the station is grossly inadequate.
6. The engine of the existing station vehicle is worn out and cost for servicing and maintaining it is enormous and uneconomical, hence needs replacement.

AJASSOR SUBSTATION (Ayegboyin, K.O.)

Staff Disposition

The staff strength across all sections and units of the substation as at 31 December, 2014 was 40. This comprised of One Research Officer (the Head of Station), Two Agricultural Superintendents, Three staff in Administration and Supply Section, Two in the Finance and Account Section, Three Drivers, One Foreman, One Craftsman, Five Watchmen in the Security Section, Twenty field workers in Plantation and Estate Management (PEM) Section while Two officers and One casual worker(MrOparakuEkokOgar) were in the Health Section. The details of the staffs and their designations are in Table 1.

Table 1: List of staff members with their designations, CONRAISS and Date of Last Promotion as at 31 December2014 in Ajassor Substation

S/N	Name	Designation	CONRAISS	Date of last promotion
1.	Dr Kayode Ayegboyin	Principal Res Officer (Head of Station)	11/02	01/10/2013
2.	MrMaroof A. Olayiwola	Principal Agric. Superintendent 1.	11/03	01/10/2012
3.	Mr Mohammed BabaNitsa	Principal Agric. Superintendent. 2	09/01	01/10/2014
4.	Mr Johnson Gidiga	Accountant 1	08/02	01/10/2014
5.	Mrs Joy TakimAwunghe	Senior Nursing Superintendent	08/02	01/10/2013
6.	Mrs Eunice Ojua	Executive Officer (Acct)	06/01	01/10/2014
7.	Mr Moses Bassey	Chief Driver/Mechanic	06/07	01/10/2002
8.	MrsEkama B. Isong	Chief Clerical Officer (Admin)	06/06	01/10/2009
9.	Mrs Rosemary O. Akpan	Chief Agric. Field Overseer	06/05	01/10/2010
10.	Ms Esther Echi	Principal Health Assistant	06/04	01/10/2011
11.	Mr Effiong N. Udoh	Senior Foreman	06/01	01/10/2014
12.	Mr Ezekiel Effiong	Assistant Chief Field Overseer	05/02	01/10/2013
13.	MrEdet R. Akpan	Asst. Chief field Overseer	05/05	01/10/2012
14.	Ms Pauline U. Ugi	Secretary Assistant 1	05/01	01/10/2012
15.	Mr James Okoi	Senior Craft man	05/07	01/10/2012
16.	Mr Edit O. Okpokam	Assistant Chief Store Keeper	05/02	01/10/2012
17.	Mr Innocent Ugbashi	Assistant Chief Field Overseer	04/11	01/10/2013
18.	Mr Godwin Ogbaji	Head watchman	03/12	01/10/2004
19.	MrEmengIloko	Head watchman	03/12	01/10/2004
20.	Mr John Eno Emeng	Motor Driver/Mechanic	03/12	01/10/2003
21.	Mr John E. Asuquo	Senior Motor Driver/Mechanic	04/07	01/10/2012
22.	Mr Ignatius Ajito	Head Watchman	03/11	01/10/2008
23.	Mr Augustine Uzichu	Head Watchman	03/06	01/10/2013
24.	Mr Samuel Udoh James	Agric. Field Attendant I	03/06	01/10/2013
25.	Mr Ime Asua Sunday	Agric. Field Attendant II	01/05	01/10/2014
26.	MrAzogorEchengIsong	Agric. Field Attendant I	03/06	01/10/2013
27.	Mr Bassey Igbang	Agric. Field Attendant I	03/06	01/10/2013
28.	MrIwaraEteng	Agric. Field Attendant I	03/06	01/10/2013
29.	Mr Augustine Ubi	Agric. Field Attendant I	03/06	01/10/2013
30.	Mr Abraham Samuel	Agric. Field Attendant I	03/06	01/10/2013
31.	Mr Godwin Idagu	Agric. Field Attendant I	03/06	01/10/2013
32.	Mr Peter Ogar	Agric. Field Attendant I	03/06	01/10/2014
33.	MrEleElengEmeng	Head watchman	03/06	01/10/2014
34.	Mr Patrick Iyaji	Agric. Field Attendant I	03/06	01/10/2013
35.	MrEkereObong Sunday	Head Watchman	03/06	01/10/2013
36.	Ms Mercy Umontia	Agric Field Attendant II	02/04	01/10/2013
37.	Mr Godwin Peter	Agric Field Attendant III	01/04	NIL
38	Mr Anthony David	Agric Field Attendant II	02/04	01/10/2013
39.	MrIdorenyinOkpo	Agric Field attendant II	02/04	01/10/2014
40.	Mr Udoh Johnny	Agric Field Attendant II	02/04	01/10/2014
41.	EkokOparakuOga**r*** **	Health Assistant	Not Applicable	Not Applicable

*Legends: *** Was employed as a full-time staff but now a casual staff due to inability of IPPIS to register him even after his employment had been documented by CRIN*

Retirees on the payroll of CRIN Ajassor Substation
The list of the 21 members of all-male retirees on the payroll of CRIN Ajassoras at 31 December 2014 is in Table 2.

Table 2: List of Retirees on the CRIN payroll at Ajassor Substation as at 31 December 2014

S/N	Names
1.	James C. Dibang
2.	Peter Ezoke Egbe
3.	Peter Eni Echeng
4.	Attah Bassey Edem
5.	E.E.Eworo
6.	I.S. Odey
7.	U.U.Innah
8.	B. Iwara
9.	M. Ogar
10.	UmontiaOkpo
11.	MbotoOdum
12.	Mbum R.
13.	BekaSabath
14.	Udoh Monday Frank
15.	Ojor I.U. Abam
16.	Owor O. Agbor
17.	Ononiwu Aloysius
18.	OnyukwuKyrian
19.	Imoke James
20.	Ayambim Charles
21.	M.T. Ekput
22.	Victor Echeng*

*Legend: *Retired from CRIN Service in June 2014 but is not on CRIN Pension List because he is under the current Monetization/Contributory Pension Scheme of the Federal Government*

Plantation Management
Nearly all cocoa plots (both CRIN and Cross River State Cocoa Seed Garden Plots) kola, coffee and tea plots are well maintained as at the time of this report. However, CRIN Ajassor seriously needs more hands to keep these plots well maintained during the raining seasons. The detail of the all the plantations and research plot with their sizes and status of maintenance at CRIN Ajassor Substation is in Table 3.

Table 3: Plantations/ Research Plots with their sizes and status in Ajassoras at 31 December 2014

Cocoa Research Plot	Hectare	Status
Cocoa plots		
1967 Trinidad	2.9	Maintained
1975 F_3 Amazon	1.6	Maintained
CRIN/NIFOR 1	6.0	Maintained
CRIN Elite Seed Multiplication	2.2	Maintained
T38 Kalime	2.8	Maintained
Commercial	2.0	Maintained
Cocoa Cuttings	1.0	Maintained
15 Acres Extension	2.0	Weedy
Amelonado	2.0	Maintained
1973 F_3 Amazon	2.0	Maintained
Seed Garden Multiplication	2.2	Maintained
Okondi	10.69	Maintained
Planting at stake	1.6	Weedy
Farming System Experiment	2.0	Maintained
Adaptability/Tolerant Trial	2.1	Maintained
65 Lines Experiments	1.0	Weedy
CRIN Elite Seed Multiplication	2.2	Maintained
Kola Research Plots		
Kola Progeny	1.6	Moribund
Kola Cuttings	0.65	Maintained
Kola Germplasm	2.92	Maintained
Kola Fertilizer Trials	2.0	Maintained
Coffee Research Plots		
Okondi	1.46	Moribund
1989 Ajassor	1.57	Maintained
Tea Research Plots		
Tea Ajassor	0.28	Maintained
New Establishments		
Cocoa Research Plot	1.32	Maintained
Ornamental Cocoa Plot	0.5	Maintained
Okondi (Cocoa) Plot	0.4	Maintained

Cocoa Transformation Agenda (CocTA) Pod Distribution
About 60,000 high yielding and disease resistant cocoa pods were distributed freely under the 2013/2014 Federal Government Cocoa Transformation Agenda (CocTA) that ended in February 2014. The pods distribution was carried out in collaboration with our two catchment States (Cross River and Akwa Ibom States) through their Ministries of Agriculture and other stakeholder. Cocoa pods distributed were mainly F_3 Amazon, T1 – T6 Seed Garden and WACRI varieties.
By 31 December 2014, a total of 22,954 cocoa pods of high yielding varieties had been distributed to farmers in different locations of Cross River, Akwa Ibom and River States in the on-going 2014/2015 CocTA programme. More farmers will still benefit from this free cocoa pods distribution before the end of February 2015 when the current CocTA 2014/2015 pods distribution period will come to a close.

Research Experiments
A number of research experiments are on-going at CRIN Ajassor Substation. While most research plots had been

established before now, few new research trials on herbicide screening, organic cocoa trial, fungicide screening, fungicide spraying and cocoa rehabilitation, by many Research Officers in different fields, are on-going at Ajassor.

WCF/CRIN Cocoa Project: The clearing of site, tree felling and cross cutting as well as the establishment of plantain in preparation for the transplanting of cocoa on the 5Ha World Cocoa Foundation project plot was completed in the year under review. The maintenance of the plot has since started.

Vehicles/Motorcycles/Generators at Ajassor

The list of the vehicles/motorcycles/generators and their conditions are as below:

i. Toyota Hilux Van FG 09 Vo3 (functional)
ii. Peugeot 404 Pick – up FG 2326 B034 (not functional; recommended for boarding)
iii. Mercedes 911 Water Tanker FG237 B02 (functional but needs total overhauling)
iv. The Eicher Truck (not functional; recommended for boarding)
v. Mitsubishi L200 Van FG 741 B03 (not in good condition; needs total overhauling)
vi. Bedford FG 238 BO3 (not functional; recommended for boarding)
vii. Tractor – FG 239 B03 MF 265 (functional but need serious overhauling)
viii. Motor-cycles: The two Motor Cycles Suzuki 185-FG 335 B03 and FG 335 B03 need total overhauling or otherwise should be boarded off as soon as possible
ix. 50 KVA Generator plant is now in good working order. It packed up due to lack of maintenance for years and old age but was repaired and totally serviced during the under review.
x. Unserviceable Tractor is recommended for boarding. We appeal to the Management to clear off all the unserviceable items from CRIN Ajassor premises. These materials are eye sores as they continue to rust, constituting nuisance and pose danger to our environment.

Infrastructure

a. CRIN/FGN sponsored Capital Projects

As at 31 December 2014, all renovation works which started in December 2013 on the 2 office buildings, the HOS residential apartment, Substation's Health Centre and Digital Meteorological Station were completed and handed over to CRIN. However, the electrification contract to link up the substation to the National Grid has not fully completed and could not be handed over to CRIN.The delay is due to the additional Gang Isolator demanded by the Electricity Distribution Company covering Ikom area. We therefore appeal to the Management to expedite action on this project so that CRIN Ajassor could start enjoying light soonest.

We also thank the Executive Director, Professor Malachy Akoroda, for the on-going upgrading of access road that links up CRIN Ajassor with Ikom-Ajassor Border Road. This project started in December 2014 and is due to complete in the 1st Quarter of 2015.We also appreciate the supply of 1 Basuki tricycle, 2 hand-movers, 1 motor-driven mover and other agricultural inputs given to the station in the year under review. We pray for more blessing, guide and protection for all the members of CRIN Management.

Other Capital Projects

CRIN Ajassor can now boost of adequate portable water supply. The drilling and construction of Solar-powered Borehole at CRIN Ajassor Substation was completed and had since been handed over for the use of all CRIN Ajassor residents. The project tagged 'European Union Micro Project Programme on Nine Niger Delta States of Nigeria (MPP9)' was a Nigerian-European Union Cooperation Initiative and was sponsored by the European Development Fund.

Also, CRIN Ajassor can now boast of solar-powered street Light. Although, this is a single pole with one point of light donated by one of the politicians in the Ikom LGA of Cross River State, we had also received promises of more of such light in future. We have the confidence that with time, as we get more attention, the whole CRIN Ajassor Office and Residential Quarters will be adequately lighted by enough solar –powered electricity.

Cocoa Fermentary/Drying slab/Shade nets

The fermentary at the station needs new roofing and other renovation works on its building. The drying slab is obsolete and needs a replacement with modern and recommended raised platform type. Meanwhile, only one of the 3 shade nets for nursery work at CRIN Ajassor is in good condition. The remaining two are already torn and dilapidated. However, they could be brought back to use with some repairs.

Cocoa Drying Oven

Work on the re-construction of the burnt, out-of-use Cocoa Drying Oven at the station is almost completed, and will be ready for use by May 2015. With the innovation we brought into play, when completed, the Drying Oven will dry about 100kg of cocoa beans at a time. This will ensure that cocoa beans are dried to between 8-10% recommended moisture content before being sold at all time and thereby prevent molding of beans as a result of inadequate sun rays during the raining seasons. The Drying Oven will also be a model to other

CRIN Substations as well as the Production Unit of CRIN Headquarters.

Environment Sanitation

The monthly Environmental Sanitation Exercise on every last Saturday of the month was observed throughout the 12 months under review. We have designed an innovative measure of creating awareness and mobilizing both staff and tenants of the station for the programme. The last Environmental Sanitation in December 2014 witnessed 100% attendance and everyone was happy.

Appeal for Public Toilets on the Estate

The residents of CRIN Ajassor Substation are still suffering from lack of adequate toilet facilities. All the WC facilities in the Junior Residential Quarters are very bad and unusable. Although, one can say that the monetization programme of the Federal Government had taken care of the accommodation of all staff, we live in a 'Farm House' which cannot be totally ignored because of its proximity to our office complex. Therefore, on behalf of all the staff and tenants of CRIN Ajasor Substation, I wish to implore our amiable Executive Director to please provide public toilets in all residential quarters of CRIN Ajassor Substation.

CRIN Image and Visitors to the Substation

Ajassor Substation is still sustaining the cordial relationship between the CRIN, State Government and the communities around us. The residents are going about testifying to the sudden but unquantifiable level of peace between them and the indigenes. Sir, this is the Lord doing.

Also, many important dignitaries visited CRIN Ajassor Substation in the year under review. We also appreciate the visit of our Executive Director, Professor Malachy Akoroda to the station in November 2014.

Encroachment of CRIN land by indigenes: Our success story

The age-long problem of encroachment of CRIN Ajassor lands by the indigenes was amicably solved soon after my arrival as the Head of Station of CRIN Ajassor Substation in December 2013. Consequently, on behalf of the Management and Staff of CRIN Ajassor, I specially thank the Clan Head of Ajassor land, Etta Anthony Ntui, for his royal support as well as the Management and Board of Governor of CRIN, Ibadan for acknowledging the effortof the Clan Head in the achieved success by CRIN Ajassor. However, as a matter of urgency, I advise that CRIN seizes the opportunity of this new-found peace to do the survey and get all relevant documents on these parcels of lands as soon as possible.

Challenges at CRIN Ajassor

As usual, CRINAjassor Substation's challenges revolve around:

1. **Inadequate workforce:** We are the largest substation in CRIN but with just a few staff. Our Field Attendants are just 16 in number but our land size is close to 800Ha and effective productive plot size of about 56Ha. We need more staff to adequately maintain and secure all our productive plots. The substation has the capacity for explosive expansion and increased productivity if more staff is engaged.Inadequate workforce has resulted into the abandonment of many productive plantations and of course, given room for pilfering of our farm produce, encroachment and lower productivity, among others. We urgently need to salvage the situation and produce at our optimal level. To this end, CRIN Ajassor requires nothing less than 60 field staff to cope with the weeding, spraying, pruning, harvesting and other cultural practices in our productive 56.86Ha of cocoa, kola, coffee and tea plots. To this end, additional 42 Field Attendants is urgently needed to complement the existing staff strength.

   Also, in order to effectively secure lives, properties and forestall against theft of our farm produce, a*dditional 20 Watchmen are needed to complement our 5 current Watchmen a*t the moment. A cleaner will also be needed to maintain the 9 toilets in the newly renovated office complexes while one young driver is needed to augment the 3 old drivers at the substation.
2. **Lack of modern tools and equipment**: Our newly renovated library and science laboratory need to be equipped with recent books and modern science tools, respectively.
3. **Funds:** While thanking our Executive Director for the ₦857,000 capital funds sent to the substation in September 2014, we appeal for Overheads and more Capital Votes to CRIN Ajassor Station in 2015. It is extremely difficult to run a Substation with 40 Staff without overheads. We need to fuel our tractor, tanker, Hilux, Tricycle, motor and hand-driven towers, bikes and generators especially in the mobilization field men to our 3 outposts at Okondi, Kalime, NIFOR etc.
4. **Other pressing needs of CRIN Ajassor Substation:**
   1. Vehicles: The substation need one more pick-up Hilux van and an 18-seater staff bus for easy movement of staff from Office to our plots at Okondi, Kalime, NIFOR, Commercial 1 and Commercial 2, and other plots located at far

distances.

2. Motorbikes: Based on the volume of the field work and the need for constant patrol of our plots by the security, there is a need to have 5 additionalmotorbikes at CRIN Ajassor substation.
3. Surveying and fencing of the station: Surveying of our lands is the only way CRIN can permanently secure these lands and stop encroachment being faced by the most substations. Wire or perimeter fencing with oil palm will also be an added advantage.
4. Construction of concrete and metallic sign posts in all plots for easy identification of name and variety of trees, year of establishment, size, location and general history of all our plots and plants.
5. An internet connection: This could be a broadband internet facility that will facilitate speedy surfing of the web and transfer of research related information to the headquarters. This will help the station to key into the present policy of internet administration strategy in CRIN.
6. Renovation of residential quarters: The buildings at CRIN Ajassor are all dilapidated while toilet facilities are becoming a mirage. Although, government quarters had been
7. monetized, an urgent rescue mission on these residential buildings is germane. Once collapsed, the tenants and staff will move out of the quarters and that will spell doom for the main office and jeopardize the safety of all farm produce at the station.
8. Construction of farm houses in the zones for the field workers to serve as coverage during rainy season.
9. Renovation of the fermentary house and construction of raised platform for sun-drying cocoa beans.
10. Renovation of 2 seedling shade nets.
11. Installation of inverter at the station to bring down the running cost on gasoline and diesel operated generators.

Internally Generated Revenue

A total amount of One Million, Two hundred and Seventy one thousand, Six hundred and five naira **(₦1,271,605)** only was generated as the IGR from various sources in 2014.

The breakdown of the revenue generated is in Table 4

T able 4: Internally Generated Revenue (January –December, 2014) for CRIN Ajassor Substation

ITEMS	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	TOTAL
FARM PRODUCE													
Cocoa pods	-	-	-	9,000	-	4,000	-	-	7,200	33,780	-	-	53,980
Cocoa beans	-	-	24,000	27,000	-	-	135,000	-	220,000	-	-	-	406,000
Cocoa seedlings	-	10,000	-	-	84,700	-	16,275	14,000	27,500	6,200	2,000	-	160,675
Kola nuts	12,000	-	-	-	-	-	-	-	-	-	700	16,100	28,800
Palm fruits	-	-	-	30,000	-	-	-	-	-	-	-		30,000
Maize (dry cobs)	-	-	30,000	-	-	-	-	-	-	-	-		30,000
Oranges	-	-	-	-	-	-	-	-	-		-	850	850
Wood (WCF project)	-	-	-	-	-	-	-	-	-		-	50,000	
SERVICES	-	-	-	-	-	-	-	-	-		-		
Rent: Staff	19,250	19,250	19,250	19,250	-	-	-	59,500	46,000	27,000	26,000	35,000	270,500
Rent: Tenants	23,000	12,000	46,500	19,250	4,500	4,500	25,750	16,250	12,500	12,500	9,000	25,250	211,000
Water supplied	-	-	-	-	-	-	-	-	10,000	-	-	17,400	27,400
Sales of bad batteries	-	-	-	-	-	-	-	-	-	2,4000	-	-	2,400
TOTAL	**54,250**	**41,250**	**119,750**	**104,500**	**89,200**	**8,500**	**177,025**	**89,750**	**323,200**	**81,880**	**37,700**	**144,600**	**1,271,605**

Library Information and Documentation Department (O.O.Fagbami)
Library Division (Ogunjobi T.E. – Acting Head, Library Division)
From January 2014 to December 2014, a total number of 2740 users were recorded. These comprised of staff, IT students, Corp members and visitors. Summary of resources consulted in the library are stated below:

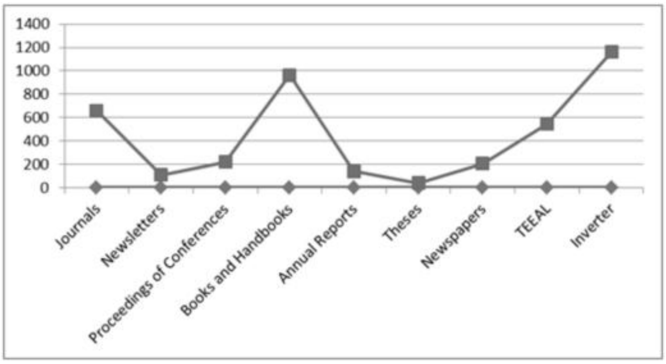


Figure 1: Library Resources Usage in 2014

There was less consultation of prescribed library materials. This could be attributed to inability to subscribe to recent journals. In order to meet up with request of scientists, electronic journals were provided in form of TEEAL covering 1993 - 2012 on various aspect of Agriculture. Furthermore, routine activities of library officers were carried out regularly which include shelving of consulted books and journals, shelf reading, charging and discharging of library materials, retrieval of overdue books and journals from users.

Inaddition, cataloguing and classification of books (including gift materials) were undertaken and completed. Also, relevant information on CRIN mandate crops and agricultural related issues were cut from newspapers and kept for scientist's consultation. Accessioning, stamping and displaying of new information resources were done. Compilation of CRIDAN on CRIN mandate crops are in progress. Inverter and solar panel were purchased and installed in the library to boost the use of electronic resources. This has led to increase in number of library users compared with previous years and also made internet accessibility easier in the library.

Publication Division (Fagbami, O.O.)
Annual Reports for 2006 was printed on contract (1000copies), while 2007-2009 reports processing were ongoing. Notices were sent for submission of 2010 – 2012 reports and these are available in softcopies. Collated reports for the year 2013 was handed over to the division for processing. A publication tagged *“CRIN at 50*” was produced to commemorate the 50th Anniversary of the Institute. Weekly CRIN bulletin was produced from the Executive Director's office. Documentary of activities for CRIN 50th Anniversary was produced in the year. No identity card accessories to produced staff Id card internally. 80 published articles in reflected journals and proceedings were listed in 2006 reports.

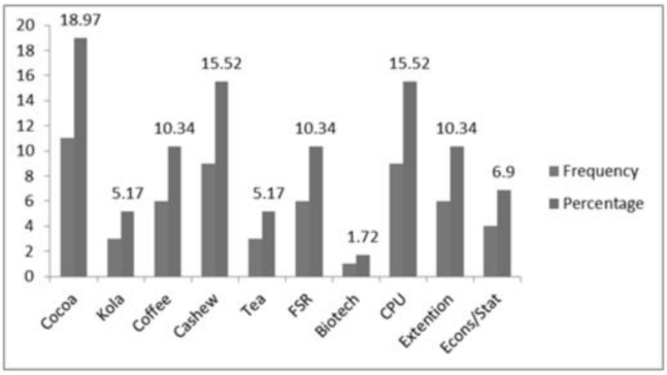


Figure 2: Distribution of Research Programmes reports in 2006

The graph shows that cocoa has 18.97% reports, 15.52% for cashew and CPU respectively. While Coffee ,FSR and Extension has 10.34% each with Econs& Statistics having 6.9%. Kola and Tea has 5.17% each. Also, Biotechnlogy has 1.72% of the published reports.

ICT Division (Ibe Osita – Acting Head, ICT Division)
In 2014, the division carried out these activities: from Internet services Website management/update and In-house training.

Hotspot on the Internet was activated to restrict Internet access to only staff and other authorized users. Placement of users on the hotspot platform has been on-going. Un-interrupted Internet to all staff till close of the day's work. Installation of sectoral antenna to service the LID Department and interfaced it with the inverter in the Internet server room. The ICT equipment at the library was equally connected to library inverter. Occasional cable cuts were rectified in-house in collaboration with some LID staff. ICT training was conducted in-house for two LID staff viz: Mr. Gbenga Oyedotun and Tony Ikpefua; this was equiped them with the requisite skills to attend to internet related requests from staff. The division also played a key role in assisting staff during the IPPIS exercise by creating email addresses and attending to other requests. The division made contact with the Internet Service Provider (ISP) to ensure un-interrupted Internet presence in the Institute.

The website of the Institute was kept up to date with research activities and other breaking news of public interest. The website played host to thousands of visitors in 2014 and constituted one stop shop for information on our mandate crops. Ccontacts were made with staff by outsider from profile showcased on the website. Institutional email address was also created for staff right from the website.

INTERNALAUDIT (FABOWALE K.M.)

Introduction

The Internal Audit is a managerial control which functions by measuring and evaluating the effectiveness of Internal Control System of Cocoa Research Institute of Nigeria at both the Headquarters and its six substations located at Owena in Ondo state, Uhonmora in Edo state, Ochaja in Kogi state, Ibeku in Abia state, Ajassor in Cross Rivers state and Kusuku in Taraba state.

Objectives

The Audit programme for 2004 was designed to provide a complete and continuous audit of the accounts and records of revenue and expenditure, assets, allocated and unallocated stores of the Institute.

Observations/Result

The Audit carried out the audit of all the Institute's financial transactions and assets during the year.

Periodic stock takings were jointly carried out by Audit, Account and Stores in the first week of the year at the headquarters and the six substations.

Payments were properly authorized and posted to various cash books and ledgers.

All financial transactions for the period complied with Federal government due process. The Audit was able to save cost where necessary and leakages were blocked.

Procurements

All procurements of assets and services during the year followed the prescribed laid down procurement rules where pre-funding was observed it was mentioned and corrected.

Stores

All materials were checked and observed properly stocked with their ledgers well maintained.

Substations Audit

2013 audit of the six substations was carried out while 2014 audit exercise could not be carried out due to paucity of fund.

Capital Projects

The Institute embarked on many projects spanning from Infrastructure (buildings and roads) to purchase of equipment and experimental field maintenance. All the projects were verified by the Institute's verification committee of which the Head of Internal Audit was a member and recommendations made before payment were made.

External Audit

The firm of Adeniji & Co Chartered Accountants was engaged and had completed the audit work on year 2013 Institute's Accounts.

ENGINEERING WORKS AND SERVICES DIVISON (Ikpefan P. A)

PREAMBLE

The Engineering works and services Division is a Division under the office of the Executive Directors as shown in the Institute organogram.

This Division is organized into three (3) Technical Sections and thirteen operational Units. This became imperative in order to effectively utilize the available Man Power and to deliver maximally in all fronts of the official responsibility.

The sections/Unit in the Division are as follows:

SECTIONS

1. Mechanical Engineering
2. Electrical Engineering
3. Civil Engineering

UNIT/SECTIONS

1. Carpentry-Civil
2. Masonry & Bricklaying - Civil
3. Road- Civil
4. Motor Vehicles – Mechanical
5. Machine workshop -Mechanical
6. Fabrication & Welding-Mechanical
7. Agricultural Equipment-Mechanical
8. Generators, Refrigerator and Air-condition-Mechanical
9. Water Supply-Mechanical
10. Plumbing-Mechanical
11. Generation & Protection-Electrical
12. Networks Installation/ Maintenance -Electrical
13. Transport

ACTIVITIES OF THE DIVISION

The activities and achievement of the Division Vis-à-Vis the strengths weaknesses opportunities and threat offered/dictated by the operating environment however, the sole function of the Division is as follows:

- Carrying out preliminary studies and investigations on all projects.
- Supervision of work being done by contracts and/or internal labour.
- Maintenance of infrastructures.
- Deployments of Drivers for vehicle movement.

S/NO	JOB DESCRIPTION	LOCATION	AMOUNT	REMARKS
1	Installation of cabinet air conditioner	Event Centre	16,750	Completed
2	Changing of one wing of statistics Division from	ERLS	183,950	Completed
	conduit to surface Installation			
3	Rehabilitation/upgrade of /Electrical Switch room	Laboratory Complex	318,940	Completed
	and control switches at laboratory complex			
	Repairs & replacement of bad Security light			
4	Electrical repairs and replacement of lightings and	Main Lab, ERLS,PM&	119,700	Completed
5	fans			
	Installation of 2 Air conditioners	Engineering		
6	Replacement of damaged Electric- pole along		90,950	Completed
7	Ladoor-Igbaro transmission line			Completed
	Installation of Air -condition & procurement of giant	Lawrence Opeke Hall		
8	Fan	New Library	28,000	Completed
		Igbaro Transmission line		
	Replacement of lighting bulbs	E.D's office & Opeke		Completed
9	Installation of halogen lamp to 400watt	Hall	46,000	Completed
10				
	Olympic		42,000	Completed
11	Installation of Generator	Admin. Block		
12		Engineering		
	Replacement of electrical fittings		8,800	Completed
13	Replacement & Substations)' office & ICT.	Workshop	54,000	Completed
14		FSR & E		
	Wire fencing of Palm Milling Unit		27,000	Completed
15	Construction of Car Park at Engineering Division.	Carpentry	15,070	Completed
16	Repairs of J.S Entrance Gate and Construction of			
	Alata gate	Director (P & S) and ICT	14,400	Completed
17	Construction and Erection of Crossbar at J.S	Centre		
	Entrance Gate		343,000	Completed
18	Changing of taps & replacement of overhead Storex	PEM		
	tank accessories	Engineering Section		
19	Changing of overhead Storex tank accessories &		99,500	Completed
	laying of underground water pipes		38,700	Completed
20	Replacement of sink waste and pipes	Junior Staff Quarters		
	Replacement of wash hand basin waste & its fittings	Junior Staff Quarters		
	Changing of plumbing materials		21,100	Completed
21		Research Store	6,600	Completed
22		Director of Research's		
		Office	2,950	Completed
23	Replacement of discharge water lose and its			
	accessories	Finance & Account	4,550	Completed
		Department	44,220	
		Main Laboratory		
		Complex/ERLS	22,600	
24	Construction of 10 Car slots.	Engineering Division		Completed
25	Construction of water drainage & Palm kernel shaft at Palm oil Section	PEM		Completed
26	Erection of Poles for fencing wire at Palm Oil Section	PEM		Completed
27	Construction of water tank Platform at Main-Laboratory quadrangle	Lab Quandrangle		Completed

28	Concreting the surrounding of J.S.A well (Beside CRIN- Staff School)	J.S.A Quarters		17,900	Completed
29	Painting of office of Director (Production & Substations) window	Laboratory			Completed
30	Erection of Poles for cross bar at the J.S Main entrance.	Junior Staff Quarters			Completed
31	Painting of the NSCDC Office	Management / Carpentry Section			Completed
32	Painting of Dr. R.Adedeji Office	Laboratory		80,000	Completed
33	Ceiling, doors, locks and roof repairs at				
34	stationary/Technical store			45,300	Completed
35	Replacement of door/lock at room 46 Admin office				
36	Roof repairs at Carpentry Unit			1,200	Completed
37	Repairs/Renovation of NSBC office (CRIN Beat)				
38	Construction of car park at engineering workshop			No cash involve	Completed
39	Construction of security shed/bench at the Security			6,700	Completed
40	Gate				
41	Repairs of Fermentary roof			309,200	Completed
42	Repairs of Podium at Conference Hall				
43	Replacements of ceiling Asbestors at ED/Admin.			23,200	Completed
44	Sec's office			10,500	Completed
45	Repair of damaged roof at SPN			11,900	Completed
46	Roof repairs at Plumbing/Mechanical workshop			19,150	
47	Replacement of window lock at the Security Section				
				23,450	
48	Replacement of louvers' at marketing office			28,600	Completed
49	Replacement of door			11,400	Completed
	Replacement of window frame			No cash involve	Completed
50					
	Replacement of door lock at Audit Section			5,500	
51		Room 46 Admin		1,200	
	FG298 VO3	office			
52		FSR&E office			11,200
	FG 630 V03				
53					16,800
54	FG 258 A03			Servicing	
					95,000
55	FG 45 B 03 FG			Servicing	
56				General	22,000
57	FG 310 VO3	So- Cool			
58	FG 075 V03		Tyres, Brake		31,100
59	FG 624 V03	Toyota Hilux	System		
	FG 309 VO3				10,400
60	FG 308 V03	Toyota Haize	Brake System		
61	FG 604 V03	Bus			83,600
62			General		
63		T. Coaster Bus	Servicing		4,200
64					
		Toyota Hilux	Shaft bearing		4,200
			Recovery of		
		Toyota Avensis	Accident vehicle		4,200
		Toyota Hilux	Gran shafts		
			pulley oil seals		14,200
		Toyota Hilux	replacement		
			Servicing & oil		34,500
		Toyota Hilux	Seal		12,600
		Toyota Hilux	Fuel pump,		
			wind screen		

S/NO	REG. NO	TYPE OF VEHICLE	REPAIRS	AMOUNTS
60	FG 308 V03	Toyota Hilux	Services and Oil Seal	14,200
61	FG 604 V03	Toyota Hilux Toyota Hilux	Fuel pump, wind screen	34,500
62	FG 309 FG	Toyota Hilux	General services	12,600
63	FG 297 V03	Toyota Coaster Bus	Towing of vehicle from Okene	65,000
64	FG45 – 03 FG	Toyota Hilux	General Servicing	31,900
65	FG 308 V03	Menz. Benz (711)	Wind screen fron and fixing	37,000
66	FG 103 V03	So –cool	& Rear and fixing	30,800
67	FG 298 V03	Toyota Ambulance	Servicing and Brake system	10,600
68	FG 482 V03	T. Haize Bus	Services & Brake	15,700
69	FG 258 V03	T. Coaster Bus	General services	17,800
70	FG 625 V03	KIA Sportage Jeep	General repair& services	29,800
71	FG 626 V03	Toyota Hilux	General services & repair	69,500
72	FG 630 V03	Peogeout 406	Top cylinders services	10,000
73	FG V03	Toyota Hilux	Suspension	39,000
74	FG 297 V03	KIA Sportage Jeep	Wind screen & Cloth disc and Plate	31,000
75	FG626 V03	Toyota Avensis	Tyres and fixing	102,700
76	FG 075 B03	Toyota Hilux	Absorbers e.t.c	24,500
77	FG 307 V03	Toyota Hilux	Tyres services oil seal	149,200
78	FG 957 S03	Land Wind Jeep	Complete steening rack & wind screen	15,170
79	FG 296 VO3	Land Wind Jeep	Top cylinder gasket and services	15,600
80	FG 299 V03	Motorcycles (Admin.)	Full light, repair	10,500
81	FG 16 S03	Motorcycles (Security)	Repairs, & services tyres	44,000
82	FG 516 B03	Toyota Hilux	General repairs Services	16,800
83	AND FG 15	KIA Sportage Jeep	Absorbers	103,000
84	S0B	Toyota Avensis	To wing from Sapade, Ogun State	63,300
85	FG 604 S03	Toyota Avensis	Absorbers front & rear, linkages, Pads,	102,600
86	FG 626 V03	Toyota Hilux	Master brakes e.t.c	
	FG 260 A03		Tyres, Batterys	
	FG 260 A03		Tyres, Brake disc & Drum	
	FG 604 S03			

87	Ruman 3.8 KVA generator servicing	Director Research office	2,800	Complete
88	Installation of New Battery to 250 KVA Generator	Main Power House	26,000	Complete
89	Serving of 250 KVA generator	Main Power House	34,000	Complete
90	Radiator Replace/Plas==== of 250 KVA Generator	Main Power House	14,500	Complete
91	Servicing of 12.5 KVA Diesel Generator	SPN Old Garage	17,200	Complete
92	Repair of Alternator of 250 KVA	Lab	4,500	Complete
93	Repair====r of 250 KVA Generator small & Big Radiator	Lab	29,000	Complete
94	Servicing of 250 KVA Generator	Lab	74,000	Complete
95	Replacement of infector pressure regulator and sensor	Main Power House	90,000	Complete
96	Replacement of starter on 3.8 KVA Generator	Director Office	1,500	Complete
97	Servicing of 3.8 Generator	Admin.	5,500	Complete
98	Routine maintenance of 250 KVA Generator	Lab & Main Power House	NIL	Complete
99	Installation & Purchase of window unit Air condition	Civil Deference Office		
100	Installation of split unit Air condition	CPU HOD Office		
101	Repair of split unit Air condition unit	Audit Office		
102	Repair of two split unit Air condition and repair of	HOD Account office		
103	refrigerator & Stabilizer	Director P &T Office		
104	Installation of Air condition	Library		
105	Installation of two split unit Air condition	Engineering Office		
106	Repair of Air condition/Installation	HOD Audit		
107	Repair of standing parkage Air condition	Board Room		
108	Repair of window unit Air condition	ERLS Office		
109	Repair of Split unit Air condition	Opeke Hall		
110	Repair of Air condition	Tissue Culture		
111	Repair of two window unit Air condition	Lab.		
112	Replacement of new split Air condition	Entomology Registry		
113	Repair of Air condition	Finane& Account Room 3		
114	Window Air condition replacement and Stabilizer			
115	All repair and installation of new stabilizer			
116	Repair of Air condition Room C 33			
117	Repair of Air condition			
118	Installation of window Air condition			
	Repair of Air condition			

PLANTATION AND ESTATEMANAGEMENT

(Akande M.A.)

A INTRODUCTION

There are four major sections in the Plantation and Estate Management Division namely.

UNIT 1: This consists of eight zones and BCOO plots where plantations of CRIN schedule crops are situated. The total hectarage crops in each zones and staff strength are stated in Table (1)

UNIT 11: This unit consists of the Ground Maintenance which involved in:

(a) The General maintenance of Institute's internal and external environment.
(b) Maintenance of horticultural/ornamental and hedges plant.

UNIT 111: This deals with the raising of all CRIN schedule crops for commercial and research purposes.

UNIT IV: The fermentary unit collects cocoa pods and processes all harvested cocoa pods and air drying of cashew nuts and sun drying of plantain chips.

B STAFF STRENGTH:

At the onset of the year 2014, staff strength stood at thirty-six (36) senior staff and one hundred and seventy-one (171) junior staff on the field and one (1) senior staff and two (2) junior staff in the PEM's office.

At the end of the year 2014, the permanent number of staff stood at 204 staff (41 senior staff and 163 junior staff) and 64 casual workers from the various plots. It is also responsible for fermenting, drying and begging of cocoa be. Periodical recruitment of 102 casual workers was carried out at various time of the year to supplement the effort of the permanent staff in general maintenance operation. Out of this total, 42 casual workers were recruited basically to replace those staff deployed as pollination gang to hybrid propagation unit. Apart from the recruitment drive, redeployment of some field staff to

Agric. business venture plc was carried out while Mr Etta N. Mbak and Mrs F. O Emmanuel were deployed to Zone 6 and 2 respectively. In addition, Nine (9) security officers were transferred to Plantation and Estate Management as field staff. The attendance of male casual workers dwindled when they were most needed because of low wages and enjoyment of higher earnings from local farms while female casual workers were more consistent in attendance. The division witnessed the sudden death of a junior staff Messer Oloyedekazzem after a brief sickness. The table 1(a) and (b) shows staff strength/ disposition.

TABLE 1(a) STAFF STRENGTH /DISPOSITION

S/No	UNIT	EFFECTIVE HECTARE	NO OF SENIOR STAFF	NO OF JUNIOR STAFF
1	PEM'S OFFICE	-	1	2
2	ZONE 1	36.08	2	16
3	ZONE 2	14.15	2	9
4	ZONE 3-4	11.70	2	7
5	ZONE 5	26.73	4	13
6	ZONE 6	26.00	3	9
7	ZONE 7	35.71	3	10
8	ZONE 8	35.75	3	13
9	ZONE 9	20.00	2	8
10	BCOO	6.00	-	2
11	GM	-	10	23
12	FERMENTARY	-	3	7
13	NDM	-	2	6
14	HPU	-	1	15
15	VPU	-	1	15
16	AGRIC BUSINESS	-	2	3
17	SOAP	-	-	2
18	BAKERY	-	-	3

C. ACHIEVEMENT

1. **Plantation Activities:** Routine and required cultural operations were adequately and effectively carried out in the existing plots in all the zones, units and BCOO plot in Moor Plantation. Such activities carried out involved:
   - (a) Slashing, under brushing and weeding
   - (b) Spraying of herbicide, insecticide, fungicide and termicide
   - (c) Supplying of missing stands.
   - (d) Removal of parasitic plants and mistletoes.
   - (e) Removal of moribund plants and diseased plants/pods
   - (f) Pruning of canopies and branches.
   - (g) Watering of young cocoa and kola plants.
   - (h) Cutting of fire traces round the plantations
   - (i) Sanitation of the plots by packing out dead and dried wood.
   - (j) Harvesting, evacuation, breaking and processing of cocoa pods.
   - (k) Harvesting and processing of kola nuts
   - (i) Picking of cashew nuts.
   - (m) Harvesting of coffee berries
   - (n) Harvesting of farm produce like cassava, plantain, maize etc.

The Zonal leader's reports are forwarded along with this report.

2. **Estate Management:** This is aspect of activity demanded a lot in order to maintain constant cleanliness and sanitation. Routine operations of the unit which include manual slashing, mechanical slashing (tractor and mower) and application of herbicide round the office complex, trimming and pruning of flowers were carried out as expected.
3. **Central Nursery:** CRIN mandate crops were raised through beans, nuts and vegetative as the need arise such as budding, grafting, layering etc, for commercial and research purposes. Pollination exercises were also carried out. During the period under review, 32,525 of cocoa seedlings were produced while Vegetative Propagation Unit (VPU) raised a total of 15,000 rootstocks. 4,112 kola seedlings of both cola acuminata and colanitida were produced while 2,614 jumbo cashew seedlings were also produced.

Sales

The total number of 37,616 hybrid pods were distributed to farmer while 16,665 cocoa seedlings were sold and 9380 cocoa seedlings were released to Vegetative propagation Unit (VPU) remaining a balance of 6480 cocoa seedlings in the nursery waiting for maturity.

1,064 kola seedlings were sold while remaining 3,048 kola seedlings in the nursery.

All 2,614 jumbo cashews seedling raised were sold. Out of 2,440 plantain suckers uprooted, 2,240 were released for the newly established parental stock garden and WCF project while 200 volunteer suckers were sold.

4. **Support for Research project:** Research officers who had their experiments in the different zones and units were assisted with labour to maintain and carry out other related field activities such as collection of data whenever the need arose.
5. **Rehabilitation:** Zone 6 was able to rehabilitate 2 hectares old cocoa plot by planting young cocoa seedlings.
6. **Establishment of MD-2 pineapple orchard:** Pineapple orchard of an area of 1654m2 was established in the month of July, 2014 with a spacing of 45cm by45cm by 1m giving 43 ½ block of four (4) rows per block as part of internally generated revenue drive for the Institute. Lots of challenges were faced as a result of die-back experience which connected with time interval between the periods that suckers were picked from the plantation and when they were finally planted which resulted to building up of fungus and nematode infection. Presently, we can only boast of one thousand, eight hundred and sixteen stands (1816) out of five thousand pineapple suckers planted. For efficient and maintenance, the 43 ½ blocks were shared among the various zones.
7. **Horticultural and Arable crops:** As part of Plantation and Estate Management effort to increase the internally generated revenue (IGR), Ground maintenance section embarked on planting of maize and vegetable at ERLS and besides CRIN co-operative building. Vegetables were sold to the staff and public at competitive price of N50.00 each. The total sum of fifteen thousand six hundred and fifty naira only (N15, 650.00) and ten thousand naira only (N10, 000.00) was remitted to the marketing section on sale of vegetable and maize respectively.
8. **Establishment of Hybrid cocoa of Tc1-Tc8**: The preparation of one hectare with plantation suckers against the establishment of hybrid cocoa of Tc1-Tc8 toward 2015 planting in various zones was done.
9. **Fermentay Unit:** Under the period in review,

- 7 tonnes and 226.4kg of dried cocoa beans were processed, dried and bagged.
- 6 tonnes and 10kg was sold, 3.5kg was released for CPU department while some are still undergoing drying on the raised platform.
- 423kg of cashew nuts were air-dried.
- 23kg of cashew nuts were sold and 400kg is still in the store.
- 310kg of dried coffee berries were brought forward from the year 2013 into the year 2014. Out of which 76kg of coffee berries were sold in the year 2014 and still remain 230kg in the store.
- 35.3kg of plantain chips produced while 31.5kg was sold and still remain3.8kg in the store.

0 **Rotational general work:** ith the recruitment of casual workers in the year 2014, rotational general work was carried out from zone to zone which has gone a long way to help the division in its field cultural activities.

1 **Establishment of Cocoa and Kola nursery** n order to avoid transportation problem at the time of planting season, Cocoa and Kola nurseries were sited and established in various Cocoa and Kola zones. Cocoa pods planting materials were sourced from West 5, West 6, West 18, and 2008, 2009, 2010 plots

2 **Farm Produce Harvesting:** adverting of cocoa pods was done weekly, transported to the breaking point, weighed, fermented and dried at the fermentary unit. All the processed and farm produce were sent to the marketing section for sales. Various farm produce harvested for internally generated revenue are analysed below.

FARM PRODUCE HARVESTED

1. COCOA PODS. TABLE 11

ZONE	JAN	FEB	MAR	APRIL	MAY	JUNE	JULY	AUG.	SEP.	OCT.	NOV	DEC	TOTAL
1	2,131	2231	2,226	4569	5768	1051	2590	843	742	4086	7845	1311	35393
2	305	745	348	1700	1520	875	343	147	185	588	1464	760	8980
3-4	2282	302	-	2030	2017	1147	37	373	1241	1663	1079	2567	14738
5	2935	1005	3807	5871	11673	1073	47	733	2557	1451	2551	4986	38689
6	3841	935	6877	7330	9010	2097	-	1206	1946	1691	3716	3470	42119
8	3253	4418	856	3585	3077	1027	2095	1093	2102	7257	8911	8714	46388
9	2435	1706	822	2305	385	795	890	1030	2172	3291	2875	4590	23296
BCOO		-	1085	1186	461	-	-	-	-	1050	1205	1325	6312
Demon.	175	53	-	-	-	-	-	-	-	-	-	111	339
HPU	250	-	-	1293	5502	9599	491	-	-	-	-	-	17135
VPU	562	-	-	-	-	-	-	-	-	-	-	-	562
TOTAL	18169	11395	16021	29869	39413	17664	6493	5425	10945	21077	29646	27834	233951
Oil palm	150	59	166	80	51	124	92	92	93	63	44	76	1090
Kola Pod	57	595	195	463	159	-	-	-	-	-	118	300	1728

- Note: 64 kegs of palm oil were produced and2kegs of palm oil remain in the store while N454, 540 was realized on palm oil distributed to the marketing and N11,450.00 on kernel shafts.
- Cocoa supplied to COCTA and others from harvested pods are;

Zone 3-4 1316 pods
Zone 8 24517pods
Total 25,833pods

(11) Sold Zone1 100Pods
“8 50pods
150pods

(111) Supplied to zone 2from zone 3-4 60 pods
Supplied to Nursery from zone 8 487pods
Supplied to zone 6 from zone 8 80pods
627pods

Grandtotal = 25833 + 150 +627 = 26,610pods

ZONES	Kola nut	Cashew nut	Coffee	Plantain	Banana	Maize	Cassava	Iyereleaf
1	-	-	-	96 bunches	155	N3,800	-	N250
2	72pods	14.6kg	-	8bunches merged to 4	-	N1,400	-	-
3-4	-	95.6kg	-	38 bunches merged to 15	-	N3,600	-	-
5	-	-	20.5kg	40 bunches merged to 20	-	-	-	-
6		78.0kg		37 bunches				
7	-	-	-	6 bunches	-	-	-	-
8	-	-	-	20 bunches merged to 15	36	N2,500	N3,000	-
9	-	-	-	66 merged to16	-	-	-	-
G/m	-	139.8kg	-	-	-	N10,000	-	-
Nursery	--	-	-	118	-	-	-	-
Total	-	320.0kg	20.5Kkg	429	191	N21,300	N3,000	N250

TABLE 111

Farm tools, chemical and soil organic fertilizer: Lots of farm tools, chemical and soil organic fertilizers were given to all various zones and units in the year under review to facilitate the division activities in its various cultural and routine operations to boost production. In order to cater for the protection and welfare of all field staff, every individual field staff was given field coats, rain boots and cutlasses to work with on the farm. The table IV show the distribution of supplied farm tools, chemical and organic fertilizer.

There are still some agricultural equipments and chemical in the store which include:

(a) 30 spraying pump
(b) 20 lawn mower
(c) 30 master cut
(d) 4 bazuki
(e) Chemical: Ultimax 10 cartoons
Glyphosate 15cartoons
Paraquat 5 cartoons
Actara 10 cartoons
Nose mask 3 dozens
(f) Polyethene bags

14. Erection of metallic signpost: Fourteen (14) metallic artistic signposts that were constructed for various zones and other units with filled information written on them about each specific unit were erected to their permanent position and place.

15. Payment of casual wages: Under the period in review, the casual wages were paid promptly as at when due to increase their job performance, morale and commitment. Thanks to the CRIN Governing Board and Internal Management Committee for this great achievement.

16. Training: Training was conducted for field staff and casual workers on hand pollination while IT students, students on excursion and visitors were also conducted round.

D. IMMEDIATE AND LONG FUTURE TERM PLAN OF THE DIVISION

(1) Expansion of our effective hectarage of Cocoa, Kola, Cashew by gapping up vacancies within the plots.
(2) Establishment of hybrid parental plots.
(3) Establishment of more new cocoa plot.
(4) Establishment of new cashew and kola plots
(5) Establishment of horticultural and arable crops.

E. CHALLENGES

(1) **POROSITY OF ZONES/UNITS AXIS:** The porosity of the zones /units allows for encroachment and stealing by unwanted visitors especially during the season which has affected our output.

(2) **INADEQUATE SUPPLY OF MANPOWER:** This is a major constraint of production Insufficient of labour to do the regular maintenance of the plots is adversely affecting the progress of job and thereby retarding production.

(3) **Sporting Activities:** Weeks of sporting activities within the month of the year under review greatly affected the input of the field staff as most field work comes up between 8-12noon of effective working hours.

F: RUNNING IMPREST/EXPENDITURE IN YEAR 2014

Imprest	May	N70, 000.00
	JUNE	N70, 000.00
	AUGUST	N70, 000.00
	NOVEMBER	N70, 000.00

Direct purchased of farm input for the month of April	N312, 690.00
Direct purchased of farm input for the month of May	N324, 150.00
Purchase of pineapple (5000 suckers)	N299, 057.00
Establishment of pineapple	N34, 760.00
Maintenance of pineapple orchard	N14, 810.00
Fuelling of Coastal bus (14/4/14 -21/7/14)	N44, 000.00
Fuelling of coastal bus (28/7/14 -27/10/14	N42, 000.00
Bulk items received on farm tools	N9, 417, 600.00
10 lawn mower	N 1,792,750.00
Bulk items received on agricultural equipment	N7,922,14.50
Project money received	N2, 242,000.00
Recruitment of labour	N5, 280,000.00
Recruitment of labour	N 2,000,000.00
Direct purchase on kola nursery	N65, 950.00
Repair of bazuki	N15, 000.00

G: Appreciation: The Plantation and Estate Management team will not cease to appreciate and show our gratitude to the leadership of Executive Director, Professor Malachy Akoroda and Management for their continuous support in items of total cash received last year, bulk items purchased on our behalf, project money received, direct purchased and casual worker provision. We hope to continue in 2015 by God's grace with great commitment and looking for more gesture from the Management.

HUMAN RESOURCES MANAGEMENT DEPARTMENT

The Human Resources Management Department of the Institute applied itself meritoriously to its primary responsibilities of supporting and assisting the Executive Director in the day-to-day administration of the Institute in conformity with the Institute's Mandate and Mission Statements.

STRUCTURE OF THE HUMAN RESOURCES MANAGEMENT DEPARTMENT

To facilitate the activities of the Department, the Department is structured into three (3) Divisions, six (6) Sections and six (6) unit viz: Personnel Management Division, Corporate Matters Division, Health Services Division, Appointments, Promotions & Discipline

Section, Training and Development Section, Pension Section, Staff Welfare and Industrial Relations Section, Maternity Section, Dispensary Section, Personnel Records Unit, Discipline Rules and Regulations Unit, Pension Records Unit, Catering Service Unit, Insurance Matters Unit and Cleaning and Maintenance Unit.

STAFF STRENGTH

- The Human Resources Management Department total staff strength as at 31 December, 2014 is seventy five (76).
  hey are summarized as follows:
  Administrative Officers, 18 Executive Officers, 17 Clerical Officers,1 Confidential Secretary, 9 Secretarial Assistants , 2 Agric. Field Attendants, 1 Chief Data Processing Assistant, 2 Catering Officers, 4 Catering Assistants, 9 Nurses, 2 Health Assistats and 2 Health Attendants.
- The aforementioned staff are at various Divisions/Sections/Units of the Department as at 31 December, 2014 as follows:

RM Office	6
Personnel Management	9
Corporate Matters	4
Health Centre	5
Pension	4
Catering Services	6
Vleaning Unit	
Field staff	
Total	**76**

. **INSTITUTE' STAFF STRENGTH AS AT 31 DECEMBER 2014**

he Institute staff strength is 808. This is analyses below:

i)	Senior Staff	58
ii)	Junior Staff	50
	Total	**08**

.	**SUBSTATIONS**	**174**
.	**HEADQUARTERS**	**634**

FUNCTIONS/ACTIVITIES OF THE DEPARTMENT

The Functions of the Department are as follows

(i) Post-effective management of all the Sections' activities of the Institute, including all elements of Personnel functions, corporate matters and Public Relations.

ii) Planning, organizing, coordinating and control of all activities including, personnel, materials, and funds.

iii) Identifying, articulating, formulating and reviewing from time to time the administrative activities of the Institute in compliance with the statutory mandate of the Institute, as well as all rules and regulations for the management of Government Instituions as they affect the Institute, promotion of staff welfare and public image of the Institute.

iv) Human Resources Management, including appointments, promotions, discipline, disengagement and post-disengagement, staff training and development.

v) Promotion and sustenance of national and international inter-institutional cooperation.

vi) Staff salaries and wages administration, other elements of staff welfare, including office and residential accommodation, health care delivery, staff recreation, staff union-management relations, staff children school, wedding, births, funerals, house warmig, housing loans, motor vehicle and car refurbishing loans, etc.

vii) Security, including insurance of all lives and properties, within the Institute premises, and the security of Institute personnel and properties outside the Institute premises.

viii) Institute Gratuities and Pensions Board of Trustees.

ix) Corporate matters including Institute' mandate, agreements and enforcement of all the rules and regulations for the administration and management of Government organizations, Public Service Rules, Financial Regulations, other relevant Federal Government Circulars, the Constitution of the Fedeal Republic of Nigeria and all the laws of the Federal Republic of Nigeria, including the Anti-Corruption Act 2000.

x) Institute' Environmental Sanitation Service.

xi) Institute' Rest House Management, Corporate Entertainment, Hospitality, Ceremonial and Protocol Matters.

xii) Organization and Management of the Institute' Internal Management Committee meetings.

xiii) Facilitation and organization of the Institute' Governing Board meetings and

xiv) Any other duty that the Executive Director may assign from time to time in pursuit of the accomplishment of the Institute' Mandate and Mission Statement.

ACHIEVEMENTS OF THE DEPARTMENT

ROMOTION

Year 2013 Senior and Junior Staff Promotions: n February 2014 and May 2014, the promotion exercises for 2013 were successfully conducted and letters of promotions were issued to all successful candidates to fill available vacancies. The analysis is as follows:-

2013 Senior Staff Promotions and Intercadre Transfers/Advancement

Total number of staff presented	89
Staff Promoted	66
Staff given Inter-Cadre Transfers	3
Staff not promoted	20

Junior Staff Promotions for 2013

Total number of staff presented	229
Staff Promoted	201
Staff given Inter-Cadre Transfer	1
Staff not promoted	27

The year 2014 Senior and Junior Staff Promotions were successfully conducted and facilitated by Human Resources Management Department within the year under reference. Please see the analysis below:

2014 SENIOR STAFF PROMOTIONS

- Total number of staff presented -18
- Staff promoted 94
- Staff given inter-cadre transfer 4
- Staff not promoted 20

2014 JUNIOR STAFF PROMOTIONS

- Total number of staff presented for promotion and inter-cadre transfers/Advancement -104
- Staff promoted - 74
- Staff given inter-cadre transfers - 5
- Staff not promoted - 25

The comprehensive list of staff promoted in year 2013 and year 2014 is attached as Annexure I and II respectively.

CONFIRMATION OF APPOINTMENT

2 Senior staff and 43 Junior staff were confirmed during the period under reference.
Please see the list at Annexure III

STAFF ON TRAINING

As at 31 December, 2014 thirty three (33) Research Scientists were on training while eighty (80) Non-Research Staff were also on training on part time and self sponsorship basis.
A comprehensive list of these staff on training are at Annexure IV and V.

IN-SERVICE TRAINING

In 2014 a total of 49 staff in different Departments/Divisions/Sections/Units went for in-service training.

The names of these staff, courses attended with dates are attached as Annexure VI.

LEFT THE SERVICE

A total of 126 staff left service in 2014. This is analysed below:

Retirement		
Age/Length of Service		13
Resignation	-	3
Death	-	4
Withdrawal	-	1
Transfer	-	2
Disciplinary Action	-	2
Termination	-	91
Total	**-**	**116**

The comprehensive list of staff that left service in year 2014 is attached as Annexure VII.

CORPORATE VISIT

(i) Officials from the office of the Accountant General of the Federation, Abuja visited the Institute for the registration of staff into the Integrated Payroll and Personnel Information System (IPPIS) Scheme on 22nd – 24th January, 2014.
(ii) Adepta France delegates visited the Institute on 29 October 2014.

MEETINGS HELD IN YEAR 2014

The Department facilitated Management meetings as follows:

INTERNAL MANAGEMENT COMMITTEE (IMC)/PROCUREMENT PLANNING COMMITTEE (PPC) MEETINGS

1. IMC and PPC meeting – Friday 17 January 2014
2. IMC & PPC meeting – Thursday 13 February, 2014
3. IMC & PPC meeting – Friday 07 March, 2014
4. Top Management Meeting – 11 March, 2014
5. IMC & PPC meeting – Thursday 24 April, 2014
6. IMC & PPC meeting – Tuesday 03 June, 2014
7. IMC & PPC meeting – 27 June, 2014
8. Emergency meeting of IMC & PPC – 07 July, 2014
9. IMC & PPC meeting – 01 August, 2014
10. IMC & PPC meeting – 29 August, 2014
11. IMC & PPC meeting – 25 September, 2014
12. IMC meeting – 23 October, 2014
13. IMC meeting – Thursday 11 December, 2014

GOVERNING BOARD MEETINGS

The Department facilitated Governing Board Meetings which were held as follows:

Governing Board Committee on Establishment Meetings:

(i) Staff Audit – 16 – 20 January 2014
(ii) Year 2013 Senior Staff Promotions – May 2014
(iii) Year 2014 Senior Staff Promotions – November 2014

Governing Board Meetings:

(i) 5 – 7 May, 2014 – 5th Business Meeting
(ii) 13 – 14 October, 2014 – 6th Business Meeting
(iii) 11 – 12 December, 2014 – 7th Business Meeting

INSTITUTE'S CORPORATE SOCIAL RESPONSIBILITY

(I) The Institute donated the sum of N50,000.00 (fifty thousand naira) only to CRIN Staff School on the occasion of its inter-house sports competition held on 20 March, 2014

(ii) Also the sum of ₦200,000 (two hundred thousand naira) was given as corporate gift to assist Odo Ona Nla community in year 2014.

PENSION MATTERS

(i) **Number of pensioners on CRIN Staff Pension Scheme's Payroll as at 31 December, 2014**
As at 31 December, 2014, the Scheme has a total number of 318 pensioners on its nominal roll.

(ii) **Payment of Pension**
Payment of pension to all retirees under CRIN Staff Pension Scheme Board of Trustee was done up to 31 December, 2014.

(ii) Death
The Pension Secretariat received the report of the death of nine (9) pensioners in the year 2014.
The list of dead pensioners is attached as Annexure VIII.

(iv) **Quarterly Business Meeting of BOT**
The Business Meetings of CRIN Staff Pension Schemes Board of Trustees were held as follows:

	Date	Venue	State
1.	05/3/2014	Owena Substation	Ondo State
2.	27/5/2014	Uhonmora Substation	Edo State
3.	03/7/2014	Ochaja Substation	Kogi State
4.	21/8/2014	Ibeku Substation	Abia State
5.	19/11/2014	Ajassor Substation	Cross Rivers State.
6.	15/12/2014	Ilorin,	Kwara State

(v) **Office Equipment**
Within the first quarter of 2014, the sum of ₦260,000.00 (two hundred and sixty thousand naira) only, was approved for the Pension Section to purchase office equipment/furniture, which had been purchased.

(vii) National Pension Commission (PenCom) Pre-Retirement Workshop
National Pension Commission (PenCom) organized a nationwide pre-retirement workshop for potential retirees in year 2014. The Institute's prospective retirees attended the said workshop at the University of Lagos on 26 March, 2014, on CRIN sponsorship.

(viii)Submission of the list of year 2015 prospective retirees to PenCom& Bureau of Public Service Reforms (BPSR)
The names of eight Institute's staff, scheduled to retire from the Institute's Service, in year 2015, were submitted to PenCom office and Bureau of Public Service Reforms (BPSR), as directed by PenCom& BPSR. Also BPSR directed that the names of Institute's retirees between 2013 - 2015 should be submitted to its office and this was done.

CRIN REST HOUSE

The Institute Rest House attended to and provided accommodation to guest as at when necessary in the year under reference. Refreshment was also provided for Government Board members during its Business meetings in 2014.
For better services, the following was put in place by the Executive Director.

(i) Renovation of the Rest House.
(ii) Provision of modern fabric, bedding materials and cooking utencies.
(iii) Sunking of high volume water bore hole
(iv) Fencing of the Rest House for security purpose

HEALTH SERVICES

Dispensary: In the year under reference, a total of 8,944 cases were seen in the Dispensary Section.
Maternity: A total of 719 cases were seen amongst whom pregnant women and children were under 1 year.
Delivery: 20 babies were delivered normally by spontaneous vaginal delivery without any complication.
Family planning: 53 clients attended the family planning clinic.
Death: No death was recorded
Sick off/Referrals: Sick off were given to staff and Casual workers depending on the medical condition on presentation at the Health centre.
Few cases of patients of both staff and non-staff were equally referred to the hospital for expert management.

Immunization

Staff and children benefited from the exercise this year. The menafrivac campaign against meningitis in Oyo State took place from 21st – Oct. – 2nd Nov. 2014. Staff and their children including the entire community benefited from the exercise.

Deworming
Deworming Exercise/Blood Pressure Check of staff took place in June/July, 2014, about 400 staff benefited from the exercise.

Fumigation
The exercise was carried out in January and June 2014 to control termite infestation.

Uniform Allowance

The Nurses received N20,000.00 each to procure uniform. N200,000.00 was received for ten (10) Nurses at Headquarters and substation in year 2014

Babies' Party

The sum of one hundred and seventy-thousand naira (₦170,000.00) was received for the babies party held on 23rd December, 2014. This is an annual event usually done to create awareness on some health issues that can help improve the general health status of the community and to encourage mothers to patronize the clinic.

Income Generated

Total income generated from both the Dispensary and Maternity was one hundred and one thousand, two hundred Naira only (₦101,200.000).

Dispensary	– 25,000.00
Maternity	– 76,200.00
Total	**101,200.00**

Cash Advance for Drug Purchase
The drug purchase in December 2013 was used for 2014.

Achievements in Human Resources Management
1. Provision of complete sets of Desk Top computer and Accessories for the 3 registries and Health Centre.
2. Successful conduct of year 2013 and 2014 Senior and Junior Staff Promotions.
3. Successful facilitation of Management meetings and Governing Board meetings.
4. Renovation of CRIN Rest House to modern standard.
5. Accreditation of Health Centre as NHIS Primary Health Care Provider.
6. Deworming of CRIN Staff at the Headquarters in June and July 2014 and checking's of blood pressure.
7. Vaccination of staff, families and community at large against meningitis in October 2014.

MAJOR OBSTACLES IN HRM DEPARTMENT
(1) Shortage of Health Attendant at CRIN Health Centre and Steward at the Rest House.
(2) Delay in the release of imprest and purchase of stationeries.
(3) Epileptic Power Supply from the national grid, inadequate water supply from Health Centre well.
(4) Inadequate office accommodations for Principal Officers in core HRM.
(5) Inadequate office furniture for staff
(6) Inadequate office equipment (laptops, refrigerators, and Air conditioners)

THE FUTURE EXPECTATIONS OF THE DEPARTMENT

(I) Computerization of the Department.
(ii) Installation of inverter for the Department.
(iii) Training and re-training of staff.
(iv) Provision of tally for vehicles and stickers for staff vehicles.
(v) Provision of an office for the Head of CRIN Rest House at the Administrative Block to accommodate the materials needed for serving at Management meetings, Governing Board meetings and Committee meetings.

RUNNING IMPREST IN YEAR 2014

Imprest Collected

		₦
(i)	Impress for Health Services Division	- 120,000.00
(ii)	Imprest for HRM	- 20,000.00
(iii)	Imprest for running mails	- 50,000.00
		- 190,000.00

OTHERS

Breakdown of Expenditure	N
Office Stationery & Computer Consumable October 2014	- 464,225.00
Office Equipment December, 2014	- 832,910.00
Sanitary materials purchased for Cleaning Unit	- 93,000.00
Total	- 1,390,135.00

S/N	NAME	PRESENT POST AND SALARY GRADE	DATE OF PRESENT APPT.	POST TO WHICH PROMOTABLE	SALARY ON PROMOTION CONRAISS/STEP	EFFECTIVE DATE	STATE OF ORIGIN	REMARKS
1	Dr. S.O. Aroyeun	Chief Res. Officer CONRAISS 13	01/10/09	Asst. Director	14/1	01/10/13	Ogun	Recommended for promotion
2	Dr. (Mrs) C.O. Jaiyeola	Prin. Res. Officer CONRAISS 11	01/10/05	Chief Res. Officer	13/7	01/10/13	Ekiti	Recommended for promotion
3	Dr. Ayegboyin Kayode	Snr. Res. Officer	01/10/08	Prin. Res. Officer	11/1	01/10/13	Oyo	Recommended for promotion
4	Mr. A. H. Otunoye	Snr. Res. Officer	01/10/08	Prin. Res. Officer	11/1	01/10/13	Abia	Recommended for promotion
5	Dr. R.O. Igbinadolor	Snr. Res. Officer CONRAISS 09	01/10/08	Prin. Res. Officer	11/1	01/10/13	Edo	Recommended for promotion
6	Mr. Adebiyi Solomon	Snr. Res. Officer CONRAISS 09	01/10/08	Prin. Res. Officer	11/1	01/10/13	Osun	Recommended for promotion
7	Mr. P.E. Aikpokpodiion	Snr. Res. Officer CONRAISS 09	01/10/08	Prin. Res. Officer	11/1	01/10/13	Edo	Recommended for promotion
8	Mr. Taiwo O. Akanni	Res. Officer I CONRAISS 08	02/09/10	Snr. Res. Officer	9/1	01/10/13	Osun	Recommended for promotion
9	Mrs. Taiwo Nnena	Res. Officer I CONRAISS 08	30/09/10	Snr. Res. Officer	9/1	01/10/13	Anambra	Recommended for promotion
10	Mr. L.A. Adebowale	Res. Officer I CONRAISS 08	01/10/07	Snr. Res. Officer	9/5	01/10/13	Ogun	Recommended for promotion
11	Mrs. Onyemachi O. Fidelia	HSLT CONRAISS 07	26/08/10	Snr. Science Lab. Tech	8/1	01/10/13	Abia	Recommended for promotion
12	Mrs. AdejiAlaba Olaitan	HSLT CONRAISS 07	02/09/10	Snr. Science Lab. Tech	8/1	01/10/13	Oyo	Recommended for promotion
13	Mr. Omoregie O. Martins	HSLT CONRAISS 07	02/09/10	Snr. Science Lab. Tech	8/1	01/10/13	Edo	Recommended for promotion
14	Mr. Iyoha Sunshine O.	HSLT CONRAISS 07	03/09/10	Snr. Science Lab. Tech	8/1	01/10/13	Edo	Recommended for promotion
15	Miss Ezeorah Loveth U.	HSLT CONRAISS 07	03/09/10	Snr. Science Lab. Tech	8/1	01/10/13	Enugu	Recommended for promotion
16	Mr. Bolarinde O. Joel	HSLT CONRAISS 07	29/09/10	Snr. Science Lab. Tech	8/1	01/10/13	Ekiti	Recommended for promotion
17	Mr. AdeduntanDotun Gbenga	HSLT CONRAISS 07	30/09/10	Snr. Science Lab. Tech	8/1	01/10/13	Oyo	Recommended for promotion
18	Mr. Iyadunni Kolawole	Higher Agric. Sup CONRAISS 07	02/09/10	Snr. Agric. Supt.	8/1	01/10/13	Oyo	Recommended for promotion
19	Mr. AtandaTairuAkinse	ACAFO CONRAISS 05	01/10/10	Chief Agric. Field Overseer	6/1	01/10/13	Oyo	Recommended for promotion
20	Mr. Okere Monday John	ACAFO CONRAISS 05	01/10/10	Chief Agric. Field Overseer	6/1	01/10/13	Oyo	Recommended for promotion
21	Mr. Oguche Nathaniel	ACAFO CONRAISS 05	01/10/10	Chief Agric. Field Overseer	6/1	01/10/13	Kogi	Recommended for promotion
22	Mr. Emaku Leo Akpor	Prin. Statistician CONRAISS 11	01/10/10	Asst. Chief Statistician	12/4	01/10/13	Delta	Recommended for promotion

23	Mrs. Ogunbosoye Bolanle Bukola	Statistician II CONRAISS 07	29/09/10	Statistician I	8/1	01/10/13	Ondo	Recommended for promotion
24	Mr. BabafemiIbitope	Prog. Analyst I CONRAISS 08	19/08/10	Snr. Prog. Analyst	9/1	01/10/13	Ekiti	Recommended for promotion
	FagbamiOyebanji	LID CONRAISS 14						for promotion
26	Mrs. Folarin Victoria	Higher Library Officer CONRAISS 07	01/10/10	Snr. Lib. Officer	8/1	01/10/13	Ogun	Recommended for promotion
27	Mr. Olukotun Olubunmi Simeon	Prin. Admin. Offr. CONRAISS 11	01/10/10	Asst. Chief Admin. Offr.	12/3	01/10/13	Kogi	Recommended for promotion
28	Mr. OnifadeAyubaOlatunde	Prin. Accountant CONRAISS 11	01/10/10	Asst. Chief Accountant	12/2	01/10/13	Oyo	Recommended for promotion
29	Mr. Onigbinde Oluwole Olarenwaju	Prin. Accountant CONRAISS 11	01/10/10	Asst. Chief Accountant	12/2	01/10/13	Osun	Recommended for promotion
30	Mrs. Agwimah Justina Adesua	Snr. Accountant CONRAISS 09	01/10/10	Prin. Accountant	11/1	01/10/13	Edo	Recommended for promotion
31	Mr. Abodunrin Peterkin Y.	Accountant II CONRAISS	24/06/10	Accountant I	8/1	01/10/13	Oyo	Recommended for promotion
32	Mr. Osawaye James	Accountant II CONRAISS	02/09/10	Accountant I	8/1	01/10/13	Edo	Recommended for promotion
33	Mr. Gimba David Augustine	Accountant II CONRAISS	02/09/10	Accountant I	8/1	01/10/13	Nasarawa	Recommended for promotion
34	Mr. AseinUwaifo	Accountant II CONRAISS	07/09/10	Accountant I	8/1	01/10/13	Edo	Recommended for promotion
35	Ogunkua Olumide O.	Prin. Exec. Offr. I	01/10/09	ACEO	12/1	01/10/13	Ondo	Recommended for promotion
36	Mrs. Ailemen E. Josephine	Snr. Exec. Officer CONRAISS 08	01/04/10	Prin. Exec. Officer II	9/3	01/10/13	Edo	Recommended for promotion
37	Mr. Imasogie Michael	Higher Exec. Offr CONRAISS 07	02/09/10	Snr. Exec. Officer	8/1	01/10/13	Edo	Recommended for promotion
38	Mr. Oboh Roland S.	Higher Exec. Offr CONRAISS 07	03/09/10	Snr. Exec. Officer	8/1	01/10/13	Edo	Recommended for promotion
39	MrsOyebodeFelicai	Exec. Offr CONRAISS 06	01/10/10	Higher Exec. Officer	7/1	01/10/13	Osun	Recommended for promotion
40	Mr. Ojelabi Azeez Abiodun	Asst. Exec. Offr. CONRAISS 05	30/08/10	Executive Officer	6/1	01/10/13	Osun	Recommended for promotion
41	Mrs. Adedire Roseline Adekemi	Asst. Exec. Offr. CONRAISS 05	30/08/10	Executive Officer	6/1	01/10/13	Ogun	Recommended for promotion
42	Mr. Akinrinola Olawale	Asst. Exec. Offr. CONRAISS 05	01/10/10	Executive Officer	6/8	01/10/13	Ogun	Recommended for promotion
43	Mrs. Emaku Eunice	Asst. Exec. Offr. CONRAISS 05	01/10/10	Executive Officer	6/1	01/10/13	Delta	Recommended for promotion
44	Mr. AbassSaheed	Asst. Exec. Offr. CONRAISS 05	01/10/10	Executive Officer	6/1	01/10/13	Oyo	Recommended for promotion

45	Mr. Ali Saidi Olawale	Asst. Exec. Offr. CONRAISS 05	01/10/10	Executive Officer	6/1	01/10/13	Oyo	Recommended for promotion
46	Mrs. Oghenegueke Rebecca	Asst. Exec. Offr. CONRAISS 05	01/10/10	Executive Officer	6/1	01/10/13	Delta	Recommended for promotion
47	Mr. AseinOyekhire	Asst. Exec. Offr. CONRAISS 05	01/10/10	Executive Officer	6/8	01/10/13	Edo	Recommended for promotion
48	Mr. Magaji Jonathan D.	Asst. Exec. Offr. CONRAISS 05	01/10/10	Executive Officer	6/12	01/10/13	Taraba	Recommended for promotion
49	Mr. Adey anju Segun O.	Asst. Exec. Offr. CONRAISS 05	01/10/10	Executive Officer	6/1	01/10/13	Oyo	Recommended for promotion
50	Miss Obi Esther Ogom	Snr. Clerical Offr. CONRAISS 05	01/10/10	Chief Clerical Officer	6/1	01/10/13	Delta	Recommended for promotion
51	Mr. IhejirikaGinnika Emmanuel	Snr. Clerical Offr. CONRAISS 05	01/10/10	Chief Clerical Officer	6/1	01/10/13	Imo	Recommended for promotion
52	Mrs. Olutade Ann O.	Snr. Clerical Offr. CONRAISS 05	01/10/10	Chief Clerical Officer	6/1	01/10/13	Osun	Recommended for promotion
53	Mrs. Oyelami Roseline	Snr. Sec. Asst. I CONRAISS 07	01/10/09	Chief Sec. Asst.	8/1	01/10/13	Oyo	Recommended for promotion
54	Mrs. Oladimeji L.T.N.	Snr. Sec. Asst. II CONRAISS 06	01/10/10	Snr. Sec. Asst. I	7/1	01/10/13	Osun	Recommended for promotion
55	Mrs. AkinyodeOlubisi Emily	Snr. Sec. Asst. II CONRAISS 06	01/10/10	Snr. Sec. Asst. I	7/1	01/10/13	Oyo	Recommended for promotion
56	Mrs. Ejenebor Francisca Bolanle	Snr. Sec. Asst. II CONRAISS 06	01/10/10	Snr. Sec. Asst. I	7/1	01/10/13	Ondo	Recommended for promotion
57	Mrs. OjoOlubunmi	Sec. Asst. I CONRAISS 05	01/10/10	Snr. Sec. Asst. II	6/1	01/10/13	Oyo	Recommended for promotion
58	Mrs. Awunghe Joy T.	NS/Nur. Supt. CONRAISS 07	01/04/10	SNS/Snr. Nursing Supt.	8/2	01/10/13	C/River	Recommended for promotion
59	Mrs. Nwajei Maureen	Snr. Health Asst. CONRAISS 05	01/10/10	Prin. Health Asst.	6/1	01/10/13	Edo	Recommended for promotion
60	Mr. Bakare A. Taiwo	Prin. Mtce. Eng. CONRAISS 11	01/10/10	Asst. Chief Mtce. Engineer	12/3	01/10/13	Ogun	Recommended for promotion
61	Mr. Agwimah Emmanuel Odion	PTO II CONRAISS 09	01/10/10	PTO I	11/1	01/10/13	Edo	Recommended for promotion
62	Mrs. AmusanLatifat Adebola	Works Supt. CONRAISS 06	01/10/10	Higher Works Supt.	7/1	01/10/13	Oyo	Recommended for promotion
63	Mr. Ogbechie Michael	ATO CONRAISS 05	01/10/10	Tech. Officer	6/1	01/10/13	Delta	Recommended for promotion
64	Mr. OyawaleMuniru	ATO CONRAISS 05	01/10/10	Tech. Officer	6/1	01/10/13	Osun	Recommended for promotion
65	Mr. Eno Innocent Eno	Asst. Chief Store Keeper CONRAISS 05	01/10/10	Chief Store Keeper	6/1	01/10/13	C/River	Recommended for promotion
	Mr. Kpeleye Friday	SMD/Mech	01/10/10	CME/Mech.	6/1	01/10/13	Delta	Recommended for promotion

LIST OF SENIOR STAFF GIVEN INTER-CADRE TRANSFERS/ADVANCEMENT

S/N	NAME	PRESENT POST AND SALARY GRADE	DATE OF PRESENT APPT.	POST TO WHICH PROMOTABLE	SALARY ON PROMOTION ON CONRAISS / STEP	EFFECTIVE DATE	STATE OF ORIGIN
1	Mr. Asowata Frank E.	Higher Science Lab. Tech. CONRAISS 07	03/09/10	Res. Officer I	8/1	01/10/13	Delta
2	Mr. Adeleke Sunday A.	Prin. Tech. Officer II CONRAISS 09	01/10/09	Res. Officer I	8/10	01/10/13	Oyo
3	Mr. Oladipupo Kayode	Chief Motor Driver/Mech. CONRAISS 06	01/10/09	Works Supt.	6/5	01/10/13	Oyo

LIST OF JUNIOR STAFF PROMOTED IN YEAR 2013

S/N	Name	Designation	CONRAISS/ Step	Date of Present Appt.	Post to which Promotable	Salary on Promotion	Recommended Effective Date
1	Idowu Babatunde	Senior Agric. Field Overseer	4/10	1/10/2011	Asst. Chief Agric. Field Overseer	5/5	1/10/2013
2	GbadamosiMufutau	Senior Agric. Field Overseer	4/6	1/10/2011	Asst. Chief Agric. Field	5/2	1/10/2013
3	Effiong Ezekiel Effiong	Senior Agric. Field Overseer	4/10	1/10/2011	Asst. Chief Agric. Field Overseer	5/5	1/10/2013
4	Ugbashi Innocent	Agric. Field Attendant I	3/15	1/10/2003	Senior Agric. Field Overseer	4/11	1/10/2013
5	Akinola Abiola	Agric. Field Attendant I	3/9	1/10/2008	Senior Agric. Field Overseer	4/6	1/10/2013
6	JayeadeAbass	Agric. Field Attendant I	3/9	1/10/2008	Senior Agric. Field Overseer	4/6	1/10/2013
7	Olawore Bose	Agric. Field Attendant I	3/9	1/10/2008	Senior Agric. Field Overseer	4/6	1/10/2013
8	Idris Fatima	Asst. Agric. Field Overseer	2/3	29/12/10	Agric. Field Overseer	3/3	1/10/2013
9	Mustapha Abibat Iyabo	Agric. Field Attendant II	2/5	1/10/2011	Agric. Field Attendant I	3/5	1/10/2013
10	OgunlusiOlayemi (Mrs.)	Agric. Field Attendant II	2/5	1/10/2011	Agric. Field Attendant I	3/5	1/10/2013
11	Tijani Akeem	Agric. Field Attendant II	2/5	1/10/2011	Agric. Field Attendant I	3/5	1/10/2013
12	Idowu Ojo Olufunke	Agric. Field Attendant II	2/5	1/10/2011	Agric. Field Attendant I	3/5	1/10/2013
13	AkintoroyeOladunn i	Agric. Field Attendant II	2/5	1/10/2011	Agric. Field Attendant I	3/5	1/10/2013
14	Apanisile Sola Alaba	Agric. Field Attendant II	2/5	1/10/2011	Agric. Field Attendant I	3/5	1/10/2013
15	Owoyele Yinka	Agric. Field Attendant II	2/5	1/10/2011	Agric. Field Attendant I	3/5	1/10/2013
16	Obiazi Mabel (Mrs.)	Agric. Field Attendant II	2/5	1/10/2011	Agric. Field Attendant I	3/5	1/10/2013
17	OlagunjuRasaki	Agric. Field Attendant II	2/5	1/10/2011	Agric. Field Attendant I	3/5	1/10/2013
18	Ajayi Joseph O.	Agric. Field Attendant II	2/5	1/10/2011	Agric. Field Attendant I	3/5	1/10/2013
19	OludayoGbolagade	Agric. Field Attendant II	2/5	1/10/2011	Agric. Field Attendant I	3/5	1/10/2013
20	Babalola Remi	Agric. Field Attendant II	2/5	1/10/2011	Agric. Field Attendant I	3/5	1/10/2013
21	Adegoke Funke	Agric. Field Attendant II	2/5	1/10/2011	Agric. Field Attendant I	3/5	1/10/2013
22	Aladegbonmire Isaac	Agric. Field Attendant II	2/5	1/10/2011	Agric. Field Attendant I	3/5	1/10/2013
23	Azeez Kafayat (Mrs.)	Agric. Field Attendant II	2/5	1/10/2011	Agric. Field Attendant I	3/5	1/10/2013
24	Popoola Olalekan	Agric. Field Attendant II	2/5	1/10/2011	Agric. Field Attendant I	3/5	1/10/2013
25	Adeogun Gbenga	Agric. Field Attendant II	2/5	1/10/2011	Agric. Field Attendant I	3/5	1/10/2013
26	AdekanbiBolajoko (Mrs.)	Agric. Field Attendant II	2/5	1/10/2011	Agric. Field Attendant I	3/5	1/10/2013
27	Fakeye Joke (Miss)	Agric. Field Attendant II	2/5	1/10/2011	Agric. Field Attendant I	3/5	1/10/2013

28	Emiola Angela (Mrs.)	Agric. Field Attendant II	2/5	1/10/2011	Agric. Field Attendant I	3/5	1/10/2013
29	OkonjiMicheal	Agric. Field Attendant II	2/5	1/10/2011	Agric. Field Attendant I	3/5	1/10/2013
30	Okorie Chimerue Joy (Mrs.)	Agric. Field Attendant II	2/5	1/10/2011	Agric. Field Attendant I	3/5	1/10/2013
31	Ajani Patience (Mrs.)	Agric. Field Attendant II	2/5	1/10/2011	Agric. Field Attendant I	3/5	1/10/2013
32	Ibiyomi Peter	Agric. Field Attendant II	2/5	1/10/2011	Agric. Field Attendant I	3/5	1/10/2013
33	Lasisi Yinka	Agric. Field Attendant II	2/5	1/10/2011	Agric. Field Attendant I	3/5	1/10/2013
34	AdioAdebukola (Mrs.)	Agric. Field Attendant II	2/5	1/10/2011	Agric. Field Attendant I	3/5	1/10/2013
35	OjoAgboola	Agric. Field Attendant II	2/5	1/10/2011	Agric. Field Attendant I	3/5	1/10/2013
36	OdukoyaOlatunde	Agric. Field Attendant II	2/5	1/10/2011	Agric. Field Attendant I	3/5	1/10/2013
37	AkangbeFolorunso	Agric. Field Attendant II	2/5	1/10/2011	Agric. Field Attendant I	3/5	1/10/2013
38	Oguntoye Akeem	Agric. Field Attendant II	2/5	1/10/2011	Agric. Field Attendant I	3/5	1/10/2013
39	Akande Kunle	Agric. Field Attendant II	2/5	1/10/2011	Agric. Field Attendant I	3/5	1/10/2013
40	Samule Olusola	Agric. Field Attendant II	2/5	1/10/2011	Agric. Field Attendant I	3/5	1/10/2013
41	Olalekan Olugbade	Agric. Field Attendant II	2/5	1/10/2011	Agric. Field Attendant I	3/5	1/10/2013
42	David Omoha	Agric. Field Attendant II	2/5	1/10/2011	Agric. Field Attendant I	3/5	1/10/2013
43	Ologunwa Tope	Agric. Field Attendant II	2/5	1/10/2011	Agric. Field Attendant I	3/5	1/10/2013
44	Ganiyu Abu	Agric. Field Attendant II	2/5	1/10/2011	Agric. Field Attendant I	3/5	1/10/2013
45	Adeyemo Sola	Agric. Field Attendant II	2/5	1/10/2011	Agric. Field Attendant I	3/5	1/10/2013
46	Akinade Kazeem	Agric. Field Attendant II	2/5	1/10/2011	Agric. Field Attendant I	3/5	1/10/2013
47	Oyepeju Tunde	Agric. Field Attendant II	2/5	1/10/2011	Agric. Field Attendant I	3/5	1/10/2013
48	Patrick Caroline	Agric. Field Attendant II	2/5	1/10/2011	Agric. Field Attendant I	3/5	1/10/2013
49	Clement Igwe	Agric. Field Attendant II	2/5	1/10/2011	Agric. Field Attendant I	3/5	1/10/2013
50	Agomu Ogenyi	Agric. Field Attendant II	2/5	1/10/2011	Agric. Field Attendant I	3/5	1/10/2013
51	Oyeneye Julius	Agric. Field Attendant II	2/5	1/10/2011	Agric. Field Attendant I	3/5	1/10/2013
52	Amosu Sunday	Agric. Field Attendant II	2/5	1/10/2011	Agric. Field Attendant I	3/5	1/10/2013
53	Raheem Waheed	Agric. Field Attendant II	2/5	1/10/2011	Agric. Field Attendant I	3/5	1/10/2013
54	Johnson Iyabo	Agric. Field Attendant II	2/5	1/10/2011	Agric. Field Attendant I	3/5	1/10/2013
55	Adeoye Stella (Mrs.)	Agric. Field Attendant II	2/5	1/10/2011	Agric. Field Attendant I	3/5	1/10/2013
56	AdesojiRonke	Agric. Field Attendant II	2/5	1/10/2011	Agric. Field Attendant I	3/5	1/10/2013
57	Azzan Olawale	Agric. Field Attendant II	2/5	1/10/2011	Agric. Field Attendant I	3/5	1/10/2013
58	Adedeji John	Agric. Field Attendant II	2/5	1/10/2011	Agric. Field Attendant I	3/5	1/10/2013

59	Adeoye Hazzan	Agric. Field	2/5	1/10/2011	Agric. Field	3/5	1/10/2013
60	AyindeJelili	Agric. Field Attendant II	2/5	1/10/2011	Agric. Field Attendant I	3/5	1/10/2013
61	Bolarinwa Felix	Agric. Field Attendant II	2/5	1/10/2011	Agric. Field Attendant I	3/5	1/10/2013
62	Anijese Funmilayo (Mrs.)	Agric. Field Attendant II	2/5	1/10/2011	Agric. Field Attendant I	3/5	1/10/2013
63	Isokpehi Daniel	Agric. Field Attendant II	2/5	1/10/2011	Agric. Field Attendant I	3/5	1/10/2013
64	ChibuoOluchi	Agric. Field Attendant II	2/5	1/10/2011	Agric. Field Attendant I	3/5	1/10/2013
65	Eze Joseph N.	Agric. Field Attendant II	2/5	1/10/2011	Agric. Field Attendant I	3/5	1/10/2013
66	Ihueze Chinedu	Agric. Field Attendant II	2/5	1/10/2011	Agric. Field Attendant I	3/5	1/10/2013
67	Okoro Emmanuel	Agric. Field Attendant II	2/5	1/10/2011	Agric. Field Attendant I	3/5	1/10/2013
68	Animba Michael	Agric. Field Attendant II	2/5	1/10/2011	Agric. Field Attendant I	3/5	1/10/2013
69	Nifu Yahaya	Agric. Field Attendant II	2/5	1/10/2011	Agric. Field Attendant I	3/5	1/10/2013
70	OkpanchiNda	Agric. Field Attendant II	2/5	1/10/2011	Agric. Field Attendant I	3/5	1/10/2013
71	Isaiah Regina J. (Mrs.)	Agric. Field Attendant II	2/5	1/10/2011	Agric. Field Attendant I	3/5	1/10/2013
72	Clement Ephesians	Agric. Field Attendant II	2/5	1/10/2011	Agric. Field Attendant I	3/5	1/10/2013
73	Moses Philippians	Agric. Field Attendant II	2/5	1/10/2011	Agric. Field Attendant I	3/5	1/10/2013
74	Ubi Augustine	Agric. Field Attendant II	2/5	1/10/2011	Agric. Field Attendant I	3/5	1/10/2013
75	Samuel Abraham	Agric. Field Attendant II	2/5	1/10/2011	Agric. Field Attendant I	3/5	1/10/2013
76	Udoh James	Agric. Field Attendant II	2/5	1/10/2011	Agric. Field Attendant I	3/5	1/10/2013
77	Echa Godwin Idagu	Agric. Field Attendant II	2/5	1/10/2011	Agric. Field Attendant I	3/5	1/10/2013
78	Ogar Peter Onah	Agric. Field Attendant II	2/5	1/10/2011	Agric. Field Attendant I	3/5	1/10/2013
79	Iyaji Patrick Adariku	Agric. Field Attendant II	2/5	1/10/2011	Agric. Field Attendant I	3/5	1/10/2013
80	AzogorEchangIsong	Agric. Field Attendant II	2/5	1/10/2011	Agric. Field Attendant I	3/5	1/10/2013
81	Igbang Bassey	Agric. Field Attendant II	2/5	1/10/2011	Agric. Field Attendant I	3/5	1/10/2013
82	OkoiEtengIwara	Agric. Field Attendant II	2/5	1/10/2011	Agric. Field Attendant I	3/5	1/10/2013
83	AbiadeSulaiman	Agric. Field Attendant II	2/5	1/10/2011	Agric. Field Attendant I	3/5	1/10/2013
84	Okorue Fredrick Friday	Agric. Field Attendant II	2/4	1/10/2011	Agric. Field Attendant I	3/4	1/10/2013
85	Philip Emmanuel Ovie	Agric. Field Attendant II	2/4	1/10/2011	Agric. Field Attendant I	3/4	1/10/2013
86	AdisaSikiru	Agric. Field Attendant II	2/4	1/10/2011	Agric. Field Attendant I	3/4	1/10/2013
87	Ibidapo Samuel	Agric. Field Attendant III	1/2	29/4/11	Agric. Field Attendant II	2/3	1/10/2013

88	Salako Gbenga	Agric. Field Attendant III	1/2	29/4/11	Agric. Field Attendant II	2/3	1/10/2013
89	OjoTosin	Agric. Field Attendant III	1/2	29/4/11	Agric. Field Attendant II	2/3	1/10/2013
90	Ojo John	Agric. Field Attendant III	1/2	29/4/11	Agric. Field Attendant II	2/3	1/10/2013
91	Adio Sunday	Agric. Field Attendant III	1/2	29/4/11	Agric. Field Attendant II	2/3	1/10/2013
92	Azeez Olawale	Agric. Field Attendant III	1/2	29/4/11	Agric. Field Attendant II	2/3	1/10/2013
93	OlaleyeFolasade	Agric. Field Attendant III	1/2	29/4/11	Agric. Field Attendant II	2/3	1/10/2013
94	Ndah Alfa	Agric. Field Attendant III	1/2	29/4/11	Agric. Field Attendant II	2/3	1/10/2013
95	EgwimahLuggard	Agric. Field Attendant III	1/2	29/4/11	Agric. Field Attendant II	2/3	1/10/2013
96	Daniel Rebecca	Agric. Field Attendant III	1/2	29/4/11	Agric. Field Attendant II	2/3	1/10/2013
97	Lawal Taofeek	Agric. Field Attendant III	1/2	29/4/11	Agric. Field Attendant II	2/3	1/10/2013
98	Adio Stephen	Agric. Field Attendant III	1/2	29/4/11	Agric. Field Attendant II	2/3	1/10/2013
99	James N. Musa	Agric. Field Attendant III	1/2	29/4/11	Agric. Field Attendant II	2/3	1/10/2013
100	Joshua N. Paul	Agric. Field Attendant III	1/2	29/4/11	Agric. Field Attendant II	2/3	1/10/2013
101	Salami Oyenike	Agric. Field Attendant III	1/2	29/4/11	Agric. Field Attendant II	2/3	1/10/2013
102	Egbe Moses	Agric. Field Attendant III	1/2	29/4/11	Agric. Field Attendant II	2/3	1/10/2013
103	Adeyanju Kehinde Hussain	Agric. Field Attendant III	1/2	29/4/11	Agric. Field Attendant II	2/3	1/10/2013
104	Olubisaye Dare	Agric. Field Attendant III	1/2	29/4/11	Agric. Field Attendant II	2/3	1/10/2013
105	Ojimah Dennis	Agric. Field Attendant III	1/2	29/4/11	Agric. Field Attendant II	2/3	1/10/2013
106	Ajibola Dare	Agric. Field Attendant III	1/2	29/4/11	Agric. Field Attendant II	2/3	1/10/2013
107	Raji Ibrahim	Agric. Field Attendant III	1/2	29/4/11	Agric. Field Attendant II	2/3	1/10/2013
108	OmitadeOluwatoyi n	Agric. Field Attendant III	1/2	29/4/11	Agric. Field Attendant II	2/3	1/10/2013
109	Oni Nike (Mrs.)	Agric. Field Attendant III	1/2	29/4/11	Agric. Field Attendant II	2/3	1/10/2013
110	Kokori Paul	Agric. Field Attendant III	1/2	29/4/11	Agric. Field Attendant II	2/3	1/10/2013
111	AmeduAchonu	Agric. Field Attendant III	1/2	29/4/11	Agric. Field Attendant II	2/3	1/10/2013
112	Ebiale Benjamin	Agric. Field Attendant III	1/2	29/4/11	Agric. Field Attendant II	2/3	1/10/2013
113	EdehTochukwu Simeon	Agric. Field Attendant III	1/2	29/4/11	Agric. Field Attendant II	2/3	1/10/2013
114	Imumolen Jeffrey	Agric. Field Attendant III	1/2	29/4/11	Agric. Field Attendant II	2/3	1/10/2013
115	Nwagale Charles	Agric. Field	1/2	29/4/11	Agric. Field	2/3	1/10/2013

116	Eubodaghe Monday	Agric. Field Attendant III	1/2	29/4/11	Agric. Field Attendant II	2/3	1/10/2013
117	Amaize Augustine	Agric. Field Attendant III	1/2	29/4/11	Agric. Field Attendant II	2/3	1/10/2013
118	Okojuwa Idowu	Agric. Field Attendant III	1/2	29/4/11	Agric. Field Attendant II	2/3	1/10/2013
119	John Mary	Agric. Field Attendant III	1/2	29/4/11	Agric. Field Attendant II	2/3	1/10/2013
120	Umontia Mercy	Agric. Field Attendant III	1/2	29/4/11	Agric. Field Attendant II	2/3	1/10/2013
121	Anthony David	Agric. Field Attendant III	1/2	29/4/11	Agric. Field Attendant II	2/3	1/10/2013
122	EfunniyiMuyiwa	Senior Photographic Asst. II	4/5	1/10/2011	Senior Photographic Asst.	5/1	1/10/2013
123	Onyebuchi Cletus	Clerical Officer I	4/11	1/10/2011	Clerical Officer	5/6	1/10/2013
124	Osinowo Bukola F.	Clerical Officer II	3/3	20/1/11	Clerical Officer I	4/1	1/10/2013
125	Oyebanjo Temitope	Clerical Officer II	3/3	20/1/11	Clerical Officer I	4/1	1/10/2013
126	Etuke Charles E.	Clerical Officer II	3/3	20/1/11	Clerical Officer I	4/1	1/10/2013
127	Magaji Precious	Clerical Officer II	3/2	6/7/2011	Clerical Officer I	4/1	1/10/2013
128	Owolabi Iyabo	Clerical Assistant	2/5	1/10/2011	Clerical Officer II	3/5	1/10/2013
129	OjoOluwatoyin	Clerical Assistant	2/5	1/10/2011	Clerical Officer II	3/5	1/10/2013
130	Olutade Bamidele	Clerical Assistant	2/5	1/10/2011	Clerical Officer II	3/5	1/10/2013
131	Lawal D Onyinyechi	Clerical Assistant	2/5	1/10/2011	Clerical Officer II	3/5	1/10/2013
132	Ibine Benjamin	Clerical Assistant	2/5	1/10/2011	Clerical Officer II	3/5	1/10/2013
133	Akano Joseph	Clerical Assistant	2/5	1/10/2011	Clerical Officer II	3/5	1/10/2013
134	Obi Samuel	Clerical Assistant	2/5	1/10/2011	Clerical Officer II	3/5	1/10/2013
135	Oladepo Kemi	Clerical Assistant	2/5	1/10/2011	Clerical Officer II	3/5	1/10/2013
136	Onipe Joseph S.	Clerical Assistant	2/5	1/10/2011	Clerical Officer II	3/5	1/10/2013
137	Salawudeen, Adedayo	Clerical Assistant	2/5	1/10/2011	Clerical Officer II	3/5	1/10/2013
138	Mrs. Ogunde Oluwatosin Ajoke	Secretarial Assistant II	4/3	3/3/2011	Secretarial Assistant I	5/1	1/10/2013
139	Babatunde Maria Olayinka	Secretarial Assistant II	4/3	3/3/2011	Secretarial Assistant I	5/1	1/10/2013
140	Sanni Olayinka	Secretarial Assistant II	4/3	3/3/2011	Secretarial Assistant I	5/1	1/10/2013
141	AlabaOlubukola	Secretarial Assistant II	4/3	14/3/11	Secretarial Assistant I	5/1	1/10/2013
142	Ajirotutu Sunday	Secretarial Assistant III	3/3	20/1/11	Secretarial Assistant II	4/1	1/10/2013
143	Ekundayo J.B.	Secretarial Assistant III	3/3	25/1/11	Secretarial Assistant II	4/1	1/10/2013
144	Adesakin Alice Olubunmi (Mrs.)	Secretarial Assistant III	3/3	26/1/11	Secretarial Assistant II	4/1	1/10/2013
145	Osho Victoria Olajumoke (Mrs.)	Secretarial Assistant III	3/3	4/3/2011	Secretarial Assistant II	4/1	1/10/2013
146	Igbinadolor Joy	Secretarial Assistant III	3-Mar	4/3/2011	Secretarial Assistant II	4/1	1/10/2013

147	Modebei-Timothy Damilola	Secretarial Assistant III	3/3	6/7/2011	Secretarial Assistant II	4/1	1/10/2013
148	IfidonIkhuosho	Head Health Attendant	3/3	1/10/2011	Higher Health Asst. Gd. II	4/1	1/10/2013
149	Adedeji Kehinde	Senior Health Attendant	2/5	1/10/2011	Head Health Asst. Gd. II	3/5	1/10/2013
150	Abah Janet	Senior Health Attendant	2/5	1/10/2011	Head Health Asst. Gd. II	3/5	1/10/2013
151	OlaworeOlutunde Sola	Head Steward	2/5	1/10/2011	Catering Assistant	3/5	1/10/2013
152	Makinde Felicia A. (Mrs.)	Head Steward	2/5	1/10/2011	Catering Assistant	3/5	1/10/2013
153	Okonche John	Senior Security Guard	4/7	1/10/2011	Head Security Guard	5/3	1/10/2013
154	Utobo Michael	Senior Security Guard	4/7	1/10/2011	Head Security Guard	5/3	1/10/2013
155	Benedict Boi	Senior Security Guard	4/7	1/10/2011	Head Security Guard	5/3	1/10/2013
156	Oderinde Sunday	Security Guard II	2/5	1/10/2011	Security Guard I	3/5	1/10/2013
157	Oyewale Samson	Security Guard II	2/5	1/10/2011	Security Guard I	3/5	1/10/2013
158	Akintoroye Johnson	Security Guard II	2/5	1/10/2011	Security Guard I	3/5	1/10/2013
159	Adebiyi Oluwabukayomi	Security Guard II	2/5	1/10/2011	Security Guard I	3/5	1/10/2013
160	Ijadunola Noah	Security Guard II	2/5	1/10/2011	Security Guard I	3/5	1/10/2013
161	Oladipupo Samuel	Security Guard II	2/5	1/10/2011	Security Guard I	3/5	1/10/2013
162	Osalaye Joseph	Security Guard II	2/5	1/10/2011	Security Guard	3/5	1/10/2013
163	AjayeobaOlanipeku n	Security Guard II	2/5	1/10/2011	Security Guard I	3/5	1/10/2013
164	Adekanbi Segun	Security Guard II	2/5	1/10/2011	Security Guard I	3/5	1/10/2013
165	Salami Kamoru	Security Guard II	2/5	1/10/2011	Security Guard I	3/5	1/10/2013
166	Owoyemi Julius	Security Guard II	2/5	1/10/2011	Security Guard I	3/5	1/10/2013
167	OlubajoBowale	Security Guard II	2/5	1/10/2011	Security Guard I	3/5	1/10/2013
168	Emmanuel Yakubu	Security Guard II	2/5	1/10/2011	Security Guard	3/5	1/10/2013
169	Joshua Guma	Security Guard II	2/5	1/10/2011	Security Guard I	3/5	1/10/2013
170	Oghenegueke John	Security Guard II	2/5	1/10/2011	Security Guard I	3/5	1/10/2013
171	Mallam Dada Bashiru	Security Guard II	2/5	1/10/2011	Security Guard I	3/5	1/10/2013
172	Okeh John	Senior Watchman	2/5	1/10/2011	Head Watchman	3/5	1/10/2013
173	Ezeh Nicholas	Senior Watchman	2/5	1/10/2011	Head	3/5	1/10/2013
174	Ibrahim Tajudeen O.	Senior Watchman	2/5	1/10/2011	Head Watchman	3/5	1/10/2013
175	Ulikhifo Michael	Senior Watchman	2/5	1/10/2011	Head Watchman	3/5	1/10/2013
176	Nwachukwu	Senior Watchman	2/5	1/10/2011	Head	3/5	1/10/2013

177	AtawodiJubril	Senior Watchman	2/5	1/10/2011	Head Watchman	3/5	1/10/2013
178	Otanwa John	Senior Watchman	2/5	1/10/2011	Head Watchman	3/5	1/10/2013
179	Dogo Genesis	Senior Watchman	2/5	1/10/2011	Head Watchman	3/5	1/10/2013
180	Uzichu Augustine	Senior Watchman	2/5	1/10/2011	Head Watchman	3/5	1/10/2013
181	Ekereobong Sunday	Senior Watchman	2/5	1/10/2011	Head Watchman	3/5	1/10/2013
182	NwonuNwefunu	Watchman	1/2	29/4/11	Senior Watchman	2/3	1/10/2013
183	Okesola Amos	Watchman	1/2	29/4/11	Senior Watchman	2/3	1/10/2013
184	Emaku Jacob	Watchman	1/2	29/4/11	Senior Watchman	2/3	1/10/2013
185	Fasina Babatunde	Watchman	1/2	29/4/11	Senior Watchman	2/3	1/10/2013
186	Numfat Zephaniah	Watchman	1/2	29/4/11	Senior Watchman	2/3	1/10/2013
187	Okoi James	Senior Craftsman	4/11	1/10/2008	Foreman	5/6	1/10/2013
188	Adio Dare Timothy	Asst. Craftsman	2/5	1/10/2011	Craftsman	3/5	1/10/2013
189	GboyegaAlade Samson	Asst. Craftsman	2/5	1/10/2011	Craftsman	3/5	1/10/2013
190	Oladimeji Taofeek	Asst. Craftsman	2/5	1/10/2011	Craftsman	3/5	1/10/2013
191	FaniyiJimoh Abiola	Asst. Craftsman	2/5	1/10/2011	Craftsman	3/5	1/10/2013
192	Boluwade Sunday	Asst. Craftsman	2/5	1/10/2011	Craftsman	3/5	1/10/2013
193	OrigbemideOmolar a Caroline	Store Assistant	2/3	20/1/11	Store Keeper	3/3	1/10/2013
194	Ogundeji Adekunle Kayode	Store Assistant	2/3	24/1/11	Store Keeper	3/3	1/10/2013
195	Onwubiko Michael	Senior Motor Driver/Mech. II	4/6	1/10/2011	Senior Motor Driver/Mech. I	5/2	1/10/2013
196	Arowobusoye Julius	Motor Driver/Mechanic	3/4	10/6/2008	Senior Motor Driver/Mech. II	4/2	1/10/2013
197	Onoja Joseph	Motor Driver/Mechanic	3/3	1/10/2011	Senior Motor Driver/Mech. II	4/1	1/10/2013
198	Oluwole Segun	Motor Driver/Mechanic	3/3	1/10/2011	Senior Motor Driver/Mech. II	4/1	1/10/2013
199	AdebusuyiAdesuyi	Motor Driver/Mechanic	3/3	1/10/2011	Senior Motor Driver/Mech. II	4/1	1/10/2013
200	Bolaji Oyedele	Motor Driver/Mechanic	3/3	1/10/2011	Senior Motor Driver/Mech. II	4/1	1/10/2013
201	Iyeh Moses	Motor Driver	2/3	9/2/2011	Motor Driver Mechanic	3/3	1/10/2013

CANDIDATE WHO WAS GIVEN INTER - CADRE TRANSFER

S/N	Name	Designation	CONRAISS/ Step	Date of Present Appt.	Post to which Promotable	Salary on Promotion	Recommended Effective Date
1.	Mr. Ojo Moses Sunday	Senior Chief Agric. Field O/S	4/6	1/10/2011	Foreman	5/2	1/10/2013

ANNEXURE II

S/N	Name	Present Post and salary grade	Post to which promoted	Salary on CONRAISS/Step	Effective Date
1	Ajayi Abiodun Adeleke	Senior Agric Field Overseer, CONRAISS 4	Asst. Chief Agric. Field Overseer	05/2	1/10/2014
2	Afolabi Gbeminiyi	Senior Agric Field Overseer, CONRAISS 4	Asst. Chief Agric. Field Overseer	5/6	1/10/2014
3	Eze Cordelia	Agric Field Attd. II, CONRAISS 2	Agric Field Attd. I	03/5	1/10/2014
4	OyewoleOlaoluwa	Agric Field Attd. II, CONRAISS 2	Agric Field Attd. I	03/5	1/10/2014
5	Abiodun Ezekiel	Agric Field Attd. II, CONRAISS 2	Agric Field Attd. I	03/5	1/10/2014
6	Allih Mohammed	Agric Field Attd. II, CONRAISS 2	Agric Field Attd. I	03/5	1/10/2014
7	Asua Ime Sunday	Agric Field Attd. II, CONRAISS 2	Agric Field Attd. I	03/5	1/10/2014
8	Ajayi Aremu John	Agric Field Attd. III, CONRAISS 01	Agric Field Attd. II	02/4	1/10/2014
9	Salami Fatai	Agric Field Attd. III, CONRAISS 01	Agric Field Attd. II	02/4	1/10/2014
10	BiliaminuAgbeniga	Agric Field Attd. III, CONRAISS 01	Agric Field Attd. II	02/4	1/10/2014
11	Ahmed SajohBuba	Agric Field Attd. III, CONRAISS 01	Agric Field Attd. II	02/4	1/10/2014
12	Ehidiamen Joseph	Agric Field Attd. III, CONRAISS 01	Agric Field Attd. II	02/4	1/10/2014
13	JamgbadiImodu	Agric Field Attd. III, CONRAISS 01	Agric Field Attd. II	02/4	1/10/2014
14	OnifadeWasiu	Agric Field Attd. III, CONRAISS 01	Agric Field Attd. II	02/4	1/10/2014
15	Durodoye Dauda	Agric Field Attd. III, CONRAISS 01	Agric Field Attd. II	02/4	1/10/2014
16	AkinbolaTemilorun	Agric Field Attd. III, CONRAISS 01	Agric Field Attd. II	02/4	1/10/2014
17	OkeSafuratu (Mrs.)	Agric Field Attd. III, CONRAISS 01	Agric Field Attd. II	02/4	1/10/2014
18	NwaoliseFelicial (Mrs.)	Agric Field Attd. III, CONRAISS 01	Agric Field Attd. II	02/4	1/10/2014
19	Ajayi Abidemi	Agric Field Attd. III, CONRAISS 01	Agric Field Attd. II	02/4	1/10/2014
20	Oyedotun Toyin (Mrs.)	Agric Field Attd. III, CONRAISS 01	Agric Field Attd. II	02/4	1/10/2014
21	Mathew Olayemi (Mrs.)	Agric Field Attd. III, CONRAISS 01	Agric Field Attd. II	02/4	1/10/2014
22	Okoh Mercy (Mrs.)	Agric Field Attd. III, CONRAISS 01	Agric Field Attd. II	02/4	1/10/2014
23	Agaji Bernard	Agric Field Attd. III, CONRAISS 01	Agric Field Attd. II	02/4	1/10/2014
24	Paul Chukwu	Agric Field Attd. III, CONRAISS 01	Agric Field Attd. II	02/4	1/10/2014
25	Nwachukwu Anthony	Agric Field Attd. III, CONRAISS 01	Agric Field Attd. II	02/4	1/10/2014
26	Yahaya Husein	Agric Field Attd. III, CONRAISS 01	Agric Field Attd. II	02/4	1/10/2014
27	Oghenegueke Victor	Agric Field Attd. III, CONRAISS 01	Agric Field Attd. II	02/4	1/10/2014
28	Oyinlade Ayodele	Agric Field Attd. III, CONRAISS 01	Agric Field Attd. II	02/4	1/10/2014
29	Sanni Ibrahim	Agric Field Attd. III, CONRAISS 01	Agric Field Attd. II	02/4	1/10/2014

30	Oghenegueke Gift	Agric Field Attd. III, CONRAISS 01		Agric Field Attd. II	02/4	1/10/2014
31	Adesina Motunrayo	Agric Field Attd. III, CONRAISS 01		Agric Field Attd. II	02/4	1/10/2014
32	IdoreyinOkpo	Agric Field Attd. III, CONRAISS 01		Agric Field Attd. II	02/4	1/10/2014
33	Udo Johnny	Agric Field Attd. III, CONRAISS 01		Agric Field Attd. II	02/4	1/10/2014
34	Adedara Cornelius	Agric Field Attd. III, CONRAISS 01		Agric Field Attd. II	02/4	1/10/2014
35	Idowu Omoleke	Agric Field Attd. III, CONRAISS 01		Agric Field Attd. II	02/4	1/10/2014
36	Lawal Oluwafemi Esther (Miss)	Clerical Officer I, 04	CONRAISS	Senior Clerical Officer	05/1	1/10/2014
37	FawusiOluwatobiAmoo	Clerical Officer I, 04	CONRAISS	Senior Clerical Officer	05/1	1/10/2014
38	Akosile Isaac Gbenga	Clerical Officer I, 04	CONRAISS	Senior Clerical	05/1	1/10/2014
39	Onigbinde Adeniyi John	Clerical Officer I,	CONRAISS	Senior Clerical Officer	05/1	1/10/2014
40	AbiadeBilikis Olabisi (Miss)	Clerical Officer I, 04	CONRAISS	Senior Clerical Officer	05/1	1/10/2014
41	OyebanjoOmogbehinAyeyemi	Clerical Officer I, 04	CONRAISS	Senior Clerical Officer	05/2	1/10/2014
42	AboderinAyokunu Kayode	Clerical Officer II, 03	CONRAISS	Clerical Officer I	04/1	1/10/2014
43	Awoyemi Taiwo (Miss)	Clerical Officer II, 03	CONRAISS	Clerical Officer I	04/1	1/10/2014
44	AseinAimoje Fredrick	Clerical Officer II, 03	CONRAISS	Clerical Officer I	04/1	1/10/2014
45	Eze Ugochukwu (Mrs.)	Clerical Officer II, 03	CONRAISS	Clerical Officer I	04/1	1/10/2014
46	Ajiboye Adebola Stephanie (Mrs.)	Clerical Officer II, 03	CONRAISS	Clerical Officer I	04/1	1/10/2014
47	Iyamu Anthony	Clerical Officer II, 03	CONRAISS	Clerical Officer I	04/1	1/10/2014
48	Esan Babatunde Emmanuel	Clerical Officer II, 03	CONRAISS	Clerical Officer I	04/1	1/10/2014
49	Bakare Bose (Mrs.)	Clerical Officer II, 03	CONRAISS	Clerical Officer I	04/1	1/10/2014
50	Arobike Sunday Bamidele	Clerical Officer II, 03	CONRAISS	Clerical Officer I	04/1	1/10/2014
51	Ajinisi Mary Oluwaponmile (Mrs.)	Clerical Officer II, 03	CONRAISS	Clerical Officer I	04/1	1/10/2014
52	AlawodeSulaiman Adewale	Clerical Officer II, 03	CONRAISS	Clerical Officer I	04/1	1/10/2014
53	Agbeniyi Funke (Miss)	Clerical Assistant, 02	CONRAISS	Clerical Officer II	03/2	1/10/2014
54	Ugi Pauline (Mrs.)	Secretarial Asst. II, 04	CONRAISS	Secretarial Assistant I	05/2	1/10/2014
55	Ajekigbe Femi (MrS)	Sec. Asst. Gd III, 03	CONRAISS	Secretarial Assistant II	04/ 1	1/10/2014
56	Ogunsanya Florence (Mrs.)	Sec. Asst. Gd III, 03	CONRAISS	Secretarial Assistant II	04/ 1	1/10/2014
57	Irumekhai Florence (Mrs.)	Sec. Asst. Gd III, 03	CONRAISS	Secretarial Assistant II	04/ 1	1/10/2014
58	Muhammed Shaibu K.	Senior Watchman, 02	CONRAISS	Head Watchman	3/6	1/10/2014
59	Musa Paul T.	Senior Watchman,	CONRAISS 02	Head Watchman	3/6	1/10/2014

60	Eleng E. Emeng	Senior Watchman, CONRAISS 02	Head Watchman	3/6	1/10/2014
61	Osun Michael	Asst. Craftsman, CONRAISS 02	Craftsman	3/6	1/10/2014
62	Ibrahim Noah	Snr. Motor Driver/Mech. II, CONRAISS 04	Snr. Motor Driver/Mech. I	05/1	1/10/2014
63	Muraina Lukman	Snr. Motor Driver/Mech. II, CONRAISS 04	Snr. Motor Driver/Mech. I	05/1	1/10/2014
64	Arumeni I. Christian	Snr. Motor Driver/Mech. II, CONRAISS 04	Snr. Motor Driver/Mech. I	05/1	1/10/2014
65	OgunkunleGbadebo	Snr. Motor Driver/Mech. II, CONRAISS 04	Snr. Motor Driver/Mech. I	05/1	1/10/2014
66	Nome Peter	Snr. Motor Driver/Mech. II, CONRAISS 04	Snr. Motor Driver/Mech. I	05/1	1/10/2014
67	IsmailaTajudeen	Motor Driver/Mech. Security , CONRAISS 03	Snr. Motor Driver/Mech. II	4/3	1/10/2014
68	OsungbadeAyoadeAbolade	Motor Driver/Mech., CONRAISS 03	Snr. Motor Driver/Mech. II	4/3	1/10/2014
69	Rabiu Akeem	Motor Driver/Mech.,CONRAISS 03	Snr. Motor Driver/Mech. II	4/1	1/10/2014
70	Ajewole Bamidele	Motor Driver/Mech.,CONRAISS 03	Snr. Motor Driver/Mech. II	4/1	1/10/2014
71	Onyemuwa John	Motor Driver/Mech.,CONRAISS 03	Snr. Motor Driver/Mech. II	4/3	1/10/2014
72	Zubairu Ahmed	Motor Driver/Mech.,CONRAISS 03	Snr. Motor Driver/Mech. II	4/2	1/10/2014
73	Dahiru Adamu Tanko	Motor Driver/Mech.,CONRAISS 03	Snr. Motor Driver/Mech. II	4/2	1/10/2014
74	Oyekunle Emmanuel O.	Motor Driver,CONRIASS 02	Motor Driver/Mechanic	3/3	1/10/2014

LIST OF CANDIDATES GIVEN INTRE-CADRE TRANSFER/ADVANCEMENT

S/N	Name	Present Post		CONRAISS on Promotion	Date of Present Appt.
1	Awofeko Beauty (Mrs.)	Agric Field Attd. III, CONRAISS 01	Senior Health Attendant	2/4	1/10/2014
2	Mr. Opalua Pius	Agric Field Attd. II, CONRAISS 03	Senior Agric. Field Overseer	4/9	1/10/2014
3	Ajayi Yemisi	Asst. Chief Agric. Field Overseer, CONRAISS 05	Assistant Agric. Supt.	05/3	1/10/2014
4	Oaikhena L. Itoya (Mrs.)	Chief Clerical Officer, CONRAISS 06	Assistant Executive Officer	05/15	1/10/2014
5	TogunBolatito O. (Mrs.)	Senior Foreman, CONRAISS 06	Assistant Technical Officer	05/1	1/10/2014

LIST OF SENIOR STAFF PROMOTED IN 2014

S/N	NAME	PRESENT POST AND SALARY GRADE	POST TO WHICH PROMOTABLE	SALARY ON PROMOTION CONRAISS/ STEP	**EFFECTIVE DATE**
1	Dr. Sunday O. Agbeniyi	Asst. Director CONRAISS 14	Director	15/1	01/10/14
2	Dr. A.O. Famaye	Asst. Director CONRAISS 14	Director	15/1	01/10/14
3	Dr. Semiu O. Ogunwolu	Chief Res. Officer CONRAISS 13	Asst. Director	14/1	01/10/14
4	Mr. Michael O. Okeniyi	Snr. Res. Officer CONRAISS 09	Prin. Res. Officer	11/1	01/10/14
5	Mr. Francis C. Mokwunye	Snr. Res. Officer CONRAISS 09	Prin. Res. Officer	11/1	01/10/14
6	Mr. Idris Ndagi	Snr. Res. Officer CONRAISS 09	Prin. Res. Officer	11/1	01/10/14
7	Mr. Mohammed Idrisu	Research Officer I CONRAISS 08	Snr. Res. Officer	9/1	01/10/14
8	Mr. Olorunfemi S. Akanbi	Research Officer I,CONRAISS 08	Snr. Res. Officer	9/1	01/10/14
9	Mrs. Olusola F. Oduwaye	Research Officer I CONRAISS 08	Snr. Res. Officer	9/1	01/10/14
10	Mr. Olayinka O. Olaniyi	Research Officer I CONRAISS 08	Snr. Res. Officer	9/1	01/10/14
11	Mrs. Aderonke T. Yahaya	Research Officer I CONRAISS 08	Snr. Res. Officer	9/1	01/10/14
12	Mrs. Funlayo A. Adepoju	Research Officer I CONRAISS 08	Snr. Res. Officer	9/1	01/10/14
13	Mr. Seun A. Adeosun	Research Officer I CONRAISS 08	Snr. Res. Officer	9/1	01/10/14
14	Mrs. Elizabeth F. Mapayi	Research Officer I CONRAISS 08	Snr. Res. Officer	9/1	01/10/14
15	Miss Chinyere F. Anagbogu	Research Officer I CONRAISS 08	Snr. Res. Officer	9/1	01/10/14
16	Mr. OsasogieUgioro	Research Officer I CONRAISS 08	Snr. Res. Officer	9/1	01/10/14
17	Mrs. Beatrice A. Nduka	Research Officer I CONRAISS 08	Snr. Res. Officer	9/1	01/10/14
18	Mr. Ibrahim F. Abdulkarim	Research Officer I CONRAISS 08	Snr. Res. Officer	9/1	01/10/14
19	Mrs Ogunjobi Taiwo E.	Senior Librarian CONRAISS 09	Principal Librarian	11/1	01/10/14
20	Alufa Funmilayo O.	Higher Science Lab. Tech. CONRAISS 07	Snr. Science Lab. Tech.	8/2	01/10/14
21	Ene A. Perpetua	Higher Science Lab. Tech. CONRAISS 07	Snr. Science Lab. Tech	8/1	01/10/14
22	Oguigo Philip	Snr. Agric. Supt. CONRAISS 08	Prin. Agric. Supt. II	9/1	01/10/14
23	Mrs. Olorunmota R. T.	Snr. Agric. Supt. CONRAISS 08	Prin. Agric. Supt. II	9/1	01/10/14
24	Odedele Samson O.	Snr. Agric. Supt. CONRAISS 08	Prin. Agric. Supt. II	9/1	01/10/14
25	Oladunmoye A. Adeola	Snr. Agric. Supt.CONRAISS 08	Prin. Agric. Supt. II	9/1	01/10/14
26	Babalola Eunice A.	Snr. Agric. Supt.CONRAISS 08	Prin. Agric. Supt. II	9/1	01/10/14

27	Abioye A. Emmanuel	Snr. Agric. Supt.CONRAISS 08	Prin. Agric. Supt. II	9/1	01/10/14
28	Babantisa Mohammed	Snr. Agric. Supt.CONRAISS 08	Prin. Agric. Supt. II	9/1	01/10/14
29	Okunade O. Olusegun	Snr. Agric. Supt. CONRAISS 08	Prin. Agric. Supt. II	9/1	01/10/14
30	Imade O. Charles	Snr. Agric. Supt. CONRAISS 08	Prin. Agric. Supt. II	9/1	01/10/14
31	Sobowale O. Mayowa	Snr. Agric. Supt. CONRAISS 08	Prin. Agric. Supt. II	9/1	01/10/14
32	Edibo Gabriel	Snr. Agric. Supt. CONRAISS 08	Prin. Agric. Supt. II	9/1	01/10/14
33	Wada Sunday	Snr. Agric. Supt. CONRAISS 08	Prin. Agric. Supt. II	9/1	01/10/14
34	Mrs. AdegboyeJibola	Snr. Agric. Supt. CONRAISS 08	Prin. Agric. Supt. II	9/1	01/10/14
35	Ojedeji A. Olusegun	Snr. Agric. Supt. CONRAISS 08	Prin. Agric. Supt. II	9/1	01/10/14
36	Adeniyi Y. Abiodun	Snr. Agric. Supt. CONRAISS 08	Prin. Agric. Supt. II	9/1	01/10/14
37	Mrs. OladejoGbemisola	Snr. Agric. Supt. CONRAISS 08	Prin. Agric. Supt. II	9/1	01/10/14
38	Awodunmila David J.	Snr. Agric. Supt. CONRAISS 08	Prin. Agric. Supt. II	9/1	01/10/14
39	Ademola Sunday	Snr. Agric. Supt. CONRAISS 08	Prin. Agric. Supt. II	9/1	01/10/14
40	Oseghale E. Godday	Snr. Agric. Supt. CONRAISS 08	Prin. Agric. Supt. II	9/1	01/10/14
41	Elugbe O. Monday	Snr. Agric. Supt. CONRAISS 08	Prin. Agric. Supt. II	9/1	01/10/14
42	Adebayo J. Adekunle	Higher Agric. Supt. CONRAISS 07	Snr. Agric. Supt.	8/2	01/10/14
43	Mrs. Falusi Loveth	Higher Agric. Supt. CONRAISS 07	Snr. Agric. Supt.	8/2	01/10/14
44	Adebisi Temitope I.	Higher Agric. Supt. CONRAISS 07	Snr. Agric. Supt.	8/2	01/10/14
45	Agbor Charles E.	Higher Agric. Supt. CONRAISS 07	Snr. Agric. Supt.	8/2	01/10/14
46	Adebayo Kayode A.	Higher Agric. Supt. CONRAISS 07	Snr. Agric. Supt.	8/2	01/10/14
47	Adeleke Olaoye A.	ACAFO CONRAISS 05	CAFO	6/1	01/10/14
48	Mrs. Onwudi Maria	ACAFO CONRAISS 05	CAFO	6/1	01/10/14
49	Omogbehin Ayo K. (Mrs.)	ACAFO CONRAISS 05	CAFO	6/1	01/10/14
50	Abulele E. Isibhakhomen	Statistician II CONRAISS 07	Statistician I	8/2	01/10/14
51	Bello Babajide	Statistician II CONRAISS 07	Statistician I	8/2	01/10/14
52	BusariLolade A. (Mrs.)	Asst. Chief Statistical Officer CONRAISS 12	Chief Statistical Officer	13/1	01/10/14
53	Adewumi E. O. (Mrs.)	Higher Library Officer CONRAISS 07	Snr. Library Officer	8/1	01/10/14
54	Ikpefua Anthony E.	Asst. Data Proc. Officer CONRAISS 05	Data Proc. Officer	6/1	01/10/14
55	OnatundeOnanuga J. O.	Asst. Chief Admin Officer CONRAISS 12	Chief Admin. Officer	13/1	01/10/14
56	Oguntona Kunle W.	Asst. Chief Admin Officer CONRAISS 12	Chief Admin. Officer	13/1	01/10/14

57	AdejoroMaltida O.	Principal Admin Officer CONRAISS 11	Asst. Chief Admin Officer	12/2	01/10/14
58	Kuforiji Emmanuel O.	Snr. Accountant CONRAISS 09	Principal Accountant	11/1	01/10/14
59	OtasowieOsamuyimen S.	Accountant II CONRAISS 07	Accountant I	8/2	01/10/14
60	Eguavoen Lucky	Accountant II	Accountant I	8/2	01/10/14
61	KuforijiAyobami O. (Mrs.)	Prin. Ex. Offr. II CONRAISS 07	Prin. Ex. Offr. I	11/1	01/10/14
62	Modebei Timothy S.	Prin. Ex. Offr. II CONRAISS 07	Prin. Ex. Offr. I	11/1	01/10/14
63	Magaji Odilia O. (Mrs.)	Higher Ex. Officer CONRAISS 07	Snr. Ex. Officer	8/1	01/10/14
64	Olojede J. I. (Mrs.)	Higher Ex. Officer CONRAISS 07	Snr. Ex. Officer	8/1	01/10/14
65	Christopher Mimiola O.	Higher Ex. Officer CONRAISS 07	Snr. Ex. Officer	8/2	01/10/14
66	Oguntona Victor O.	Higher Ex. Officer CONRAISS 07	Snr. Ex. Officer	8/2	01/10/14
67	Kareem Suraju	Higher Ex. Officer CONRAISS 07	Snr. Ex. Officer	8/1	01/10/14
68	Ezebuiro Promise	Higher Ex. Officer CONRAISS 07	Snr. Ex. Officer	8/2	01/10/14
69	OparaToyosi N. (Mrs.)	Higher Ex. Officer CONRAISS 07	Snr. Ex. Officer	8/1	01/10/14
70	Ojua Eunice (Mrs.)	Asst. Ex. Officer CONRAISS 05	Executive Officer	6/1	01/10/14
71	Akinrinola Akeem K.	Asst. Ex. Officer CONRAISS 05	Executive Officer	6/1	01/10/14
72	Adewale Temilade O.	Asst. Ex. Officer CONRAISS 05	Executive Officer	6/1	01/10/14
73	Atanda Christiana O.	Snr. Clerical Officer CONRAISS 05	Chief Clerical Officer	6/1	01/10/14
74	MrsOlaosebikan A. O.	Snr. Sec. Asst. CONRAISS 07	Chief Sec. Asst.	8/1	01/10/14
75	Peter Numfor	Snr. Sec. Asst. CONRAISS 07	Chief Sec. Asst.	8/1	01/10/14
76	Mrs. AladeBolajoko F.	Snr. Sec. Asst. II CONRAISS 06	Snr. Sec. Asst. I	7/1	01/10/14
77	Mrs. FamayeBosede A.	Asst. Chief Matron CONRAISS 12	Chief Matron/CNS	13/1	01/10/14
78	Mrs. Onifade Elizabeth H. O.	Prin. Nur. Sister II CONRAISS 09	Matron/PNS I	11/1	01/10/14
79	Mrs. Ola Olanike	Nursing Sister/NS CONRAISS 07	Snr. Nur. Sister/SNS	8/1	01/10/14
80	Huseini Usman	Prin. Health Asst. CONRAISS 06	Chief Health Asst.	7/1	01/10/14
81	Fowowe Charles O.	Snr. Catering Offr. CONRAISS 08	Prin. Catering Offr.	9/1	01/10/14
82	Titiloye Isaac	Mech. Engr. II CONRAISS 07	Mech. Engr. I	8/2	01/10/14
83	Adebayo |Babajide J	Asst. Chief Tech. Officer CONRAISS 12	Chief Tech. Officer	13/1	01/10/14
84	BasiruWasilat	Snr. Tech. Officer CONRAISS 08	Prin. Tech. Officer	9/1	01/10/14
85	OgunsuyiBusuyi A.	Higher Tech. Offr. CONRAISS 07	Snr. Tech. Officer	8/2	01/10/14
86	Gold Ahmad O.	Higher Tech. Offr. CONRAISS 07	Snr. Tech. Officer	8/2	01/10/14

87	Awe Jacob A.	Higher Tech. Offr. CONRAISS 07	Snr. Tech. Officer	8/1	01/10/14
88	Oduntan Samson	Higher Tech. Offr.	Snr. Tech. Officer	8/1	
89	Akintoroye A. K.	Works Supt. Mech CONRAISS 06	Higher Works Supt.	7/1	01/10/14
90	Matthew Dare Feyisara	Works Supt. Mech CONRAISS 06	Higher Works Supt.	7/1	01/10/14
91	Udoh Effiong N.	Foreman CONRAISS 05	Senior Foreman	6/1	01/10/14
92	OyefiJolade	Higher Store Offr. CONRAISS 07	Snr. Store Officer	8/1	01/10/14
93	Odeku Olufemi	SMD/Mech I CONRAISS	CMD/Mech	6/1	01/10/14
94	Salami Mufutau	ACAFO CONRAISS 05	CAFO	6/1	01/10/14

SENIOR STAFF CONSIDERED FOR INTER CADRE TRANSFERS

S/N	NAME	PRESENT POST AND SALARY GRADE	POST TO WHICH PROM OTABLE	SALARY ON PROMOTION CONRAISS/ **STEP**	EFFECTIV E DATE
1	Orisasona T. Matthew	Snr. Agric. Supt. CONRAISS 08	Res. Officer I	9/1	01/10/14
2	Agbebaku Endurance	Snr. Agric. Supt. CONRAISS 08	Res. Officer I	9/1	01/10/14
3	Adeyemo Adewale A.	Higher Executive Officer CONRAISS 07	Accountant I	8/2	01/10/14
4	Gidiga Johnson O.	Higher Executive Officer CONRAISS 07	Accountant I	8/2	01/10/14

S/N	NAME	DESIGNATION	CONRAISS	DATE OF 1ST APPT.	DATE OF PRESENT APPT.	DATE DUE FOR CONFIR MATION	DEPLO YMENT	PER 2012		PER 2013		REMARKS
								1	2	3	4	
1.	OlulowoOlu watoyin	Staff Nurse	07	21/3/2012	21/3/2012	21/3/14	Health Centre	B	B	B	B	
2.	Oyeledun Ibukun	Staff Nurse	07	2/4/2012	2/4/2012	2/4/14	Health Centre	B	B	B	B	
3.	Olayemi Oladele	Asst. Agric. Supt.	05	1/12/2011	1/12/2011	1/12/13	PEM	B	B	B	B	
4.	Ogunwumi Festus	Asst. Technical Officer	05	28/12/2011	28/12/2011	28/12/13	Engineer ing	B	B	B	B	
5.	AjayeobaOl udare	Asst. Technical Officer	05	1/12/2011	1/12/2011	1/12/13	Engineer ing	B	B	B	B	
6.	AseinAimoj Fredrick	Clerical Officer II	03	1/12/2011	1/12/2011	1/12/13	Admin	B	B	B	B	
7.	Eze Ogochukwu (Miss)	Clerical Officer II	03	5/12/2011	5/12/2011	5/12/13	Audit	B	B	B	B	
8.	Ajiboye Adebola	Clerical Officer II	03	6/12/2011	6/12/2011	6/12/13	PEM	B	B	B	B	
9.	Iyamu Anthony	Clerical Officer II	03	15/12/2011	15/12/2011	15/12/13	Admin	B	B	A	B	
10.	Bakare Bose (Mrs.)	Clerical Officer II	03	29/12/2011	29/12/2011	29/12/13	Health Centre	B	B	B	B	
11.	Esan Babatunde	Clerical Officer II	03	29/12/2011	29/12/2011	29/12/13	Admin	B	B	B	B	
12.	Awoyemi Taiwo (Miss.)	Clerical Officer II	03	1/12/2011	1/12/2011	1/12/13	Admin	B	B	B	B	
13.	Magaji Precious (Miss)	Clerical Officer II	03	6/7/2011	6/12/2011	6/7/13	Mambill a	B	B	B	B	
14.	Modebei T. Damilola (Mrs.)	Secretarial Asst. III	03	6/7/2011	6/12/2011	6/7/13	Uhonmor a	A	A	A	A	
15.	Oyekunle Emmanuel	Motor Driver	02	9/12/2011	9/12/2011	9/12/13	Owena	B	B	B	B	
16.	Agbeniyi Funke	Clerical Officer II	02	12/12/2011	12/12/2011	12/12/13	Admin	B	B	A	B	
17.	OnifadeWasi	Agric. Field Attd. III	01	1/12/2011	1/12/2011	1/12/13	Statistics	B	A	A	B	
18.	Durodoye Dauda	Agric. Field Attd. III	01	1/12/2011	1/12/2011	1/12/13	PEM	B	B	B	B	
19.	AkinbolaTe milorun	Agric. Field Attd. III	01	1/12/2011	1/12/2011	1/12/13	PEM	A	A	A	A	
20.	Awofeko Beauty (Mrs.)	Agric. Field Attd. III	01	1/12/2011	1/12/2011	1/12/13	Health Centre	B	B	B	B	
21.	OkeSafurat (Mrs.)	Agric. Field Attd. III	01	1/12/2011	1/12/2011	1/12/13	PEM	A	A	A	A	
22.	Nwaolise Felicia (Mrs.)	Agric. Field Attd. III	01	1/12/2011	1/12/2011	1/12/13	PEM	A	A	A	A	
23.	Ajayi Abidemi	Agric. Field Attd. III	01	1/12/2011	1/12/2011	1/12/13	PEM	B	B	B	B	
24.	Oyedotun Toyin (Mrs.)	Agric. Field Attd. III	01	1/12/2011	1/12/2011	1/12/13	PEM	B	B	B	B	
25.	Matthew Olayemi (Mrs.)	Agric. Field Attd. III	01	1/12/2011	1/12/2011	1/12/13	PEM	B	B	B	B	
26.	Idowu Omoleke	Agric. Field Attd. III	01	1/12/2011	1/12/2011	1/12/13	PEM	B	B	B	B	
27.	Okoh Mercy (Mrs.)	Agric. Field Attd. III	01	1/12/2011	1/12/2011	1/12/13	PEM	B	B	B	B	
28.	Oghenegueke Victor	Agric. Field Attd. III	01	19/12/2011	19/12/2011	19/12/13	PEM	B	B	B	B	

29.	AgajiBenard	Agric. Field Attd. III	01	1/12/2011	1/12/2011	1/12/13	Owena	B	B	B	B	
30.	Paul Chukwu Nweke	Agric. Field Attd. III	01	1/12/2011	1/12/2011	1/12/13	Owena	B	B	B	B	
31.	Fatuase Tope	Agric. Field Attd. III	01	1/12/2011	1/12/2011	1/12/13	Uhonmor a	B	A	A	A	
32.	Nwachukwu Anthony	Agric. Field Attd. III	01	1/12/2011	1/12/2011	1/12/13	Ibeku	B	B	B	B	
33.	Uwakwe Young	Agric. Field Attd. III	01	1/12/2011	1/12/2011	1/12/13	Ibeku	B	B	B	B	
34.	Uwakwe Innocent	Agric. Field Attd. III	01	1/12/2011	1/12/2011	1/12/13	Ibeku	B	B	B	B	
35.	Hussein Yahaya	Agric. Field Attd. III	01	1/12/2011	1/12/2011	1/12/13	Ochaja	B	B	B	B	
36.	Abubakar Yahaya	Agric. Field Attd. III	01	1/12/2011	1/12/2011	1/12/13	Ochaja	B	B	B	B	
37.	Sanni Ibrahim	Agric. Field Attd. III	01	26/1/2012	26/1/2012	26/1/14	Owena	B	B	B	B	
38.	Oghenegueke Gift	Agric. Field Attd. III	01	2/5/2012	2/5/2012	2/5/14	PEM	B	B	B	B	
39.	Ibhazukor Gabriel	Agric. Field Attd. III	01	2/5/2012	2/5/2012	2/5/14	PEM	B	B	B	B	
40.	Adesina Motunrayo	Agric. Field Attd. III	01	2/5/2012	2/5/2012	2/5/14	PEM	B	B	B	B	
42.	Bakare Adeyemi R.	Asst. Exec.Officer	05	9/12/11	9/12/11	9/12/13	Audit	B	B	B	B	
43.	IdorenyinOkpo	Agric. Field Attd. II	01	2/05/12	2/9/12	2/5/14	Ajassor	B	B	B	B	
43.	Udo Johnny	Agric. Field Attd. III	01	2/5/12	2/5/12	2/5/14	Ajassor	B	B	B	B	
44.	Obileye Florence, O.	Sec. Asst. III	03	18/7/12	18/7/12	18/7/14	Legal	B	A	B	B	
45.	Irumekhai Florence, A.	Sec. Asst. III	03	26/7/12	26/7/12	26/7/14	Admin.	B	B	B	B	

LIST OF STAFF CONFIRMED AS AT MAY, 2014

ANNEXURE IV

RESEARCH SCIENTISTS CURRENTLY ON TRAINING

S/N	NAME	DESIGNATION	CONRAISS	PROPOSED COURSE OF STUDY	NAME OF INSTITUTION	DATE OF COMMENCEMENT	REMARKS
	Mr. Shittu, T. R.	*Prin. Research Officer*	11	PhD in Agric. Econs.	University of Ibadan	2003/2004	
	Oloyede Amos A.	*Prin. Research Officer*	11	PhD in Forest Resources Mgt.	University of Ibadan	2002/2003	
	Mr. Oluyole K. A.	*Prin. Research Officer*	11	PhD in Agric. Econs	University of Ibadan.	2012	
	Iloyanomon Cecilia I.	*Prin. Research Officer*	11	M. Phil./PhD in Agronomy	University of Ibadan	2004	
	Ogunjobi Moruf Ayinla K.	*Prin. Research Officer*	11	PhD in Food Processing & Storage Technology	Fed. University of Agric. Abeokuta (FUNAB)	24/5/2004	
	Uwagboe Eghosa	*Prin. Research Officer*	11	PhD in Agric. Extension & Rural Development	University of Ibadan	20/2/2013	
	Adebowale B. A.	*Prin. Research Officer*	11	Ph.D in Fisheries Management	University of Ibadan	2005	
8.	Agbongiarhuoyi E. Anthony	*Prin. Research Officer*	11	M. Phil in (Agric. Extension & Rural Development)	University of Ibadan	2005/2006	
	Mrs. Mokwunye I. U.	*Prin. Research Officer*	11	Ph.D in Entomology	University of Ibadan	7/3/2007	
10	Otunonye A. H.	*Prin. Research Officer*	11	PhD in Plant Pathology (Crop Protection)	Fed. University of Agriculture Abeokuta	29/10/2009	
11	Engr. Mofolasayo Adewale S.	*Prin. Research Officer*	11	PhD in Crop Processing and Storage / Food Engineering	Fed. University of Agriculture Abeokuta (FUNAB)	11/5/2009	
12	Idris Ndagi	*Prin. Research Officer*	11	PhD in Agric. Econs. & Extension	Fed. University of Tech. Akure	2011/2012	
13	Adejobi Babatunde K.	*Senior. Research Officer*	09	Ph.D in Crop, Soil & Pest Mgt.	Fed. University of Tech. Akure	2010/2011	
14	Adeniyi Omoyele Dele	*Senior. Research Officer*	09	PhD in Crop, Soil and Pest	Fed. University of Tech. Akure	2010/2011	
15	Adeigbe O. Oluwatosin *(Research Officer I)*	*Senior. Research Officer*	9	PhD in Genetics & Plant Breeding (Environmental Biology)	University of Ibadan	2005	
16	Adenuga O. O.	*Senior. Research Officer*	09	Ph.D in Plant Breeding	Federal University of Agric. Abeokuta (FUNAB)	2008	

17	Keji Dada, E.	*Research Officer I*	08	Master Degree in Plant Biology	University of Ilorin	2004/2005
18	Idris Mohammed *(Research Officer I)*	*Senior Research Officer*	09	PhD in Crop, Soil and Pest Mgt.	Fed. University of Tech.	2012/2013
19	Akanbi O. S. O.	*Senior Research Officer*	09	. Ph.D in Crop, Soil & Pest Mgt	Fed. University of Tech.,	2007 –2008
20	Mr. Olaniyi Olayinka O.	*.Senior Research Officer I*	09	PhD in Plant Breeding	Federal University of Agriculture, Abeokuta	5/11/12
21	Mr. Kolawole O. O.	*Research Officer I*	08	PhD in Micro-biology	University of Ibadan.	2008/09
22	Taiwo Nnenna	*Senior Research Officer I*	09	PhD in Agronomy	University of Ibadan	2008/2009
23	Mrs. Adepoju Abigail . F.	*Senor Research Officer I*	09	Ph.D in Plant Breeding	University of Agricultural Abeokuta	05/11/2012
24	Adeosun A. Seun	*Senior Research Officer I*	09	PhD in Crop Protection& Environmental Biology	University of Ibadan.	20/2/13
25	Mr. Olasupo Festus .O.	*Research Officer I*	08	PhD in Crop Protection and Environmental Biology	University of Ibadan.	2008/2009
26	Mrs. Mapayi E. F.	*Senor Research Officer I*	09	PhD in Plant Breeding	Federal University of Agriculture, Abeokuta	5/11/2012
27	Miss Anagbogu Chinyere F.	*Senior Research Officer I*	09	M. Phil/PhD in Plant Breeding & Genetics	University of Ibadan	2009/2010
28	Mr. Ugioro Osasogie	*Senior Research Officer I*	09	PhD in Plant Physiology	Federal University of Agric. Abeokuta(F UNAB)	10/5/2010
29	Mrs. Nduka Beatrice A.	*Senior Research Officer I*	09	PhD in Crop Soils & Pest Mgt.	Fed. University of Tech. Akure, Ondo	2012 / 2013
30	William Olaide Abisola	*Research Officer I*	08	PhD in Agricultural Extension & Rural Development	Fed. University of Agric. Abeokuta	2007 /2008
31	Okeniyi M.O.	*Prin. Research Officer*	11	PhD in Nematology	Fed. University of Tech. Abeokuta, (FUTA)	10/5/2002
32	Taiwo Olayinka A.	*Senior. Research Officer*	09	PhD in Agric. Econs	University of Ibadan	2012/2013
33	Yahaya A.T.	*Senior. Research Officer*	09	M.Phil in Economics	University of Ibadan	2010

LIST OF RESEARCH OFFICERS ON TRAINING AS AT 31 DECEMBER, 2014.

ANNEXURE V

The table below shows the list of Non-Research Staff on part time/weekend training as at 31 December, 2014.

S/N	NAME	DESIGNATIO	CONRAISS	PROPOSED COURSE OF STUDY	NAME OF INSTITUTION	DATE OF COMMENCEMENT	REMARKS
1.	Mr. Idris Garba	Asst. Chief. Agric. Field Overseer	05	ND in Agricultural Technology	Federal College of Agric, Moor plantation, Ibadan	10/12/2010	
2.	Mr. Mohammed Idi	Prin. Agric Supt.	11	M.Sc in Crop, Soil and Pest Management	Federal University of Technology, Akure	2012/2013	
3.	Mr. OjoOluseyeAbioy	Asst. Agric. Supt.	05	HND in Crop Production Technology (Option)	Federal College of Agric, Moor plantation, Ibadan	20/1/2012	
4.	Mr. Ogiugo Philip	Snr. Agric. Supt.	08	HND in Crop Science	College of Agric., Agenebode Campus, Edo-State	24/10/2010	
5.	Mr. Alli S.O.	Asst. Executive Officer	06	B.Sc in Economics	University of Ibadan, Ibadan.	2010/2011	
6.	Baba Nista Mohammed	Snr. Agric. Supt.	08	M.Sc in Crop Soil & Pest Mgt.	Federal University of Technology, Akure	2010/2011	
7.	Mr. Adewoye G. Adebowale	Snr. Sci. Lab. Technologist II	08	M.Sc in Environmental Science with option in Environmental Toxiology	Olabisi Onabanjo University, Ago-Iwoye, Ogun State	2011/2012	
.	Mrs. Titiloye O.E.M.N.	Admin. Officer I	08	MMP in Managerial Psychology	University of Ibadan, Ibadan.	2011/2012	
9.	Abiade Bilikisu O.	Clerical Officer I	05	ND in Accountancy	Osun State College of Technology, Esa- Oke	2011/2012	
10.	Mr. Ibine I.B.	lerical Officer	03	ND in Public Admin.	The Polytechnic, Ibadan	6/12/2010	
11	Fawusi Oluwatobi	Clerical Officer I	05	ND in Business Admin.	The Polytechnic, Ibadan	11/01/2010	
12	Obi Esther	Senior Clerical Officer	06	Business Admin.	The Polytechnic, Ibadan	2009/2010	
13	Ejenebor F. Bolanle	Senior Secretarial Asst.	07	ND in Office Technology & Mgt.	The Polytechnic, Ibadan	11/1/2010	
14	Akinrinola, O.A.	Asst. Executive Officer	06	HND in Accountancy	Fed. Polytechnic Idah	2009/2010	
15	Oghenegueke Gift	Agric. Field Atted. III	01	ND in Agric. Technology	Fed. College of Agric. Moor Plantation, Ibadan.	12/12/2011	
16	Oladepo Kemi	Clerical Officer	03	ND in Accountancy	The Polytechnic, Ibadan	6/12/2010	
17	Suraju Kareem	Higher Executive Officer	08	Accountancy	University of Ado-Ekiti	26/820110	
18	Ibrahim Wasiu Adewale	Executive Officer	06	B.Sc in Accountancy	LAUTECH Ogbomosho	18/3/2013	

19	Mrs. Ogunjobi T.E.	Snr. Librarian	09	M. Phil/P.hD in Library Studies	University of Ibadan, Ibadan	2008/2009
20	Mr. Osita Ibe	Snr. Prog. Analyst	09	M.Phil/Ph.D in (Lower Atmospheric Physis)	University of Ibadan, Ibadan	2011/2012
21	Miss. Lawal Esther	Clerical Officer I	05	ND in Accounting	Osun State College of Technology, Esa-Oke	2009/2010
22	Mr. Kolawole K. David	Asst. Agric. Supt.	05	Crop Production Tech. Option	Fed. College of Agric., Moor Plantation, Ib.	10/12/2010
23	Mr. Adigun A.B.	Principal Agric. Supt. I	11	M.Sc in Crop, Soil and Pest Mgt.	Federal University of Technology, Akure	2009/2010
24	Mrs. Adepoju O.A.	Snr. Conf. Secretary	08	PGD in Public Admin.	National Open University, Ib.	2011/2012
25	Haruna John	Chief Store Keeper	06	Agricultural Technical Field	Agricultural Training Centre, Ochaja	2011/2012
26	Adio Oludare T.	Asst. Craftman.		ND in Electrical engineering	Ibadan.	15/10/12
27	Mrs. J.O. Ojo	Clerical Officer II	03	HND in Accountancy	The Polytechnic, Ibadan.	11/1/2010
28	Olutade Bamidele O.	Clerical Officer II	03	Economics	Olabisi Onabanjo University, Ago-Iwoye , Ogun State.	2006-2007
29	Mr. Akano Joseph	Clerical Officer II	03	ND in Business Administration	The Polytechnic, Ibadan.	24/10/2011
30	Miss. Adesina Motunrayo C.	Agric. Field Attd. III	01	Accountancy	The Polytechnic, Ibadan	06/12/2010
31	Baoku F.A. (Mrs.)	Matron I	11	B.Sc in Nursing	Ladoke Akintola University of Technology, Ogbomosho	2012/2013
32	Iyamu I. Anthony	Clerical Officer II	03	B.Sc in Political Science	National Open University of Nigeria	2013/2014
33	Mr. D.B. Durodoye	Agric. Field Attd. III	02	ND in Agric. Technology	Federal College of Agric. Moor Plantation, Ibadan	2011/2012
34	Ogundeji Babatunde A.	Snr. Sci.Lab. Technologist	08	Crop soil & Pest Mgt.	Federal University of Technology, Akure	2011/2012
35	Akinyode Olabisi	Snr. Secretarial Asst. II	07	Office Technology	The Polytechnic, Ibadan	11/1/2010
36	Ogunde Oluwatosin Ajoke	Secretarial Asst. I	04	B.Sc in Psychology	University of Ibadan	2008/2009
37	Mrs. Alaba Olubukola O.	Secretarial Asst. II	04	HND in Office Technology Mgt.	The Polytechnic, Ibadan	6/12/2010
38	Obi Samuel I.	Clerical Officer II	03	HND in Business Admin.	The Polytechnic, Ibadan	24/10/2011
39	Morakinyo R.A.	Chief Sec. Asst	08	HND in Office Technology & Mgt.	The Polytechnic, Ibadan	2010/2011
40	Osinowo Bukola	Clerical Officer I	04	B.Sc in Mass Communication	Olabisi Onabanjo University, Ago-Iwoye, Ogun-State	2006/2007
41	Sekoni O.E.	Asst. Executive Officer	05	HND in Business Admin.	Akwa-Ibom State Polytechnic, Ikot-Osurua	2009/2010

42	OjoOluwabunmi (Mrs.)	Secretarial Asst. I	05	ND in Office Technology & Mgt	The Polytechnic, Ibadan	6/12/2010
43	Ikpefua Anthony E	Data Officer	06	B.Sc in Political Science	University of Ibadan.	2008/2009
44	OnifadeWasiu	Clerical Officer II	03	B.Sc in Accounting	National Open University of Nigeria	2012/2013
45	Akosile Gbenga	Clerical Officer	04	ND in Bus. Admin	Osun state Polytechnic Iree	2013/2014
46	Asein Fredrick	Clerical Officer I	04	ND in Bus. Admin	Osun state Polytechnic Iree	2013/2014
47	Alade B.F. (Mrs.)	Snr.Secretarial Asst. II	06	ND in Office Technology & Mgt.	The Polytechnic, Ibadan	2010/2011
48	Oyefi J.A. (Mrs.)	Higher. Store Officer	07	HND in Purchasing & Supply	The Polytechnic, Ibadan	2008/2009
49	Ogunsola G.B.	Chief Secretarial Asst.	08	HND in Office Technology & Mgt.	The Polytechnic, Ibadan	2010/2011
50	Olaosebikan O.A.	Chief Secretarial Asst. I	07	HND in Office Technology & Mgt.	The Polytechnic, Ibadan	2010
51	Enagu V.O.	Prin. Agric. Supt. I	11	M.Sc in Crop Soil & Mgt.	Federal University of Technology, Akure	2012
52	Etuke Charles	Clerical Officer II	03	B.Sc in Political Science	National Open University of Nig., Sango, Ib.	2012/2013
53	Oketokun Grace Olusola	Asst. Agric. Supt.	05	HND in Crop Production Technology Option	Federal College of Agric. Moor Plantation, Ib.	2012/2013
54	Ajulo Felix	Head Security Guard	05	ND in Business Administration	The Polytechnic, Ibadan	6/12/10
55	Mrs. Oduola A.O.	Matron I	11	M.Sc in Social work (Health option)	University of Ibadan	2012/2013
56	Mrs. H.C. Agbebaku	Accountant I	08		ICAN	2001
57	Mr. Adebiyi Oluwabukayomi S.	Security Guard Gd II	04	B.Sc in Mathematics	Open University of Nigerian(NOUN)	2013/2014
58	Miss. Idris Fatima	Agric. Field Overseer	03	ND in Agric General Tech.	Akperin Orshi College of Agriculture, Yandeu, Gboko, Benue State	2013/2014
59	Adegboye Jibola (Mrs.)	Snr. Agric. Supt.	08	Crop Management	Federal University of Technology, Akure	2013
60	Olagunju Rasaki	Agric. Field Overseer	03	ND in Agric. Tech.	Federal College of Agric., Moor Plantation, Ibadan	2013
61	Mrs. Ogundare O.A.	Asst. Chief Agric. Field Overseer	05	Agric. Tech. ND	Federal College of Agric., Moor Plantation, Ibadan	2009/2010
62	Balogun S.T.	Snr. Sci. Lab. Technologist	08	Environmental Biology	Ladoke Akintola University of Technology, Ogbomoso	2008/2009
63	Mrs. Igbinadolor A.J.	Secretarial Asst. II	03	ND in Office Technology Mgt.	The Polytechnic, Ibadan	2013/2014
64	Fagbemi D.O.	Chief Sec. Asst.	08	HND in Office Technology Mgt.	The Polytechnic, Ibadan	2013/2014
65	Mrs. Ogunbosoye	Statistician I	08	Mathematical science/statistics	Federal University of Technology, Akure	2012/2013
66	Obi Esther	Chief Clerical Officer	06	ND in Business Admin	The Polytechnic, Ibadan	2011
67	Abulele I.E.	Statistician I	08	M.Sc in Statistics	Olabisi Onabanjo University, Ago Iwoye	2013/2014
68	Mrs. J.N. Ijoma	Prin. Science Lab. Technologist I	11	Food /Industrial Bio-Chemistry	Olabisi Onabanjo niversity, Ago Iwoye	2006

69	Obatoye A.O.	Prin. Science Lab.	11		Olabisi Onabanjo University Ago Iwoye	2007/2008	
70	Mr. Olayiwola A.M.	Prin. Agricultural Supt. I	09	Crop, Soil & Pest Mgt.	Federal University of Technology, Akure	2008/2009	
71	Babafemi I.B	SPO	09	Professional Certificate	Zebeel International Institute of Mgt. and Technology, Dubai, United Arab Emirates (UAE)	Sep, 2014	
72	Babalola E.A (Miss)	PAS	09	PGD in Agronomy	Lautech	2012/2013	
73	Uguoke Joseph C	AAS	05	HND in Agriculture (Crop Product. Tech. Option)	Federal College of Agric. Moor Plantation	2013/2014	
74	Ekundayo Benson J.B.	Secretarial Asst.	04	NCE in English Social Studies	Federal College of Education (special) Oyo	13/3/2008	
75	Mr. Fajutu Kayode S.	Head Security Guard 03	05	ND in Bus. Admin	Ogun State Institute of Tech. Igbesa	2012/2013	
76	Oghenegueke John	Security Guard	03	ND in Bus. Admin	Ogun State Institute of Tech. Igbesa	2012/2013	
77	Okere Monday J.	CAFO	06	HND in Crop Production Technology	Federal College of Agric. Moor Plantation, Ibadan	20/1/2012	
78	Ahmed Yahaya Saiduna	CCO	06	HND in Accountancy	Federal Polytechnic, Damaturu, Yobe State	2012/2013	
79.	Mogaji Mohammed	SAS	08	Ph.D in Agric Engineering	The Federal University of Technology, Akure.	20/4/2015	
80.	Mr. Oguenegueke Victor	AFA III	02	Civil Engineering	Osun State College of Tech. Esa-Oke	20/10/2011	

NON-RESEARCH STAFF CURRENTLY ON TRAINING AS AT 31 DECEMBER, 2014

ANNEXURE VI

LIST OF STAFF THAT ATTENDED IN- SERVICE TRAINING WORKSHOP/SEMINAR/CONFERENCE IN YEAR 2014

S/N	NAME/DESIGNATION	EVENTS/COURSE OF STUDY	DURATION	SPONSORING BODY	HOST ORGANISATION/ ORGANIZATION EVENTS	REMARKS
1	Mrs. Mokwunye I. U Prin. Research Officer	Award Womens leadership and Mgt. course	6 -12 April, 2014	Fellowship	Nairobi, Kenya	
2	Mr. Olasupo F. O Research Officer I	Bio-safety Training Workshop 2014 Cocoa Borlaug Fellowship Programme/Award	1 -3 April, 2014 Oct –December, 2014	Fellowship Fellowship	Organized by African Bio-safety Network of Expertise (ABNE) under the NEPAD in collaboration with Federal Ministry of Environment Abuja The USDA's Agricultural Research Service (ARS) Subtropical Horticulture Research station Miami, Florida, United State.	
3	Mr. B. A. Ogunjobi Snr. Science Lab. Tech.	Training on laboratory Procedures and Analysis of soil Crop & Agricultural Products	03 – 09 August, 2015	Self Sponsorship	Nigeria Institute of Science Laboratory Technology, Samanda, Ibadan	
4	Mr. Babafemi I. B Snr. Programme Analyst	Notification of 3 days off duty for Research 4 life training of trainers Workshop	24 – 26 March, 2014	Self Sponsorship	Information training and outreach centre for Africa (ITOCA) in collaboration with the	
5	Dr. S. O. Aroyeun Asst. Director	rmission to travel to University of Ghent, Belgium to attend Cocoa and Cholate processing Workshop Permission to attend WASD Conference	11 – 26 June, 2014 12 – 16 August, 2014	Self Sponsorship	University of Chent, Belgium Montreal Canada	
6	Dr. B. D. Adewale Snr. Research Officer	African Plant Breeding Academy 2014	15-28 June, 2014	CRIN, Sponsorship	The Training is at World Agronomy forestry centre (ICRAF) Nairobi Kenya	
7	Engr. A. S. Mofolasayo Prin. Research Officer	A Research Methodology Seminar	27 – 28 May, 2014	Self Sponsorship	At the ICT Resources Centre Federal University of Agriculture, Abeokuta	
8	Dr. S. B. Orisajo Ag. Head, (FSR & E)	Request for permission to CLP/COCTAFFS facilitators training Workshop	13 – 14 March, 2014	-	Mount Pleasant Hotel, Old Ijebu Ode road, Ibadan	
9	Agbebaku Endurance Senior Agric. Supt.	Community Driven Development Approach on Agriculture & Rural Development	20 – 26 Sept, 2014	-	Agricultural & Rural Management Training Institute, Ilorin, (ARMT)	
10	Ebulu SunayA. Prin. Science Lab. Technology I	Maintenance of Visual Aids Equipment for optimum performance	11 –14 Nov, 2014	CRIN, Sponsorship	Public Administration and Management Development Institute (PAMDI)	

11	Mr. Kolawole Oluwaseun Research Officer I	Norman E. Borlang Fellowship for the leadership enhancement in Agriculture Programme (LEAP)	8 months 13 January – 14 Sept., 2014		University of Florida, USA
12	Mr. Musa Samuel Ojo Chief Motor Driver/Mech	Offer of provisional admission to candidate into the Mechanical electrical Engineering Develop Centre Six – months conversion training for Chief Driver Mechanic/plant operators to works Superintendent (Mechanical) cadre	July, 2014 to Dec., 2014	CRIN, Sponsorship	Ibara Abeokuta, Ogun State
13	Mr. Ajiroba Ad eniyi Taiwo Chief Motor Driver/ Mech.	Offer of provisional admission to candidate into the Mechanical Electrical Engineering Develop Centre Six – months conversion training of Chief Driver-Mechanic/plant operators to works Superintendent (Mechanical Cadre)	July 2104 – Dec. 2014	CRIN, Sponsorship	Ibada Abeokuta, Ogun State
14	Dr. Ipnmoroti R. R Asst. Director	Retrospective approval to attend Organic Conference	6 -11 April, 2014	Self Sponsorship	Wedey University of Science and Technology, Ondo State
15	Mrs. I. U. Mokwuoye Prin. Research Officer	Permission to attend award role modelling event	16 May, 2014	CRIN Sponsorship	Prospect High School, Abanla
16	Mrs. Adeigbe O. O Senior Research Officer	Permission to attend award role modelling event	16 May, 2014	CRIN Sponsorship	Prospect High School, Abanla
17	Mrs. Yahaya A. T Research Officer I	Permission to attend award role modelling event	16 May, 2014	CRIN Sponsorship	Prospect High School, Abanla
18	Miss AlufaFunmillayo O. Higher Science Lab. Tech	Permission to attend award role modelling event	16 May, 2014	CRIN Sponsorship	Prospect High School, Abanla
19	Miss Ezeorah L. A Senior Science Lab. Tech	Permission to attend award role modelling event	16 May, 2014	CRIN Sponsorship	Prospect High School, Abanla
20	Anagbogu F. C Senior Research Officer	Notification on Norman Borloug 2014/15 leadership Enhancement in Agriculture programme Fellowship Leadership award and request for permission to go for the Research Programme	2014/2015 8 months Sep.,2014 to Aug, 2015	IITA, University of California, USA	CGAIR, International Institute of Tropical Agriculture (IITA) and University of California, U.S.A
21	Mr. B. A. Ogundeji Snr. Science Lab. Tech.	The 30^{th} Annual Conference of the Nigeria Institute of Science Lab. Tech	29 Oct., and I Nov, 2014	Self Sponsorship	Akure, Ondo State, 2014
22	Dr. (Mrs.) Jayeola C. O Chief Research Officer	Team building and leadership Skill (LDSD)	11-15 August, 2014	CRIN, Sponsorship	Badargry Lagos
23	Dr. Orisajo Chief Research Officer	Team building and leadership Skill (LDSD)	6-10 October, 2014	CRIN, Sponsorship	Badagry Lagos
24	Dr. Agbeniyi O Asst. Director	Team building and leadership Skill (LDSD)	6-10 October, 2014	CRIN, Sponsorship	Badagry Lagos
25	Dr. Famaye Asst. Director	Team building and leadership Skill (LDSD)	6-10 October, 2014	CRIN, Sponsorship	Badagry Lagos
26	Mr. Fagbami Director (LID)	Team building and leadership Skill (LDSD)	6-10 October, 2014	CRIN, Sponsorship	Badagry Lagos
27	Mr. Akhidime S. Prin. Admin. Officer	Advance Management Course (MSD 700)	7-19 Sept, 2014	CRIN, Sponsorship	Badagry, Lagos
28	Mrs. Oluwadare S. Prin. Admin Officer	Advance Management Course (MSD 700)	7-19 Sept, 2014	CRIN, Sponsorship	Badagry, Lagos

29	Mr. Okaisabor J. Prin. Agric. Superintendent	Participatory Management of Com. Dev. Groups Based Organisation in NARD Project (ARM 350)	13-17 October, 2014	CRIN, Sponsorship	Badagry, Lagos
30	Mr. Victor Enagu Prin. Agric. Superintendent	Participatory Management of Com. Dev. Groups Based Organisation in NAR in NARD Project (ARM 350)	13-17 October, 2014	CRIN, Sponsorship	Badagry, Lagos
31	Prof. M. O. Akoroda Executive Director	Public Policy Analysis & Mgt. Workshop (PASD)	4 – 8 August, 2014	CRIN Sponsorship	Badagry, Lagos
32	Dr. (Mrs.) Dongo Director (P & T)	Public Policy Analysis & Mgt. Workshop (PASD)	4 – 8 August, 2014	CRIN Sponsorship	Badagry, Lagos
33	Mrs. P. A. Ubebe Ag. Head (Admin & Supplies)	Public Policy Analysis & Mgt. Workshop (PASD)	4 – 8 August, 2014	CRIN Sponsorship	Badagry, Lagos
34	Mr. Fabowale K. M Head (Internal Audit)	Public Policy Analysis & Mgt. Workshop (PASD)	4 – 8 August, 2014	CRIN Sponsorship	Badagry, Lagos
35	Mr. Onifade A. Ag. Head (F & A)	Public Policy Analysis & Mgt. Workshop (PASD)	4 – 8 August, 2014	CRIN Sponsorship	Badagry, Lagos
	Mr. Ayoade O. A Senior Executive Officer (Budget)	Computer Application for project Management (ARM 251)	11 July, 2014	CRIN, Sponsorship	
37	Mrs. Adepoju O. A Confidential Secretary	Managing the Boss and organising the office for corporate efficiency	2 – 5 Dec., 2014	CRIN, Sponsorship	Badagry, Lagos
38	Mrs. T. Y Adeagbo Confidential Secretary	Managing the Boss and organising the office for corporate efficiency	2 – 5 December, 2014	CRIN, Sponsorship	Badagry, Lagos
39	Mrs. K. Olumini Asst. Chief Executive Officer (Marketing)	Strategies for revenue Generation (EFMS)	6 – 10 October, 2014	CRIN, Sponsorship	Badagry, Lagos
40	Mr. Shittu Abu Senior Accountant	Strategies for revenue Generation (EFMS)	6 – 10 October, 2014	CRIN, Sponsorship	Badagry, Lagos
41	Mrs. AlabaOlubukola Secretarial Assistant	Managing the Boss official schedule and office/Document security	16 – 19 September, 2014	CRIN, Sponsorship	Ogba, Lagos
42	Mrs. Sanni Olayinka Secretarial Assistant	Managing the Boss official schedule and office/Document security	16 – 19 September, 2014	CRIN, Sponsorship	Ogba, Lagos
43	Mrs. Oladimeji L.T.N Senior Secretarial Asst.	Managing the Boss official schedule and office/Document security	16 – 19 September, 2014	CRIN, Sponsorship	Ogba, Lagos
44	Mr. Bakare A. T Asst. Chief Maintenance Engeer	Leadership and Managerial skills Development for Engineer and Technical Officers	8 – 11 July, 2014	CRIN Sponsorship	Enugu
45	Mr. Osita Ibe Programmer Analyst	Facilities Maint Management	5 – 8 August. 2014	CRIN Sponsorship	Lagos
	Kuforiji Wale Prin. Accountant	Strategies for Revenue Generation (EFMS)	10 October, 2014	CRIN, Sponsorship	Badagry, Lagos
47	Ogunkua O. O Asst. Chief Executive Officer	Strategies for Revenue Generation (EFMS)	6 – 10 October, 2014	CRIN, Sponsorship	Badagry, Lagos
48	Farinola P. A Procurement officer	Procurement & Supply chain Management best practices in public & Private sectors	18 – 21 November, 2014	CRIN, Sponsorship	Lagos
49	lkokoh Loveth U. Senior Admin. Officer	Alternative dispute resolution (LGLSD)	11 – 15 August, 2014	CRIN, Sponsorship	Badagry, Lagos

ANNEXURE VII

LEFT THE SERVICE

List of staff who left service as a result of Age/Length of Service and Transfer/Withdrawal, Resignation and Disengagement.

S/N	NAME	DATE OF BIRTH	AGE ON RETIREMENT	DATE OF IST APPOINTMENT	DESIGNATION/RANK	CONRAISS	DEPLOYMENT	RETIREMENT DATE	MODE OF EXIT
1.	Ojo Zacheaus Olusegun	14/2/1954	60 years	1/9/1993	Head Security Guard	05	Security Section	14/2/2014	Compulsory retirement on account of age
2.	Mr. Odeleke Tajudeen	1/1/1956	58 years	23/3/1979	Works Supt	06	Engineering Works	23/3/2014	Compulsory retirement on account of length of service
3.	Ogunbosoye Idowu Akin	16/4/1960	54 years	21/3/1979	Chief Sc. Lab Tech	13	Plant Breeding	21/3/2014	Compulsory retirement on account of length of service
4.	Adesina Serah	1/1/1962	52 years	1/12/1997	Chief Agric. Field Overseer	06	PEM	3/1/2014	Voluntary retirement
5.	Gbiye Emily	16/1/1960	54 years	2/6/2003	Senior Agric Field Overseer	06	PEM	6/1/2014	Voluntary Retirement
6.	Nwakaeze Linus	27/8/1971	32 years	29/4/2011	Agric. Field Attd. III	01	Ibeku S/Station	23/8/2013	Resignation
7,	Mrs. Domi Maria	17/7/1954	57 years	2/6/2003	Agric. Field Attd. I	03	Admin & Supplies	24/11/2011	Withdrawal
8.	Fadele W	13/4/1954	60 years	1/12/1997	AFA I	03	Owena	13/4/2014	Compulsory retirement
9.	Adamu P	10/10/1958	56 years	27/5/1979	Chief Sec. Asst.	08	Headquarters	29/5/2014	Compulsory retirement on account of length of service
10	Adesina E.O.	26/6/1960	54 years	11/6/1979	Chief Sec. Asst.	08	Headquarters	11/6/2014	Compulsory retirement on account of length of service

11.	Aighekaen E.O	26/4/1949	65 years	10/10/1978	Director	15	Headquarters	26/4/2014	Compulsory retirement on account of length of service
12.	AdisaSikiru	10/10/1984	30 years	19/6/2009	AFA I	03	PEM	1/6/2014	Resignation
13.	Victor E	27/6/5	years	1/12/1997	Head Watch Man	03	Ajassor	27/6/2014	Compulsory retirement
14.	Ajao A.A.	5/6/1966	48 years	11/8/2000	PRO	11	CPU	2/9/2014	Voluntary retirement
15.	Emaku L	12/7/1954	60 years	4/8/1980	Asst. Chief Statistics	12	Econs/Statistics	12/7/2014	Compulsory retirement
16.	Ogar O.P	29/10/84	30 years	19/5/2013	Health Asst.	03	Ajassor	28/7/2014	Disengagement
17.	AderoluIsmaila	13/6/1974	40 years	29/9/2010	SRO	09	Entomology	8/11/2014	Transfer
18.	Oduwaye Fehintola	23/12/1975	39 years	29/9/2010	RO	08	P/Pathology	27/11/2014	Resignation
19.	Adefaka Olusola Saka	2/12/1959	55 years	29/11/1990	Asst. Director	14	F & Acct	28/11/2014	Voluntary Retirement
20.	Dr. Adewale Babasola Daniel	20/2/1967	47 years	5/2/2009	SRO	09	P/Breeding	7/7/2014	Transfer

LIST OF DECEASED OFFICERS FROM 01 JANUARY, 2014 TO 31 DECEMBER, 2014

S/N	NAME	DESIGNATION	CONRAISS	DATE OF IST APPT	DATE OF DEMISE	Deployment
1	Dr. A.O. Fademi	Director	15	30-Mar-1982	10-Mar-2014	Headquarters
2	Okoro Emmanuel	Agric. Field Attd I	3	2-Jan-2009	-Jun-2014	Ibeku
3	Oloyede Kazeem	Agric. Field Attd I	3	2-Jun-2006	18-Aug-2014	Headquarters
4	Uwakwe Young	Agric. Field Attd II	2	1-Dec-2011	-Sep-2014	Ibeku

NAMES OF STAFF WHO LEFT SERVICE BASED ON DISCIPLINARY ACTION

S/NO	NAME	DESIGNATION	DEPLOYMENT	OFFENCES	DISCIPLINARY ACTIONS
1.	Mrs. Okonche Julianah	Clerical Assistant	Statistics Section	Presentation offake National Diploma Result	Dismissed from Service
2.	Mr. Jonan Johnson	Agric. Field Attd. III	PEM	Absent from duty without leave	Termination of Appointment

UNCONFIRMED STAFF WHOSE APPOINTMENTS' WERE TERMINATED

S/N	NAME	DESGNATION	CONRAISS	DATE OF ST APPT.	DATE OF TERMINATION	DEPLOYMENT
1	Adegbindin Abel	Higher Executive Officer	07	13/12/2011	24/1/2014	ADMIN.
2	Abioye Bosede (Mrs.)	Nursing Sister	07	5/4/2012	24/1/2014	Health Centre
3	Ipadeola Funke (Miss)	Asst. Agric. Supt.	05	1/12/2011	24/1/2014	PEM
4	Ajibola Yinka	Clerical Officer II	03	1/12/2011	24/1/2014	ADMIN.
5	FademiOmoditunu (Miss.)	Clerical Officer II	03	5/12/2011	24/1/2014	ADMIN.
6	Robert Oludare	Clerical Officer II	03	24/1/2012	24/1/2014	ADMIN.
7	Adeyemo Adekunle Johnson	Clerical Officer II	03	28/12/2011	24/1/2014	ADMIN.
8	Adeyemo Stephen	Clerical Officer II	03	1/12/2011	24/1/2014	LID
9	Ganiyu Bolanle (Miss.)	Clerical Officer II	03	5/12/2011	24/1/2014	Finance & Accounts
10	Osho Ezekiel	Craftsman	03	1/12/2011	24/1/2014	Engineering
11	Odugbela Oluwasina	Motor Driver/Mech	03	7/12/2011	24/1/2014	Engineering
12	Makinde Gbolagade	Motor Driver	02	25/1/2012	24/1/2014	Security
13	Alamu Risikat	Agric. Field Attd.III	01	1/12/2011	24/1/2014	PEM
14	Ogenyi Simon	Agric. Field Attd.III	01	1/12/2011	24/1/2014	PEM
15	Alalade Kunle	Agric. Field Attd.III	01	1/12/2011	24/1/2014	CFC
16	Ayidu Sunday	Agric. Field Attd.III	01	1/12/2011	24/1/2014	PEM
17	Ochenchi Paulina (Mrs.)	Agric. Field Attd.III	01	1/12/2011	24/1/2014	PEM
18	Lawal Kazeem	Agric. Field Attd.III	01	1/12/2011	24/1/2014	PEM
19	Okojere Happiness	Agric. Field Attd.III	01	1/12/2011	24/1/2014	PEM
20	Ijadunola Funmilayo	Agric. Field Attd.III	01	1/12/2011	24/1/2014	PEM
21	Dauda Olawoyin	Agric. Field Attd.III	01	1/12/2011	24/1/2014	PEM
22	OlaleyeBidemi (Mrs.)	Agric. Field Attd.III	01	1/12/2011	24/1/2014	PEM
23	Akinpelu Modinat	Agric. Field Attd.III	01	1/12/2011	24/1/2014	PEM
24	Onanuga Odutola	Agric. Field Attd.III	01	1/12/2011	24/1/2014	PEM
25	Adeloju Kayode	Agric. Field Attd.III	01	1/12/2011	24/1/2014	PEM
26	Olayiwola Iyabo (Mrs)	Agric. Field Attd.III	01	1/12/2011	24/1/2014	PEM
27	Oloyede Elizabeth (Mrs)	Agric. Field Attd.III	01	1/12/2011	24/1/2014	CFC
28	Williams Olabisi (Mrs.)	Agric. Field Attd.III	01	1/12/2011	24/1/2014	PEM
29	Okontah Kehinde (Miss)	Agric. Field Attd.III	01	1/12/2011	24/1/2014	PEM
30	Ganiyu Ibrahim	Agric. Field Attd.III	01	1/12/2011	24/1/2014	PEM
31	Akinola Bukola (Miss.)	Agric. Field ttd.III	01	1/12/2011	24/1/2014	PEM
32	Isaac Emmanuel	Agric. Field Attd.III	01	1/12/2011	24/1/2014	PEM
33	Oladokun Abiodun	Agric. Field Attd.III	01	1/12/2011	24/1/2014	PEM
34	Olugbade Lukman	Agric. Field Attd.III	01	1/12/2011	24/1/2014	PEM
35	OyeniranAdejoke (Mrs.)	Agric. Field Attd.III	01	1/12/2011	24/1/2014	Health Centre
36	Salawu Adetunji	Agric. Field Attd.III	01	1/12/2011	24/1/2014	PEM
37	Ibitoye Folake (Mrs.)	Agric. Field Attd.III	01	1/12/2011	24/1/2014	PEM

38	Morufu Salawu	Agric. Field Attd.III	01	1/12/2011	24/1/2014	PEM
39	Adebayo Olusola	Agric. Field Attd.III	01	1/12/2011	24/1/2014	Bakery
40	Alhassan Gloria (Mrs.)	Agric. Field Attd.III	01	1/12/2011	24/1/2014	PEM
41	Atoyebi Oluwatoyin (Miss.)	Agric. Field Attd.III	01	1/12/2011	24/1/2014	PEM
42	Kuforiji Monisola (Mrs.)	Agric. Field Attd.III	01	1/12/2011	24/1/2014	PEM
43	Ayidu Temitope (Mrs.)	Agric. Field Attd.III	01	1/12/2011	24/1/2014	PEM
44	Gbadamosi Taye	Agric. Field Attd.III	01	1/12/2011	24/1/2014	PEM
45	Ojo Sunday	Agric. Field Attd.III	01	1/12/2011	24/1/2014	PEM
46	Ehimme Charles	Agric. Field Attd.III	01	1/12/2011	24/1/2014	PEM
47	Oghenejabor Rita (mrs.)	Agric. Field Attd.III	01	1/12/2011	24/1/2014	PEM
48	Ojo Iyabo (Miss)	Agric. Field Attd.III	01	1/12/2011	24/1/2014	PEM
49	Oladipupo Olabisi (Mrs.)	Agric. Field Attd.III	01	1/12/2011	24/1/2014	PEM
50	Kunnuola Seun	Agric. Field Attd.III	01	1/12/2011	24/1/2014	PEM
51	Adewumi Ngozi (Mrs.)	Agric. Field Attd.III	01	1/12/2011	24/1/2014	PEM
52	OkohChuks	Agric. Field Attd.III	01	1/12/2011	24/1/2014	PEM
53	Salami Theresa (Mrs.)	Agric. Field Attd.III	01	1/12/2011	24/1/2014	PEM
54	Olayiwola Sakiratu (Mrs.)	Agric. Field Attd.III	01	1/12/2011	24/1/2014	PEM
55	Oshodi Veronica (Mrs.)	Agric. Field Attd.III	01	1/12/2011	24/1/2014	PEM
56	Ugwu Paulina (mrs.)	Agric. Field Attd.III	01	1/12/2011	24/1/2014	PEM
57	Ayoade Olufemi (Mrs.)	Agric. Field Attd.III	01	1/12/2011	24/1/2014	PEM
58	Kayiwedo Solomon	Agric. Field Attd.III	01	19/12/2011	24/1/2014	PEM
59	Fadahunsi Fatai	Agric. Field Attd.III	01	19/12/2011	24/1/2014	PEM
60	Okojie Peter	Agric. Field Attd.III	01	19/12/2011	24/1/2014	PEM
61	Matthew Samuel	Agric. Field Attd.III	01	2/4/2012	24/1/2014	PEM
62	Oniosun Basiru	Agric. Field Attd.III	01	2/4/2012	24/1/2014	Bakery
63	Lawal Kafaya (Miss.)	Agric. Field Attd.III	01	2/5/2012	24/1/2014	ADMIN.
64	Olorungbami Nike (Mrs.)	Agric. Field Attd.III	01	2/5/2012	24/1/2014	PEM
65	Animashahun Taofeek	Agric. Field Attd.III	01	2/5/2012	24/1/2014	PEM
66	MuritalaWaheed	Agric. Field Attd.III	01	2/5/2012	24/1/2014	PEM
67	Olorunkalu Taye	Agric. Field Attd.III	01	2/5/2012	24/1/2014	PEM
68	Akinola Wasiu	Agric. Field Attd.III	01	2/5/2012	24/1/2014	PEM
69	AransiRamoni	Agric. Field Attd.III	01	2/5/2012	24/1/2014	PEM
70	Tijani Sadia (Mrs.)	Agric. Field Attd.III	01	2/5/2012	24/1/2014	PEM
71	Iseoluwa Samuel	Agric. Field Attd.III	01	2/5/2012	24/1/2014	PEM
72	Sikiru Koro	Agric. Field Attd.III	01	2/5/2012	24/1/2014	P/Breeding
73	Onipe Modupe (Mrs.)	Agric. Field Attd.III	01	2/5/2012	24/1/2014	ADMIN.
74	Ganiyu Saidi	Agric. Field Attd.III	01	2/5/2012	24/1/2014	PEM
75	Bakare Motunrayo (Mrs.)	Agric. Field Attd.III	01	2/5/2012	24/1/2014	P/Breeding

76	Falana Maria (Mrs.)	Agric. Field Attd.III	01	2/5/2012	24/1/2014	PEM
77	Saheed Ademola	Agric. Field Attd.III	01	2/5/2012	24/1/2014	Engineering
78	Babalola Bayo	Agric. Field Attd.III	01	2/5/2012	24/1/2014	PEM
79	Sarafa Hammed	Agric. Field Attd.III	01	2/5/2012	24/1/2014	PEM
80	Bello Jelili	Agric. Field Attd.III	01	2/5/2012	24/1/2014	PEM
81	Jimoh Abdulahi	Agric. Field Attd.III	01	2/5/2012	24/1/2014	PEM
82	Taoheed Ojo	Agric. Field Attd.III	01	2/5/2012	24/1/2014	PEM
83	Ishola Ropo	Agric. Field Attd.III	01	2/5/2012	24/1/2014	PEM
84	Adedokun Israel	Agric. Field Attd.III	01	2/5/2012	24/1/2014	PEM
85	Ojo Olawale	Agric. Field Attd.III	01	2/5/2012	24/1/2014	PEM
86	Ogah Sunday	Agric. Field Attd.III	01	2/5/2012	24/1/2014	PEM
87	Azeez Taofeek	Agric. Field Attd.III	01	2/5/2012	24/1/2014	PEM
88	Dada Victoria (Miss.)	Agric. Field Attd.III	01	14/5/2012	24/1/2014	PEM
89	Adeyemo Solomon	Watchman	01	2/5/2012	24/1/2014	Security
90	Hammed Abiola	Watchman	01	2/5/2012	24/1/2014	Security
91	Solomon Oluremi	Asst. Exec. Officer	05	28/12/2011	24/1/2014	Audit

ANNEXURE VIII

LIST OF DEAD PENSIONERS IN 2014

S/N	NAME	DATE RETIRED	DATE OF DEATH	LOCATION
1.	Monkio, J.O.	5/6/03	January 2014	Headquarters
2.	Efunla Marcus	14/7/06	January 2014	Headquarters
3.	Kalu, J.O.	10/10/00	May 2014	Ibeku
4.	Ukwu, C.U.	10/10/00	May 2014	Ibeku
5.	Oladunmoye, J.	31/8/99	June 2014	Headquarters
6.	Ogbechie Pius	18/2/91	June 2014	Headquarters
7.	Awodele R.A.	31/12/00	August 2014	Headquarters
8.	Onasanya Lawrence	31/8/99	October 2014	Headquarters
9.	Echeng, P.E.	29/4/04	July 2014	Ajassor

LEGAL UNIT (Ikokoh L.U.)

1) **APPOINTMENT OF A NEW LEGAL RETAINER**

The start of the Legal Unit in 2014 began with the appointment of a new Legal Retainer in person of Barr. Kunle Faokunla, Principal, Kunle Faokunla Chambers, Oke-Ado, Ibadan, who was appointed on 22 January, 2014 after the retirement of Chief K.O. Latunji, on 31 December, 2013, having served the Institute as Legal Retainer for thirty one (31) years.

Barr. Kunle Faokunla immediately took over all the Institute's cases pending at the National Industrial Court, Ibadan.

The Institute's Management agreed that the sum of ₦100,000.00 which was also paid to Chief K.O. Latunji should be maintained for Barr. Faokunla and it would be paid bi-annually.

2) **LITIGATION**

Three new suits were received, in which the Institute and the Institute's Governing Board were sued. Below is the list of fresh suits, cases still pending at the various courts, the cause of action and the different stages of each suit.

Out of three fresh suits, two were concluded at the National Industrial Court, Ibadan, in 2014 and judgement given in favour of CRIN.

Also, the case of Mr. Ibrahim Suleiman which began in 2010, was concluded in 2014 in favour of CRIN as the court held that a staff on probation is not entitled to the processes or steps required for termination of his/her appointment.

Kindly find attached the report on cases in Court.

3. **LEGAL ISSUES**

a) The Legal Unit served as an advisory Unit to the Executive Director in Labour Matters between the Institute and the Federal Ministry of Labour, Oyo State chapter, when the Non-Academic Staff Union wrote to the Ministry of Labour for a reconciliatory meeting on the termination of appointment of 91 ex-staff in January, 2014.

b) Advise was given to Management on matters relating to the Odo-Ona Nla Youth movement and letters were written to the Presidency, Honourable Minister and some others were copied.

c) The Ugbenu Community in Abia State where CRIN Ibeku outstation land is situate, received a threat in December, 2014, from the Ugbenu Community member who wrote to the Institute through Barr. Obiora W. Abonyi on behalf of the Aketeke family claiming that the family gave out the land to the Institute on 14 April, 1983, based on certain conditions, which includes employment of some members of the family, assistance in project development within the family and community, payment of annual ground rent etc.
According to them CRIN has failed to fulfilled the above conditions and now they are requesting that CRIN, should re-negotiate its continued occupation of the land and fulfill the above conditions.
From investigation, it was established that some men from the Community spair-headed the move against CRIN without the knowledge and support of the traditional leader of Ugbenu who discussed with CRIN representative.
CRIN is to discuss further with the traditional leader and ensure the issue is settled amicably.

d) The Legal Unit, on behalf of the Executive Director issued out reminder letters to all Heads of CRIN Substations including the Officers-in-Charge, requesting them to facilitate the acquisition of all instruments or documents that was used to transfer ownership of the Substation lands to CRIN.
This action was to be carried out at the various State Ministries of Lands and Survey, where the Substations are situate.

e) On 13 November, 2014, a report was made to the Divisional Police Officer, Idi-Ayunre, Police Division, Oluyole Local Government, on the illegal entry into the Junior Staff quarters, by some ex-staff of CRIN, whose appointment were terminated on 24 January, 2014 and their quarters was sealed up in May, 2014.
Meanwhile, the issue of the termination of their appointment and ejection from the quarters is before the National Industrial Court, Ibadan and know order was given for them to return.

f) CRIN Uhonmora Substation was sued and fined the sum of ₦200,000.00 (two hundred thousand naira) for failing to file staff tax returns for CRIN staff of Uhonmora Substation, between January, 2012 to September, 2013. The case was struck out after CRIN paid the fine.

g) The Institute received a letter from Ondo State Lands Records Bureau requesting for the status of Ipinsa land because Ipinsa Community wrote to them to approve a layout on CRIN land at Ipinsa.

4. **ACHIEVEMENT**

a) **Favourable Court Judgement**

i) Non Academic Staff Union of Educational and Associated Institutions (NASU) V. CRIN and CRIN Governing Board.
On 24 June, 2014, the National Industrial Court delivered its judgement in the above mentioned case in favour of CRIN by striking out the case stating that the National Industrial Court lacked jurisdiction over a trade union matter that had not exhausted all means of alternative dispute resolution since the matter was still before a reconciliator.

ii) 12 retrenched staff of 1985 V. CRIN and Executive Director
This case was struck out by the National Industrial Court on 29 September, 2014, based on the preliminary objection raised by the Institute that the retrenchment in question took place in 1985, and going by the Public Officers Protection Act, the case was statute barred because it was not brought within three months after the retrenchment.

iii) Mr. Ibrahim Suleiman V. CRIN
The aforementioned case was struck out and dismissed on 03 October, 2014, at the National Industrial Court, based on the following reasons:

1) Mr. Suleiman's case lacked merit.
2) His termination while on probation was lawful.
3) He is not entitled to any relief sought for, that is, reinstatement, payment of his salary from May, 2010 till date and compensation.

b) **Posting of Staff to the Legal Unit**

In February, 2014, three staff were posted to the Legal Unit, namely:

a) Mrs. Fatima Suleiman Mohammed – Executive Officer
b) Mrs. Florence Ogunsanya – Secretarial Asst. II
c) Mr. Frederick Asein – Clerical Officer

The posting of the aforementioned staff greatly boosted the work of the Legal Unit, thereby making it more efficient and productive.

c) **Office of the Legal Unit**
With the kind assistance of the Executive Director and the co-operation of the Administration and Supplies Department, room A 46 in the Administrative building was allocated for the use of the Legal Unit until a more suitable office space is available.

d) **Imprest**
With the kind approval of the Executive Director, the sum of ₦20,000.00 was approved as monthly imprest for running the affairs of the Legal Unit, which was paid only in the month of August throughout 2014.

e) **Photocopier Machine/Desktop Computer set**
Again the Executive Director, approved the procument of photocopy machine, sharp AR-5618 for both Legal Unit and the Procument Division and a new desktop computer set. This has eased the work of the Legal Unit greatly.

f) **Furniture/Stationeries/other items**
Contrary to 2013, the Legal Unit was better equipped with sufficient tables, chairs, iron cabinet and other items highlighted in the attached table of items purchased in 2014.

g) **Training**
The Ag. Head, Legal Unit, Barr. L.U. Ikokoh (Mrs.), attended one week training on Alternative dispute resolution at the Administrative Staff College of Nigeria (ASCON), on 11 to 15 August, 2014 and the report/recommendation was written to Executive Director in which she stated the various ways to implement the knowledge gained at the training in relation to dispute between CRIN Management, Labour, Staff and other groups of people, commercial transaction and the ways to sustain peace in the Institute.

h) **Law Books**
In December, 2014, law books which includes Laws of the Federation of Nigeria, Labour Law Review and Law textbooks were procured for the Legal Unit to boost the Law Library and to be equipped with the knowledge of the Law.

CONSTRAINT

With the kind assistance of the Executive Director and the Institute's Management, some of the constraint reported in 2013 annual report were taken care of in 2014. For this reason the present constraint is limited to the following:

a) **Shortage of professional personnel**
The Legal Unit is aware of the Institute's effort to employ a legal officer, to relieve the present staff of the Unit of some of the duties. It is still expected that another legal officer will be employed when possible.

b) **Imprest**
The sum of twenty thousand naira (₦20,000.00) was approved as monthly imprest, for running the Legal Unit, but was paid only once August, 2014. The Legal Unit, humbly wish to use this opportunity to appeal for regularly imprest.

6. **EXPENDITURE**
In 2014, the total sum of ₦1,141,860.00 (One million one hundred and forty one thousand eight hundred and sixty naira) was released to the Procurement Division who purchased the following items on behalf of the Legal Unit. The above sum includes an imprest of the sum of twenty thousand naira (₦20,000.00) for the month of August, 2014.

PROCURED ITEMS FOR THE LEGAL UNIT IN 2014

S/n	Item	Unit	Unit price ₦	Cost ₦
	Books			
1.	Labour Law Review	20	2,000.00	40,000.00
2.	Laws of the Federation of Nigeria	14	17,860.00	250,040.00
3	Nigeria Tax Offences & Penalties	1	2,500.00	2,000.00
4	Company Secretary & Legal Adviser	1	2,000.00	2,000.00
5	Public Service Rules	3	1,200.00	3,600.00
6	Administrative Law	1	4,000.00	4,000.00
7	Legal Drafting	1	3,500.00	3,500.00
8	Law of Tort by Ese Malami	1	3,500.00	3,500.00
9	Commercial Law	1	1,000.00	1,000.00
10	Compendium of Tax Law	1	4,000.00	4,000.00
11	Human Rights in Nigeria	1	2,900.00	2,900.00
12	Injunctions and Enforcement of orders	1	5,000.00	5,000.00
13	Law and Practice of Industrial Relation	1	6,000.00	6,000.00
14	Drafting Corporate & Commercial agreement	1	12,000.00	12,000.00
15	Essential of Corporate Law	1	5,000.00	5,000.00
16	The Law & Practice of Public procument	1	5,000.00	5,000.00
	Other Items			
17	A4 Paper	4 packs	3,000.00	12,000.00
18	Markers	3 packs	500.00	500.00
19	Printer (3 in 1)	1	47,000.00	47,000.00
20	Flash 8gb	2	1,500.00	3,000.00
21	Large brown envelope	10 packs	800.00	8,000.00
22	Anti-virus multiple user	1	15,000.00	15,000.00
23	Standing fan	3 packs	10,000.00	30,000.00
24	DVD	2 packs	2,000.00	4,000.00
25	Desktop table	1	15,000.00	15,000.00
26	Window blind	18 metres	10,000.00	40,000.00
27	Generator (tiger 2.7)	1	35,000.00	35,000.00
28	Giant stapler	1	4,000.00	4,000.00
29	Giant Shapner	3 pieces	500.00	1,500.00
30	Photocopier toner	1 pack	12,000.00	12,000.00
31	Dust bin with cover	3 pieces	1,500.00	4,500.00
32	Toilet roll (full pack)	2 packs	4,250.00	8,500.00
33	Printer toner	1 pack	10,000.00	10,000.00
34	Small stapler	1	500.00	500.00
35	Desktop computer	1	158,000.00	158,000.00
36	Biro	1 pack	1,350.00	1,350.00
37	Pencil	1 pack	900.00	900.00
38	Envelope (official) smooth surface (box) medium	1 pack	2,300.00	2,300.00
39	Envelope (official) smooth surface (box) small	1 pack	1,850.00	1,850.00
40	Hard cover note book (dozen)	6 pieces	542.00	3,250.00
41	A4 Paper	1 pack	3,350.00	3,350.00
42	Harpic	6 pieces	317.00	1,900.00
43	Air freshner	6 pieces	320.00	1,925.00

44	Insecticides	6 pieces	708.00	4,250.00
45	Correction fluid (box)	1	75.00	75.00
46	Cellotape	1 roll	1,500.00	1,500.00
47	Power surge protector	1 piece	3,800.00	3,800.00
48	Steel framed leather chair	4 pieces	44,370.00	44,370.00
49	Office table	1	15,000.00	15,000.00
50	Executive table and chair	1 set	174,000.00	174,000.00
51	Double leaves steel file cabinet	1	104,000.00	104,000.00
52	Imprest for August	1 month		20,000.00
	Total			**1,141,860.00**

7. **CONCLUSION**

All staff of the Legal Unit wishes to appreciate the Executive Director and the Institute's Management, for the support given to the Unit so far, especially building up the law library and for the on-going reforms in the Institute. It may seem gradual but CRIN will get there.

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ANNUAL REPORT

OF THE

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2015

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COCOA PROGRAMME

Experimental Title: Assessment of sharp practices among farmers in cocoa farming in Nigeria: implications to sustainable improvement of cocoa production and trade

Investigators: Famuyiwa, B. S., Oduwole, O. O.
Malik, M. B. and Williams, O. A.

Introduction

The term sharp practices is described by Wikipedia (2015) as pejorative phrase to describe sneaky or cunning behavior which is within technical rules and law. Some other studies described it as misrepresentation, trickery, illegal and dishonest in business operations. This term can however, be applicable to agriculture and more specifically farming; this is to say misrepresentation and cutting corners in farming operations. It can also be said that sharp practices appears in every form of the qualifying terms along the value chain of all agricultural products and most especially cocoa. In farm practices, sharp practices have been identified to cause serious economic, social, and environmental problems hence, its actions are at variance with the objectives of sustainability.

Cocoa is one of the cash crops from the non-oil sector that contributes to the nation's Gross Domestic Product (GDP). It contributed 5% to the world market as stated by the Nigeria Investigative Reporting Project (NIRP, 2015) and serves as means of employment to over 2M families while some agro allied industries rely on cocoa beans as their raw materials. Cocoa has being discovered to play major roles in human health such as: prevents heart disease, fights fatigue, prevents diabetes, prevents hypertension, prevents breast cancer, arrests persistent cough, boosts brain power, reduces the risk of blood clot and boosts libido (Cocoa Producer Alliance, COPAL 2007, ICCO,2008, and NCDC, 2008).

However, in spite of all these qualities and its potential to improve the nation's economy, it has being established in separate studies by Asogwa and Dongo (2008), Lawal *et al* (2005) and Ogunjimi *and* Farinde (2012), that farmers face a lot of operational challenges such as pests infestations, soil infertility and climate change. Attempt to solve these problems have led to indiscriminate use of chemicals and other pesticides; which are equally described as sharp practices. As a matter of fact, Sosan and Akingbohungbe (2009) identified traces of pesticide residue in the blood serum and breast milk of some surveyed cocoa farm families. It has also being discovered that farmer practices in cocoa plantation if unguided, can damage the environment (Wikipedia, 2015). The findings of Sosan, et al., (2010) have attributed some health related issues such as; prostate cancer, developmental effect, reproductive defect, endocrine problems, headache, itching being predominant in cocoa growing areas to farmers' sharp practices in the use of pesticides. Consequently, farmers and stakeholders along cocoa value are being exposed to environmental hazards due to farmers' behavioral habits as a result of their sharp practices, socioeconomic factors, and inappropriate usage of pesticides. This has led to the International Cocoa and Confectionaries Organization (ICCO) (2008) to make concerted efforts in campaign against indiscriminate use of pesticides and Cocoa Alliance (2014) issued a warning letter to member states on the threat to stop exporting cocoa with pesticide residues above the Minimum Residue limit (MRL)

Africa produces about 71.62 % of the world cocoa production, America about17.89%, while Asia and Oceania contribute about 10.46% (ICCO, 2015). However, consumption pattern is skewed toward the less producing countries; European Union 36 %, North America 24 %, North America 24 %, Asia and Oceania 16 %, Latin America 10 %, Other Europe 10 % and Africa 4 % (ICCO, 2014). Sustainability in the pattern of production rests on consumption. Hence, those that dictate the quality of bean do not go into much production, but consume high, while those that produce high because of their low income are much into sharp practices.

Different interventions have emerged and are still emerging targeted towards sustainable agriculture, most especially in cocoa, in order to meet the world standard in the aspect of social, economic and environment. Sustainable farming definition can be deduced from the definition of sustainable development by International Institute for Sustainable Development (IISD) (2013) as farming that meets the needs of the present without compromising the ability of future generation to meet their needs. To achieve this, ICCO, (2008) came up with list of Good Agricultural practices (GAP) for cocoa to guide farmers' production. In 2004, there was an inauguration of National Cocoa development Committee that started the cocoa rebirth (NCDC, 2008). Also during President Jonathan's government in Nigeria, Cocoa Transformation Agenda (CocTA), which was an arm of Agricultural Transformation Agenda (ATA) was inaugurated to improve cocoa production both in quality and quantity (Babatunde, 2012).

However, studies have shown that traces of chemical residues have being discovered in breast milk and blood serum of those feeding on some products of cocoa beans and relatives of cocoa farm families Sosan and Akingbohungbe (2009). Consequently, there is a threat on the exportation of Nigeria cocoa due to some traces of chemical residues found in exported cocoa bean. Ogunjimi and Farinde (2012) Dongo and Asogwa (2009) have also traced these residues to indiscriminate use of pesticides. Farmers who happen to be at the lower ebb of the ladder determine cocoa quality through their practices. More importantly, the habits of stakeholders along cocoa value chain go a long way to determine the quality of cocoa and allied products produced for human consumption. This is justified by the request from the ICCO to the Stakeholders along the value chain, to adhere to Good Agricultural Practices by farmers to reduce the residues found in exported cocoa beans. In view of the forgoing, a study on the extent to which cocoa farmers who are the primary producer of cocoa beans exhibit unwholesome attitudes in their farm practices and the implications on sustainable cocoa production and trade became necessary. In order to produce quality cocoa beans, the attitude of farmers producing the beans needs to be redirected towards the consciousness of Good Agricultural Practices (GAP)

Objectives

The major objective of the study was to assess some major sharp practices in cocoa farming operations among farmers in Nigeria and their implications on sustainable production and trade. The specific objectives were to:

1. identify socioeconomic characteristics of the farmers;
2. assess major sharp practices among the farmers;
3. determine the level of sharp practices among respondents;
4. evaluate the extent of cocoa farming sharp practices and
5. deduce implications to cocoa production and trade.

Hypothesis

There is no relationship between cocoa farmers' sharp practices and yield in the study areas

Methodology

A multistage sampling procedure was used in selecting respondents for the study using CRIN geographical information system (GIS) generated land use/land cover in cocoa farms in Nigeria. Stage one involved purposive selection of five from six geo-political zones where cocoa is commercially grown in Nigeria. Stage two involved purposive selection of one state from each of the five geo-political zones (based on production levels; the highest cocoa producing state was selected) that support commercial production of cocoa, this gives a total number of five states (Ondo, Kogi, Abia, Cross Rivers and Taraba) from the fourteen states. At stage three, selection of two local government Areas (LGAs) which were purposively selected (on their levels of production; the highest and the lowest producing LGAs) from the list of LGAs to give 10 LGAs in all. Stage four was a random selection of one community from the lists of communities in each LGAs to give 10 communities while stage five involved systematic selection of 60 smallholder cocoa farmers from the list of cocoa farmers in each community to give 600 smallholders as the respondents for the study. A structured interview schedule was used to elicit information from the respondents while data were analyzed using descriptive and inferential statistical tools.

Development of scale to measure sharp practices among farmers in cocoa farming: From exhaustive review of literature, (Lawal *et al*; ICCO, 2008; Farinde and Ogunjimi, 2009; CRIN, 2009 and Wright and Boorse, 2010), fifty-four (54) sharp practices in cocoa farming were identified and standardized by six research Scientists; one from each discipline (Entomology, Pathology, Agronomy, Breeding, Processing, Soil protection and Nutrition, Economics and Extension) who scored each sharp practice. Practice with the score of 0.6 coefficients were considered appropriate for the study based on David's descriptor as explained by Subair (2007). Twenty nine sharp practices were finally considered. The 29 sharp practices were measured with a dichotomous scale of 1: 0, practiced with a score of 1 and none practiced with a score of 0. The data were subjected to descriptive and parametric analysis using SPSS 17.

Results and Discussions

Socioeconomic characteristics: The study revealed that about 46.2% of the respondents were between 41-60 years old with a mean age of 48.57 $\pm$ 14.08 standard deviation. This is an indication that middle aged group of the population are now going into farming. This supports sustainability as farming activities can only be handled by young people. Though youthful age may encourage sharp practices, in attempt to cut corners, it also revealed that majority (94%) of the respondents were male with an indication that, majority of the farm practices were handled by male. It corroborates the findings of Oladipupo, et al (2010) that farm work is skewed towards male because of gender inequalities. Table 1 also shows that respondents had mean farm size of 10.40 $\pm$ 2.0 ha, with a mean farm age of 32.30 $\pm$ 2.2 years. The study supports the findings of Oluyole and Sanusi (2010). However, the farmers' mean farm age was 32.33$\pm$ 20.03 years. Very few (18%) had farm equal or less than 10 years. About 48.67% were under 30 years of production, while 51.33% of the cultivated farms more than 30 years old. The result corroborates Ogunjimi and Farinde (2010) that cocoa production in Nigeria are affected by old age.

Majority (84.30%) had no extension contact. Farmers' contact with extension officers promotes access to appropriate information that supports sustainability. It implies that, the respondents did not have access to information.

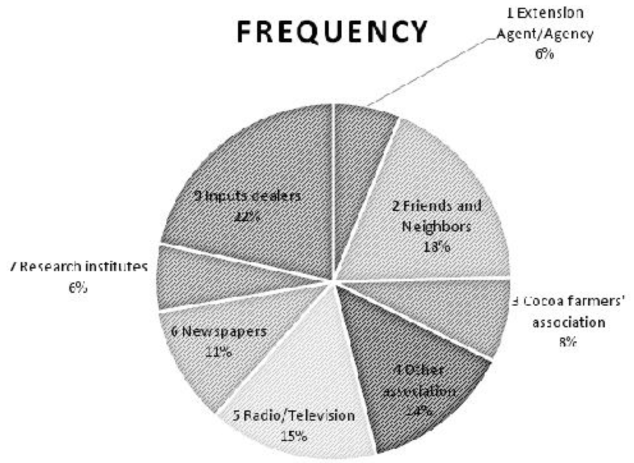
Table 1: Respondents' socioeconomic characteristics ~~N~~600

S/N	Varia bles	Frequency	Percentage	Mean	Std
	Age			48.57	14.08
	20 - 40	221	36.9		
	41 - 60	277	46.2		
	61 - 80	90	15.1		
	81 - 100	12	2		
	Sex				
	Male	564	94		
	Female	36	6		
	Farm Size				
	0.5 - 10 ha	448	74.7	10.4	2.0
	11 - 20 ha	86	14.3		
	21 - 30 ha	37	6.2		
	31 - 40 ha	5	0.8		
	> 40 ha	24	4		
	Age of Farm				
	<10	108	18	32.3	2.2
	11 - 20 years	109	18.2		
	21 - 30 years	75	12.5		
	31 - 40 years	122	20.3		
	41 - 50 years	107	17.8		
	51 - 60 years	50	8.3		
	61 - 70 years	9	1.5		
	> 70 years	[illegible]	3.3		
	Farmers' Extension contact				
	Yes	76	12.70		
	No	524	87.30		

Source: Field survey, 2013

Farmers' sources of information: Figure 1 shows that majority (70%) seek information from Input dealers and 60% from friends and neighbors. However, only about 20% seek information from research Institutes and 20% from extension agents. Information is the acquisition of knowledge on an interest issue. Information seeking behavior is vital in agricultural development. Result shows that, respondents do not seek information from experts. The possibility of being exposed to environmental hazards is high when farmers fail to seek information from experts. This is an indication that inappropriate sources of information as operational habit is high among the farmers and can encourage sharp practices. Consequently, this behavior does not encourage cocoa sustainability and could result in cocoa production that fall short of international trade standard.

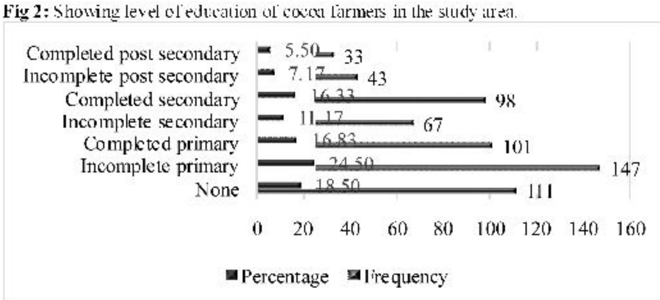
Figure 1: Distribution of respondents by sources of information =₦600



Source: Field survey, 2013
***Multiple responses were recorded**

Farmers' educational level: Figure 2 shows the respondents' educational level with majority (93.5%) being literate. Education is ability to read and write. The result shows an improvement in educational level of farmers compared with previous studies that describe farmers as illiterate. This may be due to the number of youths and retired civil servant entering into the profession of cocoa cultivation. There is high tendency for the respondent to understand different kinds of hazards. Though this does not reflect in their sharp practices. It can be deduced that literate farmers engaging in sharp practices do so because of quick financial returns.

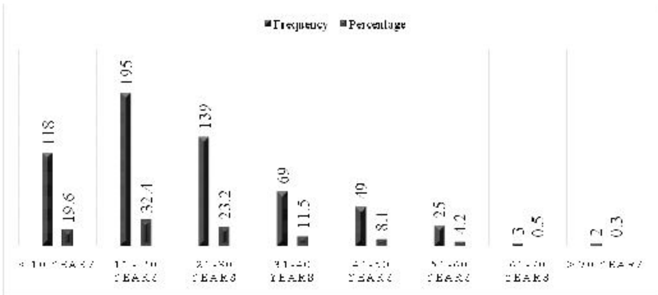
Fig 2: Showing level of education of cocoa farmers in the study area.



Source: Field survey, 2013

Years of farming experience: Figure 3 revealed that the respondents had many years of farming experience in cocoa farming with mean 24± 14.93 years. Experience supports sustainability but sometimes, brings over confidence on the job. Encarta (2009) opined that this may promote behavioral inflexibility.

Figure 3: Distribution of respondents by years of farming experience =₦600



Source: Field survey, 2013
Mean = 24 years
Standard deviation = 14.93 years

Farmers' production level: The study revealed, as shown in Table 1, that majority (62.83%) produced below 503kg/ha, with only 37.17% producing more than 503 kg as shown in Table 2. CRIN, (2011) opined that many factors contribute to farmers' low production. With production mean of 218.79kg/ha, militating factors could be some operational habits like; not seeking appropriate information, not attending meetings, use of banned pesticides and failure to collect required planting materials from the appropriate places. For instance a farmer who does not have information about CRIN's high yielding varieties will still plant the old varieties. Majority of these sharp practices have negative effect on cocoa yield and reduce the quality of beans with overall adverse effect on trade.

Table 1: Distribution of respondents by level of production of cocoa

Production Level	Scores	Frequency	Percentage
High Level	>503kg	223	37.17
Medium	>393<503	59	9.83
Low Level	393kg <	318	53.00

Source: Field survey, 2013
Minimum =11.67kg/ha
Maximum =993.06kg/ha
Mean = 218.79 kg/ha
Standard deviation =192.63
N=600

Farmer's practice of sharp practices: Table 2 shows the major behavioral activities in cocoa farming where there are sharp practices among farmers in rank order. The first group of behavior is during spraying such as 'not using protective glasses when spraying' ranking 1st with a mean of (0.83), followed by use of hand glove (0.82), wearing overall/protective and boot (0.81), while nose cover had (0.79). This category of behavior is followed by famers' sharp practices at breaking of pods (0.77) and in the use of pesticides. The list sharp practice according to the rank order is child labor with mean (0.47). However, Table 3 shows the overall categorization of the farmers into levels of sharp practices with majority (67.5%) showing high level of sharp practices

Table 2: Mean rank order of farmers sharp practices

S/N	Cocoa farmers' sharp practices	Mean	Std. Deviation	Rank
1	Not using protective glasses when spraying	0.83	0.38	1
2	Not using Hand gloves when spraying	0.82	0.38	2
3	Not using Overall/Protective when spraying	0.81	0.39	3
4	Not using Jungle boots during spraying	0.81	0.39	3
5	Not using nose protector when spraying	0.79	0.41	5
6	Use of sharp objects to break pod	0.77	0.42	6
7	Inappropriate disposal of unused chemicals	0.76	0.43	7
8	Using fertilizer/chemical not recommended for cocoa production	0.76	0.43	7
9	Using fertilizer/chemical not in the list of approved agrochemical	0.76	0.43	7
10	Inappropriate disposal of used chemical containers	0.76	0.43	7
11	Use of expired fertilizer/chemical	0.73	0.45	11
12	Use of polythene bags	0.72	0.45	12
13	Not washing of hands after chemical application	0.71	0.45	13
14	Drying of cocoa beans on bear concrete	0.71	0.46	13
15	Not reading chemical instruction before usage	0.71	0.46	13
16	Spraying of chemical against the wind	0.70	0.46	16
17	Inappropriate disposal of bad cocoa beans	0.69	0.46	17
18	Scooping/stirring chemical with bare hands	0.68	0.47	18
19	Not seeking right knowledge on recommended chemicals on cocoa	0.68	0.47	18
20	Use of unwashed containers for chemical application	0.68	0.47	18
21	Pod waste deposits as heap around farm area	0.67	0.47	21
22	Over dosage use of fertilizer/chemical	0.66	0.47	22
23	Application of fertilizer without prior test of soil/plant requirement	0.65	0.48	23
24	Taking advice from retailers	0.60	0.49	24
25	Not attending crop association meetings	0.59	0.49	25
26	fermenting for less than 5 days	0.59	0.49	25
27	Mixing of fertilizer/chemicals as single dose application	0.48	0.50	27
28	Deposits of sweating from fermented cocoa bean	0.48	0.50	27
29	Use of child labor	0.47	0.50	29

Source: Field survey, 2013

Level of sharp practices

Table 3: Farmers' levels of sharp practices

Level of sharp practices	Scores	Frequency	Percentage
High level	> 20	405	67.5
Low level	< 20	195	32.5

Source: Field survey, 2013
Mean = 20.06
Standard deviation = 8.03
Maximum = 29
Minimum = 00.0

Correlate of farmers' sharp practices and cocoa yield in the study areas: Table 4 showed that there is significant and positive relationship between cocoa farmers' sharp practices and yield at ($r= 0.09$; $p>0.032$). This implies that as farmers' sharp practices increase, there is increase in yield. This observation is supported by the study of Asogwa and Dongo (2009), in farmers' use of pesticides. Mohit (2008) also attested to the fact that, farmers in cocoa farming use pesticides indiscriminately which is referred to sharp practice to increase their yield.

Table 4: Correlation of farmers' sharp practices and cocoa yield in the study areas

Variable	r	r^2	P	Coefficient of determination	Decision
Farmers' yield	0.09	.0081	0.032	0.81%	Sig

Conclusion

The study concludes that, sharp practices among cocoa farmers are high in the study area. Though there was a significant and positive relationship between sharp practices and farmers' yield, it was discovered that the farmers were producing at a mean yield of **218.79 kg/ha** which is lower than expected under Good Agricultural Practices (GAP).

Implications for cocoa sustainable production and trade: The following implications were deduced from the study:

- Sharp practices among farmers was high
- Farmers' health and sustainable production will be affected by the identified sharp practices if not addressed.

  In relation to trade, adherence to Good Agricultural Practices, which prevent sharp practices will lead to:
- Increased quality and price of traded cocoa
- Improved trust in the cocoa value chain
- Increased efficiency in the cocoa value chain

Recommendations

- Enforcement of GAP for quality bean production.
- Training and retraining of young cocoa farmers on hazardous effect of sharp practices on sustainable cocoa production.
- Encouraging farmers to belong to farmers organisation in order to share knowledge from training.
- Target gender groups, especially women, should be given high consideration for training/ exposure.
- Policy on eradication of environmental hazards associated with cocoa farming operations and in all aspect of the cocoa value chain.

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Experiment Title: Somatic embryogenesis and plant regeneration from flora explants of newly released cacao (Theobroma cacao l.) Hybrids for Nigeria

Investigators: Mapayi E.F., Muyiwa A.A., Anagbogu C.F., Adenuga O.O., Olaniyi O.O. and Adepoju A.F.

Introduction

Cacao is one of the most important cash crops in Nigeria. Cacao production is mostly valued for its seed product, which has its niche in the world of confectionaries, cosmetics and pharmaceuticals. Currently, eight new cacao hybrids were released by Cocoa Research Institute of Nigeria (CRIN) to the country, which have better performance in terms of yield, bean quality and earliness to fruiting. Application of tissue culture techniques, in order to produce somatic embryos and consequently plantlet regeneration from the flora explants of these hybrids becomes germaine for efficient mass propagation and distribution across the country. Hence, this research was targeted at generating embryogenic callus from cacao flora explants (staminode and petal) of the eight new hybrids (Tc-1, Tc-2, Tc-3, Tc-4, Tc-5, Tc-6, Tc-7 and Tc-8) and subsequently plantlet regeneration.

Materials and methods

Floral explants were collected from TC-1, TC-2, TC-3, TC-4, TC-5, TC-6, TC-7 and TC-8 *cacao* hybrids, in hybrid pod garden at CRIN, Ibadan and subjected to *in-vitro* culture at CRIN tissue culture laboratory. The established cocoa tissue culture media protocol developed by the Pennsylvania state University tissue culture laboratory was adopted for the study. Unopened immature flower of medium large size with the base of filaments attached were collected in a clean McCartney bottle containing distilled water early in the morning between 8am-9am. The flower buds were then surface sterilized in 4% of sodium hypochlorite solution for twenty minutes by gently rocking the tube back and forth every five minutes while ensuring contact of the hypochlorite solution with the flower buds. The hypochlorite solution were then completely removed by thorough rising with sterile distil water and inverting the tubes several times. The flower buds; in sterile petri-dishes were transferred inside laminar flow hood (leaving behind as much water as possible) until ready for dissection. The flower buds were sliced across at a position approximately one-third of the flower length from the base of filament using a sterile scalpel No. 11 blade. Staminode and petal tissues were then extracted. Staminode and petal based explants were transferred into a petri-dishes containing 25-30ml of primary callus growth medium (P.C.G). Petri-dishes were then sealed with parafilm, labelled and kept in a box. Cultures were maintained in the dark at $27^oC \pm 2^oC$for fourteen days and were transferred into 30ml of the secondary callus growth medium (S.C.G 1) for another two weeks for the production of callus in the dark. This was also transferred after two weeks into secondary callus growth medium (S.C.G 2). Callus from SCG medium were sub cultured and maintained every two weeks in embryo development medium (ED) till large number of somatic embryos were developed.

Result and Discussion

There were formations of callus in both explants (Fig.1) at two weeks on PCG medium (fig.2 and 2b) and four weeks on SCG media (fig.3) for all the eight genotypes considered for the study. Production of embryogenic callus from *cacao* floral explants has been demonstrated and this offers a high potential in the future production of elite *cacao* variety (Li, Z. *et al*.; 1998) and efficient in vitro propagation systems in multiplication of the materials, conservation and in the gene transformation.

Conclusion

Production of embryogenic callus from the floral explants (staminode and petal) of the *cacao* genotypes has high potential for plantlet regeneration. Also, somatic embryo induction method (adopted from Pennsylvania protocol for *cacao*) was found to be effective and efficient in the somatic embryogenesis of these eight(8) *cacao* genotypes considered for the study.

Recommendation

Based on the fact that these genotypes callused at two weeks, it indicates that they can be directly selected for mass propagation and improvement programmes

Challenges

Lack of fund to move the callused materials to the Temporary Immersion Bioreactor Sytems (TIBS) in order to speed up its plantlet regeneration and electricity to power the Bioreactor.

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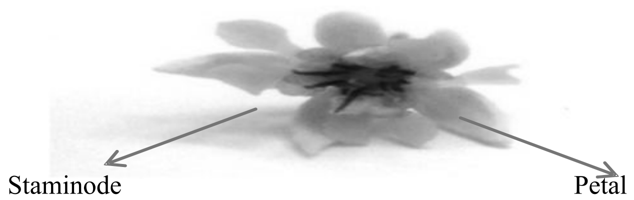

Fig.1: *Cacao* staminode and petal tissues

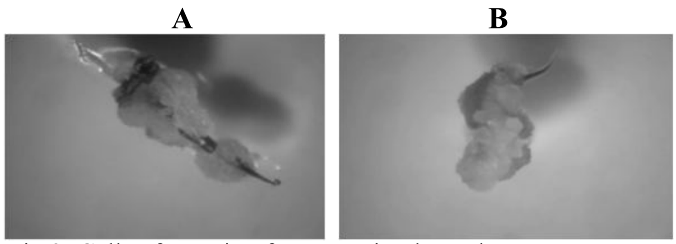

Fig.2: Callus formation from staminode explant at two weeks on Primary Callus Growth (PCG) medium. (A)TC-1, (B) TC-2

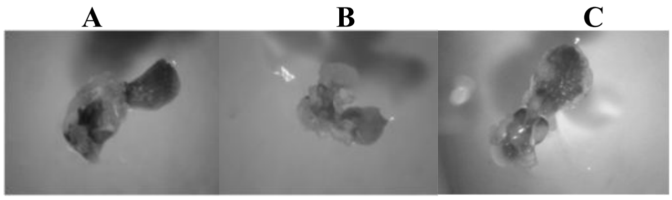

Fig.2b: Callus formation from petal explant at two weeks on Primary Callus Growth (PCG) medium. (A)TC-1, (B) TC-2, (C) TC-3

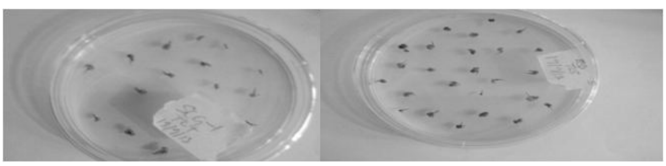

Fig.3: Callus formation at four weeks on Secondary Callus Growth (SCG) medium and Embryo Development (ED) medium

KOLA PROGRAMME

Experimental Title: On-Station Establishment of Kola Germplasm

Investigators: Oduwole, O.O., Adebiyi, S, Adenuga, O.O., and Ugioro, O., Mokwunye, F. C., Taiwo, N. and Adebowale, L. A.

Introduction

The Kolanut tree, both *Cola nitida* and *Cola acuminata* remains a source of wealth in West African countries, especially Ghana, Nigeria, Togo and Republic of Benin. The cultivation of kola in Nigeria is ecologically limited to the rainforest zones of the South as well as some areas of the Savannah region. *C. nitida* is internally traded and was observed to be growing abundantly in the bush of Otta by 1854. The cultivation was also noted in Egba Division and Labochi in 1902 after which the cultivation spread to the forest areas such as Ibadan, Osogbo and Otta through the influence of railway routes. Despite all efforts made by peasant farmers to increase kola production, there is still low productivity per tree/ha due to the problems of sterility and incompatibility.

The most commonly used species are *Cola nitida* [(Vent) Schott and Endlicher], *Cola acuminata* [(Pal de. Beuav) Schott and Endl] and *Cola anomala* (Schott and Endlicher). These, in addition to many uncultivated species are of great importance for their economic, pharmaceutical, confectionery, nutritional, socio-cultural and other uses. The average kolanut production per tree of *C. nitida* is 250 nuts per year, in contrast to an annual production of 3,000 to 10,000 kolanuts per tree per year recorded in experimental plantings which were hand pollinated (Morakinyo and Olorode, 1984). There is the need to solve the problem of self and cross incompatibilities and inefficient pollination, which are responsible for low yield. Solutions to the problem of fruit loss due to pest and disease attack, untimely harvesting as a result of cryptic green colour of the pod as well as unpleasantly tall height of the trees need to be proffered. There is the need to reduce the gestation period of the crop. All these will further encourage farmers' interest in the crop.

Objectives

The objectives of the study are:

i. To establish new Germplasm plots from the collected accessions at CRIN headquarters and sub-stations so as to expand the genetic base of the institute's kola Germplasm;
ii. To characterize the Germplasm using molecular markers so as to determine their genetic profile; and
iii. To select superior parents from collections for the development of improved varieties.

Methodology

In 2014, Purposive random sampling was employed to collect good varieties of Kola nuts from the farmers' farms in South western Nigeria. Out of the six states in the geopolitical zone, Osun, Ondo and Ogun state were purposively selected for high kola production. Two local governments were randomly selected for remarkable records in terms of quality and production in each of the selected States.

In each of the two local government areas, Two (2) kola nut producing communities were randomly selected to give a total of twelve (12) kola nut producing communities for the study. Samples of high yielding Kola nuts with known history both in Cola nitida and Cola acuminata were collected from farmers' farms.

The nuts collected were pre-germinated, raised in the nursery and successfully transferred to the field in August 2015.

Sample area

State	LGA	Villages	Varieties	Source	No. Introduced
Osun	- Odo-otin - Ife-south - Atakumosa West - Atakumosa East	Oke-otun, okuku, idi-obi, Ologiri. Ikoromaja Saga and Iyemogun	Olokuku (*C. nitida*) *C. acuminata* varieties	Ghana Okuku	5 1 3 4
Ondo	- Ile-oluji/oke-Igbo Idanre	Bamkemo Dagbaja Alade idanre	Olokuku (*C. nitida*)	-	9 1
Ogun	Shagamu	Solubo (Ode Lemo)	*C. nitida*	-	3

Results and Discussion

There was a protracted Industrial Crisis in the Institute from November through December, 2015, which made the research field inaccessible throughout this period, resulting in the loss of a reasonable population of the established genotypes. Irrigation activities were intensified on the genotypes that survived the extended period of lack of water supply from late December, 2015 through March 2016.

Major Obstacles: The major obstacles encountered in the execution of this project include:

a. Late release of fund: The late release of fund made it impossible to proceed to the fields for the establishment of these Germplasm. As a result, few members of the kola research team had to pre-fund the field establishment in August, 2015, so as to still utilize the available precipitation for successful establishment, after which the fund was released late October, 2015.

b. The Industrial Crisis that occurred in the Institute from November through December, 2015 made the research field inaccessible, especially for irrigation during the dry season. Consequently, a good number of the successfully established plants were lost. Only forty-five (45) stands of the plants survived the 2015/2016 dry season.

References

Morakinyo, J.A. and Olorode, O. (1984). Cytogenetic and Morphological studies on *Cola acuminata* (P.Beauv). Schott and Endlicher; *Cola nitida* (Vent) Schott and Endlicher and Cola acuminata x Cola nitida F_1 Hybrid. *Café Cacao*, *The*. Vol xxviii No 4, 1984

Experimental Title: Synergistic effects of organic and inorganic based fertilizers on soil, leaf chemical properties and growth performance of kola (*Cola nitida*)

Investigators: Adejobi, Kayode Babatunde

Introduction

Kola is a tree of tropical rain forest and a member of the family *sterculiaceae* (Opeke, 2005) about 40 kola species have been described in West Africa. However, the kola species of economic importance in Nigeria are *Cola nitida* and *Cola acuminata* (Daramola, 1978) . The use of the kola nut like the coffee berry and tea leaf, appears to have ancient origins, it is chewed in many West African cultures, individually or in social setting, to restore vitality and ease hunger pains. Kola nut is an important part of the traditional and spiritual practices of culture and religion in West Africa, particularly in Niger and Nigeria (Aina, 2004). Kola nuts are used as a religious object and sacred offering during prayers, ancestors' veneration and significant life events, such as naming ceremonies, weddings and funerals. They are also used in traditions divination system called obi divination (Epaga, 2003)

Nigeria is the leading world producer of kola nut. It is estimated that Nigeria currently produces 70% of the world kola nuts with annual production of 200,000 metric tonnes of fresh nuts (Asogwa, 2012), although only 10% of this amount is exported, the rest is consumed locally. Inspite of the immense benefits of kola, many factors have been limiting its production in Nigeria. Among these factors are poor agronomic practices, ageing kola farms (Adebiyi et al., 2011), partial and total sterility, inefficient natural pollination, field and storage pest and diseases (Daramola, 1978) and poor soil fertility (Asogwa ,2011). William et al.(1991) reported that because of the high rainfall, soil of humid tropics are usually leached to the extent that they contain lower level of plant nutrient that those from dryer regions and because alkaline substances (Ca, Mg, K and Na) are leached out , tends to be acidic in nature. It has also been reported that Nigeria soils are largely deficient in major essential soil nutrients. Hence, multiple nutritional deficiencies and lower yield are common occurrence (Agboola and Sobulo, 1981)

Effort to increase the soil nutrient status through the use of chemical fertilizers by farmers is rather limited due to high cost of fertilizers and /or their poor availability to farmers locally. Thus, there is need to identify locally available organic fertilizers which can be used to improve the fertility of the soil used in raising kola seedling in the nursery which usually takes about 8 to 12 months (pre-nursery and nursery proper). Recent research on fertilizer has reviewed the potentials of some organic fertilizers as cheap, readily available, affordable, and adoptable. The use of animal and crop wastes in form of farm yard manure (FYM) or compost is common practices in majority of the farm communities. Several studies have shown that ash derived from cocoa pod husk , saw dust and oil palm bunch waste increased availability of nutrients in the soil and consequently enhanced growth performance of the crops such as coffee, maize , cassava and vegetable (Ojeniyi et al. 2010; Adejobi et al. 2011). Also, the importance of plant nutrients content in human waste such as urine has never been realized as an alternative source of fertilizer for raising kola seedling in the nursery. However, there is paucity of information on the combine use of different levels of human urine (HU), goat dung (GD) and kola pod husk ash on growth performance of kola seedlings and chemical properties of kola soil. The use of these wastes will assist in environmental sanitation and nutrient recycling in both farms and urban communities.

The objective of this study therefore was to evaluate the combine effects of human urine, Goat dung and kola pod husk ash on the chemical properties of soil and growth performance of young kola seedlings in the nursery.

Materials and Methods

Experimental location: The trial was conducted at the experimental plot of Cocoa Research Institute of Nigeria (CRIN), Ibadan, on latitude 07° 10°E and longitude 03° 52°E in the humid tropical and rainforest zone of Nigeria. The rainfall is between 1200mm -1500mm per annum and a daily average temperature of 30.10°C.

Pre-planting, soil sampling and analysis: The top soil to be used for this trial was collected from 0-15cm depth on the site and mixed thoroughly. The representative samples were taken to the laboratory, air dried and sieved with 2mm sieve and ready for routine analysis. The soil pH (1:1 soil/water) was read on the pH meter. Organic matter was determined using wet oxidization method through Chromic Acid Digestion (walkey and black ,1934) soil P was extracted by Bray P, extractant and the extract was developed into murphy Blue Coloration and determined on a spectronic 20 at 882 um(Murphy and Riley,1962). The soil k, Ca, Mg and Na were extracted with 1M NH_4OAC pH 7 and the contents of K, Ca and Na were read on the flame photometer (Jenway clinical PFP7, designed and manufactured by Jenway Ltd. Felsted Dunmow, Essex CM6 3LB, United Kingdom) while the Mg content was determine on the Atomic Absorption Spectrophotometer (Movaspec 11 visible spectrophotometer , manufactured by Pharmacia Biotech Biochron Ltd, Cambridge, England). Total N was determined using the microkjedahi method (Jackson, 1964).

Collection, processing and chemical analysis of kola testa (KT): Kola pod husk was obtained from kola processing unit of CRIN, Ibadan. It was sun dried for a week and then burnt to ashes. After cooling the ash collected was bagged and kept in dry place before application. The goat dung was obtained from nearby pen in Akure, Ondo state.

The % nitrogen was determined by weighing 2g of each organic material into a digester flask and 5ml of H_2SO_4 with selenium and copper sulphate tablets were added. After 5ml of NaOH was added, the distillate was collected and boric acid was added with an indicator before it was filtrated with O.I.M HCl. Furthermore, two grams of each organic material was weighed into a clean dry digestion tubes to determine the P, K, Ca and Mg contents. 25ml of HNO_3 was added down the neck of the flask and swirled to ensure that the organic material was thoroughly wetted. 5ml of H_2so_4 and 5ml of perchloric acid ($HClO_4$) were added and the mixture was swirled again. This was then placed at the digestion block and heated carefully by ensuring that the samples did not froth. Digestion was continued until the samples were clear and acids were completely volatized. The samples were allowed to cool and 10ml of distilled water was added; filtration into 100ml volumetric flask was done and the filtrate was left to cool before it was filled to the mark with distilled water. For phosphorus (P) 20ml of phosphorus vanado molybdate solution was added and allowed to stand for at least 2 hours. The colour absorbance was measured on spectronic 20 at 442um. Meanwhile, the % k, Ca and Na contents, an aliquot was measured into 100ml flask and diluted to mark. 1ml of the sample solution was taken, and the flame photometer was adjusted, this was followed by the aspiration on the diluted sample solution. The solution was read and later converted to mg/kg. The mg content was determined using the atomic absorption spectrophotometer.

Human urine was also collected from a house hold in CRIN, Ibadan. The collected urine solution was transported 3km to the nursery where it was stored for 2 weeks and later applied to the soil. Twenty five (25ml) milliliter of urine solution was analyzed using the aforementioned methods.

Experimental hypothesis: Three hypotheses were tested using independent variable (X1) and dependent variables Y1 for kola seedlings .The independent variables (X1) were defined as organic materials such as Human Urine / Kola Pod Husk Ash mix, Human Urine / Goat Dung Manure mix, Human Urine/ Kola Pod Husk Ash/ Goat Dung Manure mix.

The dependent variable (Y1) were defined as comprising plant height , number of leaves , leave area , stem girth , number of branches, root length and shoot length and soil and leaf N, P, K, Ca and Mg, soil pH and O.M.

Each null hypothesis (H0=U) was tested to determine whether significant statistical relationship existed between each dependent and the observed independent variables.

The three hypotheses tested were as follows:

1. There is no significant relationship between the organic materials and the plant height, number of leaves, stem girth, number of branches, leaf area, root length and shoot length of kola seedlings.
2. There is no significant relationship between the organic materials and soil N, P, K, Ca, Mg, PH and O.M compositions.
3. There is no significant relationship between the organic materials and leaf N,P, K, Ca and Mg of the Kola seedlings

Pre-nursery and nursery establishments: In July 2010, disease free kola nuts (*C.nitida*) were obtained from Kola Processing Unit, CRIN, Ibadan. The nuts were planted in wooden box filled with sawdust and watered. The nuts germinated and allowed to grow in the pre-nursery for 8 months. During this period, the germinated seedlings were watered and weeds were controlled manually. The bulk soil samples (0-15cm depth) were sorted to remove stones and plant debris and 2.5kg of the soil was placed into the poly bag (25cm X 13cm). There were eight treatments in all and the rates of application were 400ml Hu + 5t/ha KPHA, 400ml Hu +20t/ha GD, 400 ml Hu+ 5t/ha KPHA + 5t/ha GD, 400ml Hu +5t/KPHA + 10t/ha GD, 400ml Hu + 5t/ha KPHA + 15t/ha GD, 400ml Hu + 5t/ha KPHA +20t/ha GD, 400kg/ha Urea and the control (no fertilizer; no manure). All the treatments were replicated three times and arranged in a completely randomized design (CRD). The treatments were applied at the time the pre-germinated kola nut seed was planted into each poly bag. After four weeks of planting in the nursery, plant height, number of leaves, stem girth, number of branches and leaf area of kola nut seedlings were measured. These growth parameters were measured at every four weeks interval up to 24 weeks after planting.

Weeding of site was started at 3 weeks after planting and repeated at 6, 9 and 15 weeks after planting. At the termination of the experiment (24 WAP) in the nursery, the seedlings were carefully removed from the poly bags for the measurement of fresh root and shoot weights, root and shoot lengths. They were oven dried and thereafter dried root and shoot weights were taken before finally analyzed for N, P, K, Na, Ca and Mg contents. Post planting soil sample were also taken from each treatment, at the termination of the experiment, air dried and sieved for analysis of soil N, P, K, Ca, Mg pH, and O.M .

Statistical Analysis: The growth data collected were analyzed using ANOVA. The treatment means were compared using the Duncan's multiple Range Test ($p<0.05$)

Results and Discussion

Both the physical and chemical properties of the soils used for raising of kola seedlings in the nursery are presented in Table 1. According to the results of the particle size analysis, the soil was texturally sandy loam belonging to Onigambari series and alfisol (soil survey staff, 1999). Based on the established critical levels for soils in south western Nigeria, the soil was acidic with pH of 5.24 and low in organic matter (0.54%) compared to the findings of critical level of 3% organic matter (Agboola and Corey, 1976). In addition, the total % nitrogen (0.13%) was found to be less than 0.15% N, which is considered as the optimum for most crops including kola (Sobulo and Osiname, 1981). While the available P (2.02mg/kg) was less than 10mg/kg P, which is considered as adequate for the production of crops (Agboola, 1982).

The exchangeable K and Mg (0.52cmol/kg and 2.39cmol/kg) were higher than the critical levels of 0.2cmol/kg and 0.9cmol/kg which were considered optimal for most crops (Agboola, and Corey, 1976). Among the organic residues used , kola pod husk ash (KPHA) had the highest pH (8.21) and P (32.62) followed by human urine (6.80) while goat dung had the lowest pH and P of (6.38) and (16.36) respectively (Table 2). In particular human urine had the highest N, K, Ca, and Na concentrations and this was followed by kola pod husk ash. The goat dung was indicated to be fairly high in NPK and Ca (Table 2). Relative higher N obtained from kola pod husk ash could be attributed to the fact that kola pod husk could be a good N source to that extent that volatilization of N during burning could not reduce it N content to a critical level of 0.15% required for most crops.

The plant height, number of leaves, stem girth, number of branches, leaf area, root and shoot, weight of kola seedlings under different organic fertilizers are presented in tables 3 and 4. The results showed that combined application of 400ml HU + 20t/ha GD increased significantly ($p<0.05|$) the plant height, number of leaves, number of branches, shoot length, and fresh shoot weight of kola seedlings relative to urea treatment and the control. While combined application of 400ml HU +5t/ha KPHA + 15t/ha GD gave significant higher stem girth, leaf area, and dry root weight relative to the urea fertilizer treatment and the control. This study showed that human urine , goat dung and kola pod husk ash , seemingly waste products of man ,animal and plant respectively could be used as fertilizers to increase availability of N,P,K, Ca, and Mg in the soil and their uptake by kola plants thereby leading to enhanced growth performance of kola. This result attests to the synergistic relationship that exists among the amended organic manures and their resultant complimentary effect in enhancing vegetative growth of kola seedlings. The current result is consistent with the findings of Ayeni (2010) who reported that cocoa pod ash combined with NPK 15:15:15 fertilizers significantly ($p<0.05$) gave the highest fruit yield of tomato. Similarly, Makinde (2010) found out that vegetative growth of crops was engendered by organic manure especially kola pod husk, cocoa pod husk and NPK fertilizer. Also Upreti (2011) observed that the crops yield (potato, rice , radish onion and wheat) increases when urine is applied in split and efficacy of urine increases with the supplement dose of phosphorus (p) and potash (k) from chemical fertilizers to increase yield of different crops as compared to urine applied in single dose at the time of planting. The poor growth of the kola seedlings in the nursery under the control treatment was consistent with the low nutrient status of soil N, P, Mg, OM and pH, this fact is supported by Agboola (1982) who had identified poor soil fertility as the moving factor in reducing crop yields. This observation was also corroborated with the work of Moyin-Jesu, (2008) which identified deficiency symptoms of yellow coloration , purple coloration and marginal burning of leaves signifying N,P, K deficiencies in tropical Africa soils.

Table 1: pre-planting physiochemical properties of the soil.

Soil properties	value
Physical properties	
Sand	656.69g/kg
Silt	189.78g/kg
Clay	153.53g/kg
Textural class	sand loam
Chemical properties	
pH ($H_2 0$) 1:1	5.24
Organic Carbon	1.32g/kg
Organic Matter	0.54%
Total Nitrogen	0.13g/kg
Available Phosphorous	2.02mg/kg
Exchangeable bases	
K^+0.51cmol/kg	
Ca^{++}	0.48cmol/kg
Mg^{++}	2.39cmol/kg
Na^+	0.89cmol/kg
Mn^{++}	0.04cmol/kg
Exchangeable acidity	
Al^{+++}	0.24cmol/kg
H^+	0.12cmol/kg
ECEC	4.27cmol/kg

Table 2: chemical analysis of human urine(HU), kola pod husk ash (KPHA) and goat dung (GD) used as organic fertilizers

Treatments	pH H_2O (1:1)	C/N	OM %	N %	P mg/kg	K Cmol/kg	Ca Cmol/kg	Mg cmol/kg	Na Cmol/kg
Human urine	6.8	-	-	6.92	21.37	7.88	7.50	2.50	5.83
kola Pod Husk Ash (KPHA)	8.21	10.0	2.8	3.26	32.62	3.93	6.90	3.80	2.19
Goat Dung(GD)	6.38	6.2	4.8	1.26	16.36	2.29	3.40	1.90	1.62

Table 3: Effects of different levels of HU and KPHA on growth parameters of kola seedlings in the nursery

Treatments	Plant height (cm)	Number of Leaves (cm)	Stem Girth (cm)	Numbe of Branches	Leaf Area (cm)	Root Length (cm)	Shoot Length (cm)
400mlHU+5t/ha KPHA	32.74ab	15.16bdc	0.97ab	3.58ab	42.66b	28.50ab	39.16ab
400mlHU+20t/ha GD	38.27a	21.44ab	0.94ab	4.35a	41.01b	19.93b	45.90a
400mlHU+5thaKPHA+5t/ha GD	34.79ab	13.83dce	0.87ab	3.14ab	39.31b	30.83a	39.33ab
400mlHU+5t/haKPHA+10t/ha GD	33.65ab	8.29e	0.83ab	2.72ab	55.32ab	19.43b	29.00b
400mlHU+5t/haKPHA+15t/ha GD	35.70ab	17.77abc	1.03a	3.76a	64.22a	29.80a	39.73ab
400mlHU+5t/haKPHA+20t/ha GD	35.88ab	21.66a	1.01a	3.70a	58.19ab	28.90ab	40.83ab
400kg/ha urea	28.56b	9.73de	0.76b	1.89b	44.51b	30.04ab	34.47b
Control	28.09b	13.66de	0.80b	2.00b	40.05	19.33b	29.77b

Treatments means within each column followed by the same letters are not significantly different from each other

Table 4: the yield parameters of kola seedlings 24 weeks after planting under differnet levels of fertilizers

Treatments	dry shoot weights (g)	fresh root Weights (g)	dry root weights (g)	fresh shoot weights (g)
400mlHU+5t/haKPHA	12.76ab	4.64b	20.28ab	8.20abc
400mlHU+20t/haGD	9.58b	4.91b	32.13a	11.55ab
400mlHU+5t/haKPHA+5t/haGD	12.17ab	4.55b	15.15bc	6.79be
400mlHU+5t/haKPHA+10t/haGD	6.56b	5.76b	7.27b	3.45b
400mlHU+5t/haKPHA+15t/haGD	14.43ab	8.10a	23.32b	10.10abc
400mlHU+5t/haKPHA+20t/haGd	21.53a	5.81b	27.64ab	13.86a
400kg/ha urea	22.83a	5.49b	21.90b	6.74bc
Control	16.43ab	7.05b	24.46b	10.67ab

Treatments means within each column followed by the same letters are not significantly different from each other

Table5: post-planting physiochemical properties of the soil

Treatments	Soil pH (H_2O) 1:1	OC g/kg	OM %	N %	P mg/kg	K cmol/kg	Ca Cmol/kg	Mg Cmol/kg	Na Cmol/kg
400mlHU+5t/ha KPHA	6.93c	1.40b	2.41b	1.12b	17.05a	0.59b	4.31ab	1.50ab	0.40ab
400mlHU+20/ha GD	7.12b	2.04ab	3.50a	2.18a	8.65f	0.88a	3.50d	1.20c	0.37b
400mlHU+5t/haKPHA+5t/ha GD	7.13b	2.01ab	3.47a	1.17b	10.29d	0.41c	4.60a	1.40ab	0.45ab
400mlHU+5t/haKPHA+10t/ha GD	6.53d	3.27a	2.77b	1.14b	10.33d	0.42c	4.00bc	1.50ab	0.65a
400mlHU+5t/haKPHA+10t/ha GD	6.55d	1.97ab	3.40a	2.17a	13.41c	0.46c	3.90c	1.80a	0.39b
400mlHU+5t/haKPHA+20t/ha GD	7.36a	2.05ab	3.53a	2.18a	4.12g	0.11e	2.90e	1.30bc	0.13d
400kg/ha Urea	6.01e	2.53ab	1.36c	2.22a	13.69b	0.32d	4.30ab	1.60ab	0.33c
Control	5.96f	2.78ab	0.51d	0.89c	9.57e	0.30d	3.80cd	1.00c	0.27cd

Treatments means within each column followed by the same letters are not significantly different from each other

Table 6: leaf chemical composition after 24 weeks of treatment application.

Treatments	N %	P Mg/kg	K Cmol/kg	Mg Cmo;/kg	Ca Cmol/kg	Na Cmol/kg
400mlHU+5t/ha KPHA	2.25bc	46.13a	4.86c	32.00a	36.00dc	1.59b
400mlHU+20t/ha GD	2.88a	29.99bc	8.64a	18.59c	68.88a	0.49d
400mlHU+5t/haKPHA+5t/ha GD	2.60a	19.21d	5.54b	14.04	33.31e	1.74a
400mlHU+5t/haKPHA+10t/ha GD	2.74a	19.29d	7.77a	25.00b	57.56a	0.55c
400mlHU+5t/haKPHA+10t/ha GD	2.39b	18.12d	7.45a	18.81c	45.26b	0.40f
400mlHU+5t/haKPHA+20t/ha GD	2.78a	21.05cd	4.82c	32.00a	60.00a	0.50d
400kg/ha Urea	2.15bc	19.47d	4.04d	33.33a	40.71c	0.41ef
Control	0.04d	7.17e	2.67e	7.25d	3.36e	0.21g

Treatments means within each column followed by the same letters are not significantly different from each other
Effects of both organic and inorganic fertilizers applied on post planting physiochemical properties of the soil are presented in table 5. Different organic fertilizers applied increased significantly ($P<0.06$). The soil pH, OM, N, P, Mg compared to the control (Table 5). This observation did not deviate from the works of Ojeniyi and Adejobi (2002). Swift and Anderson (1993) reported that organic manure increased soil N, OM, P, K and pH and also micronutrients which are absent in conventional N,P,K 15:15:15 fertilizer. The significant increase in soil pH by the use of 400ml Hu + 5t/ha KPHA and 20t/ha GD compared to other treatments was traced to its high K and Ca as a result of the synergy among the amended organic manure and could be effective as liming materials. The soil PH had been reported to influence nutrient uptake and available to crops for optimum growth (Gordon, 1988). Meanwhile the NPK fertilizer gave the best value of soil N as compared to other treatments and control. The leaf analysis of the kola seedlings for different organic fertilizer sources is presented in table 6. The results showed that there were significant increases ($P<0.05$) discovered in the leaf N, P, K, Ca, Mg contents as compared to the control. 400 ml HU+ 20t/ha GD increased the kola leaf N, K and Ca contents compared to the NPK fertilizer and the control; however, 400 ml Hu + 5t/ha KPHA was found to increase the leaf P more than other treatments and the control.

Recommendation and Conclusion

Some selected organic manures and NPK fertilizers were studied in terms of their effects on soil, leaf chemical properties and growth performance of kola in the nursery. It was proved that, amended form of goat dung and human urine with kola pod husk ash increased the soil, leaf and growth performance of the kola seedlings in the nursery . For this reason, farmers are encouraged to adopt the use of amended goat dung and human urine especially 400ml Hu + 20t/ha GD. Combination of more than two organic sources might not be necessary.

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Experimental Title: Evaluation of the potential use of human urine amended with cocoa pod husk ash as nutrient sources for growth performance of kola (cola nitida) in south-western, Nigeria

Investigators: Adejobi, Kayode Babatunde

Introduction

Kola nut is caffeine –containing nut of evergreen trees of the genus cola, primarily the species *Cola acuminata* and *Cola nitida* It is chewed in many west Africa cultures, individually or in a group setting .It is often used ceremonially, presented to chiefs or presented to guests. Kolanut (C*ola nitida*) are also source of essential oils and alkaloids which have utilization in the preparation of beverages and pharmaceutical products and for flavoring in confectionary industry. It is also used as masticatory for stimulating effect. Because of its economic importance, the young plant should be raised in nurseries using fertile topsoil rich in organic matter. However, it is often difficult to obtain adequate suitable topsoil due to deforestation. Egbe et al (1989) observed that kola soils in Nigeria had low exchangeable K, N and P. widespread deficiency of B and Cu was also reported. The use of animal and crop wastes in the form of farmyard manure (FYM) or compost is a common practice in majority of the farm community in Nigeria. But the importance of the plant nutrients content in human waste has never been realized as an alternative source of fertilizer for crop production. Out of the human excreta i.e. faeces and urine, urine has high nitrogenous fertilizer value than faeces. Urine contains up to 0.9:0.12:0.26% of N, P and K respectively (Vnneras et al 2004). Urine is quick acting fertilizer rich in nitrogen can be applied directly to the soil as it is entirely sterile product and the health risk from the use of urine has been found to be negligible (Hoglund et al 2000). Cocoa pod husk is an organic source of fertilizer in Nigeria with about 800,000 tones generated annually and is often wasted. It is advised that the husk be burnt into ash as a method of farm sanitation and can be applied to soil as an organic fertilizer. Cocoa pod husk ash acts slowly and contains organic matter, high K and P but low in N. Both human urine and CPHA materials can complement each other to match the needs of crops. Nigeria soils are very deficient in nitrogen content low in phosphorous and potassium content (Ojeniyi et al 2009). Hence nitrogenous fertilizer is the necessary supplement on soil in order to increase the productivity of the country and about 1,927,971 tonnes of chemical fertilizer (mostly urea) is imported in Nigeria in a fiscal years 2005-2010(IFDC, 2012). It is estimated that an adult excrete about 550 litres of urine per year (Esrey et al, 1998). 550 liters of urine is calculated ton have 4.0kg of nitrogen, 365g of phosphorous and 1kg of potash (vinneras and

Jonson 2002). Nigeria total population in year 2006 was about 150,000,000. If only about 50% of total population of Nigeria starts to collect urine, it is required to about 666:60:126 thousand tones urea, triple super phosphate and muriate of potash respectively which can totally fulfill the demand of chemical fertilizers in Nigeria and can also save the foreign currency needed to import these fertilizers. Experiments in other countries have proved that nutrients in urine are easily accessible to plant and effective as chemical fertilizers. In Nigeria very little research has been carried out on the use of human urine amended with cocoa pod husk ash as nutrient sources for growth performance of kola seedlings. (Egbe and olaniran, 1980). However, the use of chemical fertilizers on kola production is hindered by its scarcity, high cost, incomplete nutrient supply and possible enhancement of soil acidity in case of N fertilizers (Egbe et al 1989). There is need to study cheap, locally sourced human and agricultural waste that could enhance balance crop nutrition.

Therefore the objective of this study was to evaluate the potential use of human urine amended with cocoa pod husk ash as nutrient sources for growth performance of kola

Materials and Methods

The experiment took place at the research farm cocoa research institute of Nigeria, Ibadan (07^0 10, 03^0 52^0E) in the rainforest zone of Nigeria between 2010 and 2011. The annual rainfall is between 1200-1500mm per annum while the average temperature is 30.1^0C. The soil is texturally sandy loam belonging to Onigambari series and an alfisols (soil survey staff, 1999).

Soil sampling and analysis before planting: Soil samples (sandy loam) used in the experiment were randomly collected from 0-15cm depth , mixed thoroughly and the bulked sample was taken to the laboratory , air dried and sieved to pass through 2mm screen for analysis. The soil pH (1:1 soil/water) was read on the pH meter. Organic matter was determined by wet oxidation method (A.O.A.C. 1970). Soil P was extracted by the Bray P1 extraction and measured by the Murphy blue coloration and determined on a spectronic 20 at 882 um (Jackson 1965). Soil k ,Ca and Mg were extracted with 1m NH4 DAC, PH7 were determined with flame photometer; Mg was determined with atomic spectrophotometer. The total nitrogen was determined by the microkjedahi method in which the distillate is filtrated against the boric acid (AOAC, 1990).

Sources and preparation of organic fertilizer: The cocoa pod husk (CPH) used for the experiment was obtained from the crop processing unit of cocoa research institute of Nigeria, Ibadan. The Cocoa Pod Husk (CPH) was dried for 3 weeks and then burnt to ashes. After cooling the ash collected was bagged and kept in dry place.

Two (2) grammes of CPHA were analyzed. The nitrogen content was determined by kjedahi method (Jackson 1965), while the determination of other nutrients such as P,K,Ca,Mg and Na were done using the wet digestion method based on 25-5-5ml of HNO_3- H_2SO_4-$HCLO_4$ acid. The K and Ca nutrient were read on the flame photometer while Mg, Fe, cu, Zn and Mn were read on the atomic absorption spectrometer. The P content was developed in yellow coloration with Vanado Molybdate solution and read on a Spectronic 20 at 442um. The organic carbon (%) was determined by wet oxidation method through chronic digestion (walkey and black, 1934).

Human urine was also collected from a household in CRIN, Ibadan. The collected urine solution was transported 3 km to the nursery where it was stored for two weeks and later applied to the soil. Twenty five (25ml) milliliter of urine solution was analyzed using the aforementioned methods.

Pre-nursery and nursery establishment: Matured fruits of kolanut were collected from the kola plantation in CRIN, Ibadan. The seeds were obtained after extraction of the fruits, its mucilage washed and air dried for 72 hours at room temperature to remove moisture. Two seed box of (90 X 60 X30 cm) size were filled with saw dust and the mature seeds of kolanut were planted. Cultural practices such as weeding and watering were carried out as necessary. The planted kolanut seeds germinated after between 25 -35 days and were transplanted to the nursery. The bulk soil samples taken (0-15cm) was sieved to remove stones and planted debris and 2.5 kg of the sieved soil was placed into the polyethene bag. (25 cm X 13 cm).

There were 8 treatments in all and the rates of application were: 800ml of human urine (HU), 700ml of human urine + 5t/ha of cocoa pod husk ash (CPHA), 600ml of human urine + 5t/ha cocoa pod husk ash, 500ml of human urine + 5t/ha cocoa pod husk ash, 400ml of human urine +5t/ha cocoa pod husk ash, 300ml of human urine + 5t/ha cocoa pod husk ash, 200ml of human urine + 5t/ha cocoa pod husk ash and control (no fertilizer).

The organic manure was added to the soil two weeks after germinated kolanut seeds were sown, each treatment was replicated three times and arranged in a completely randomized design. (CRD). Growth parameters such as plant height, number of leaves, leaf area, stem girth and number of branches were recorded from 4 weeks after planting (WAP) and later monthly until 24 weeks after planting. Hand weeding was done at 3 weeks after planting and repeated at interval of 3 weeks.

At the termination of the experiment (24 WAP) in the nursery, the seedlings were carefully removed from the polythene bags for the measurement of fresh root and shoot weights, roots and shoot lengths.
They were oven dried and there after dried root and shoot weights were taken before finally analyzed for N, P, K, Na,Mg and Ca contents. Post planting soil samples were also taken from each treatment, at the termination of the experiment air dried and sieved for analysis of soil N,P,K,Ca,Mg,PH and O.M.

Statistical Analysis: The growth data collected were analyzed using ANOVA. The treatment means were compared using the Duncan's multiple range test ($p<0.05$).

Results and Discussion

The physical and chemical properties of the soils used for raising kola seedlings in the nursery are presented in Table1. Based on the established critical levels for the soils in the south western Nigeria, the soils are acidic (5.20) and low in organic matter (0.52%) when compared with 3% critical level (Agboola and Corey, 1973). The total % nitrogen (0.12%) was found to be less than 0.15%N, which is considered as the optimum for most crops including Kola (Sobulo and Osiname (1981). The available P (3.01 mg/kg) was less than 10mg/kg that is considered as adequate for crop production in this region (Agboola, 1982). Also the exchangeable K and Mg (0.50cmol/kg and 2.39 cmol/kg) were higher than the critical level of 0.2 cmol/kg and 0.9 cmol/kg which are considered optimal for most crops (Agboola and Corey, 1976).

Table 1: Pre-planting physiochemical properties of the soil

Soil properties	value
Physical properties	660.70g/kg
Sand	192.36g/kg
Silt	146.94g/kg
Textural cross	sand loam
Chemical properties	
pH(h2o) 1:1	5.20
organic carbon	1.30g/kg
organic matter	0.52%
Total nitrogen	0.12%
Available phosphorus	3.01mg/kg
Exchangeable bases	0.50cmol/kg
K+	0.45coml/kg
Ca+	0.45cmol/kg
Mg+	2.39cmol/kg
Mn+	0.89cmol/kg
Exchangeable acidity	
Al++	0.24cmol/kg
H+	0.12coml/kg
ECEC	4.67Cmol/kg

Between the organic manures used, cocoa pod husk ash (CPHA) had the highest pH and P, this was an indication that it could be effective as a liming materials. While human urine (HU) had the highest N, K, Ca, Mg and Na. The result was in agreement with the work of Upretiet al (2011), who found out that human urine could act as effective as NPK fertilizer which can be used as an effective source of plant nutrients and any crops can be grown using urine as a fertilizer without significant reduction in the yield if nutrient losses during handling could be minimized.

Table 2: Chemical analysis of Human urine and cocoa pod ash used as organic fertilizers.

Treatment	pH $H_20(1:1)$	C/N -	OM %	N %	P Mg/kg	K Cmol/kg	Ca Cmol/kg	Mg Cmol/kg	Na Cmol/kg
Human Urine(HU}	6.8	-	-	6.92	21.37	7.88	7.50	2.50	5.83
Cocoa Pod Husk Ash (CPHA)	7.21	5:9	-	1.02	40.26	5.01	3.60	1.80	3.06

The plant height ,number of leaves , stem girth , number of branches , leave area , root and shoot lengths fresh and dry root weights of kola seedlings under different levels of human urine amended with cocoa pod husk ash treatment are presented in table 3 and 4.

The application of different levels of human urine amended with cocoa pod husk ash increased significantly ($p<0.05$>) on growth and yield parameters of kola seedlings compared to the control treatment (table 3 and 4). This study showed that HU and CPHA seemingly waste products of man and cocoa should be used to reduce soil acidity and increase availability of N, P, K, Ca, Mg, and Na in the soil and their uptake by kola plants thereby leading to enhanced growth performance of kola. Poor growth of kola seedlings as a result of low nutrient status of soil and N, P, K, Ca, Mg, soil PH, Na and OM were generally observed in no treatment plots. This observation is in agreement with the work of (Moyin –Jesu, 2008).Which identified deficiency symptoms of yellow coloration, purple coloration and marginal burning of leaves signifying N,P,K deficiencies of tropical Africa soils. Human urine blended with cocoa pod husk ash at 400ml Hu +5t/ha CPHA increased the plant height, number of leaves , stem girth , leave area, rot length and shoot length of kola seedlings by 12% , 29.3%, 7.8%,37%, 10% and 5% respectively compared to single application of 800ml HU. When compared with 700ml Hu+5t/ha CPHA, it also increased the plant height,, number of leaves , stem girth , leave area, root length and shoot length of kola seedlings by 20% , 24%, 9%, 18%, 5%,1% and 33%. Also human urine amended with CPHA increased significantly ($p<0.05$) the soil N, P, K, Ca, Mg, PH, Na, OC and OM compared to the control treatment (Table 5).

Table 3: Effect of different leaves of HU and CPHA on growth parameters of kola seeding in the nursery

Treatments	Plant height	No of leaves	Stem girth cm	Number of branches	Lent and area	Root length cm	Shoot length
800ml HU	32.16ab	12.17b	0.59ab	4.93b	22.71b	29.23a	41.83a
700mlHU+ 5t /ha CPHA	29.20ab	13.08b	0.59ab	4.25b	34.13a	29.10a	29.37b
600ml/HU+5t/ha CPHA	35.81a	11.80b	0.58ab	4.13b	23.92b	25.35ab	39.40ab
500ml/HU+5t/ha CPHA	28.61a	10.52b	0.58ab	12.14a	35.85a	22.73b	22.67ab
400ml/HU+haCPHA	36.52a	17.22a	0.64a	5.16b	36.00a	29.36a	43.93a
300ml/HU+5t/haCPHA	22.35b	12.21ab	0.64a	4.50b	23.31	32.33a	30.43ab
200ml/HU+5t/haCPHA	26.77b	15.32ab	0.54b	5.25b	27.40b	28.4ab	33.17ab
CONTROL	21.81c	8.17c	0.41c	2.97c	20.64c	16.73b	20.37c

Treatment means within each column followed by the same letters are not significantly different from each other using Duncan Multiple Range Test at 5%level

Table 4: The yield parameters of kola seedlings 24 weeks after planting under different levels of fertilizer

Treatments	**Fresh Root Weight (g)**	**Dry Root Weight (g)**	**Fresh Shoot Weight (g)**	**Dry Shoot Weight (g)**
800ml HU	11.19b	4.16b	21.15a	8.69ab
700ml/HU+5ta/haCPHA	15.60a	6.11a	21.66a	10.46a
600mlHU+5t/haCPHA	9.41b	3.68b	18.42b	8.12ab
500ml/HU+5t/haCPHA	9.71b	4.58b	12.01c	4.65b
400ml/HU+5t/haCPHA	11.66b	4.19b	21.46a	8.74ab
300ml/HU+5t/haCPHA	10.63b	3.40b	14.66b	5.49b
200ml/HU+5t/haCPHA	10.12ab	3.58b	14.95b	5.68b
Control	7.71c	2.81c	8.90d	3.69c

Treatment means within each column followed by the same letters are not significantly different from each other using Duncan Multiple Range Test at 5%level

Table 5: post planting physicochemical properties of the soil

Treatmen ts	Soil pH H2O (1:)	OC %	OM %	N %	P Mg/kg	K Cmol/kg	Ca Cmol/k	Mg Cmol/kg	Na Cmol/kg
800ml HU	6.23d	1.42c	2.43de	1.156de	18.76b	0.79ab	.90a	2.18a	0.41bc
700mlHU+5t/haCPHA	7.12c	2.71a	4.19a	2.36a	23.82a	1.10a	3.67b	1.99a	0.36bcd
600mlHU+5t/haCPHA	7.33b	2.21b	3.43b	2.02b	15.17bc	0.45bcd	4.60a	1.37b	0.51a
500mlHU+5t/haCPHA	7.41ab	1.67c	3.77b	1.56c	11.91cd	0.56bed	4.55a	1.31b	o.61a
400mlHU+5t/haCPHA	7.46ab	2.14b	3.11c	1.35cde	10.36d	0.78abc	3.66b	1.44b	0.35bcd
300mlHU+5t/haCPHA	7.57a	2.15b	2.64d	1.41cd	8.29d	0.14d	2.92	1.35b	0.13e
200mlhu+5t/haCPHA	7.60a	2.54ab	2.41d	1.03e	10.18d	0.31cd	4.27ab	1.28b	0.28cde
Control	5.70e	0.83d	1.23c	0.10f	2.93e	0.11e	1.94d	0.89c	0.19fc

Treatment means within each column followed by the same letters are not significantly different from each other using Duncan Multiple Range Test at 5%level

This observation did not deviate from the works of Ojeniyi and Adejobi (2002). Swift and Anderson (1993) reported that organic manures increased soil N, OM, P, K and PH and also micronutrients which are absent in conventional NPK 15:15:15 fertilizers. Increase in soil PH by the use of combined application of HU and CPHA compared to the single application of HU and the control could be traced to the synergistic effect of the two organic fertilizers which produced high K and more especially Ca contents and could be effective as liming materials unlike Urea and NPK fertilizers when applied continuously to soil, decreases soil PH and OM. The soil pH has been reported to influence nutrient uptake and availability to crops for optimum growth (Gordon, 1988). The control treatment had least value of soil, leaf and growth parameters of kola seedlings compared to combined and single application of the organic manure (table 5 and 6). The significant increase in growth parameters, soil nutrient composition and leaf nutrient uptake of kola seedlings by the different levels of HU and were due to their high nutrient contents (N, P, K , Ca and Mg) which encouraged vegetable growth. Nitrogen is known to be responsible for plant growth and protein synthesis (Ojeniyi, 1984). While P and K were essential for promotion of meristematic tissue and carbohydrates formation (Tisdale and Nelson, 1966). 400ml HU + 5t/ha CPHA, 700ml HU + 5t/ha CPHA and 500ml HU + 5t/ha CPHA applications were most beneficial for the kola seedlings than other treatments because generally both ash and urine are easily mineralized due to their lower C/N ratios (Folorunso, 1999and Hoglung et al ,2000).

Table 6: leaf chemical composition after 24 weeks of treatment application

Treatm ents	N %	P Mg/kg	K Cmol/kg	Mg Cmol/kg	Ca Cmol/kg	Na Cmol/kg
800 HU	2.42b	13.48c	5.66c	30.30	35.16g	2.34b
700ml/HU+5t/haCPHA	2.06ef	7.61h	4.00d	16.95d	40.15f	1.76b
600mlHU+5t/haCPHA	2.00f	9.75g	7.25b	13.35d	34.17h	3.13b
500mlHU+5t/haCPHA	2.59a	26.32a	12.00a	15.02d	49.36b	11.86a
400mlHU+5t/haCPHA	2.18cd	10.31f	6.55bc	19.33bcd	46.34c	2.35b
300mlHU+5t/haCPHA	2.21c	12.85e	3.58de	22.94bc	62.14a	2.64b
200mlHU+5t/haCPHA	2.57a	12.85d	2.54e	16.33ed	41.32e	1.67b
Control	1.00g	5.20i	1.76f	4.32i	5.02g	0.27c

Treatment means within each column followed by the same letters are not significantly different from each other using Duncan Multiple Range Test at 5%level

Recommendation and Conclusion

The results indicated that 400ml HU +5t/ha CPHA, 700ml HU+ 5t/ha and 500ml HU + 5t/ha CPHA applications increased the soil, leaf N,P,K,Ca, Mg , soil PH , OM and also both growth and yield parameters of kola seedlings . It is concluded that human urine amended with CPHA could serve as a good fertilizer for the kola seedling as shown in the experiment. Human urine amended with cocoa pod husk ash applied at 400ml HU +5t/ha CPHA being the most effective treatment improving kola growth, yield parameters and soil chemical properties is therefore recommended for optimum growth of kola seedlings in the nursery.

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COFFEE PROGRAMME

Experimental Title: Genetic diversity studies of coffee

Investigators: Adepoju A.F, Anagbogu C.F And Dada K.E

Introduction

Coffee belongs to the genus *Coffea L.* of the family Rubiaceae which contains over 10,000 species that are grouped into 640 genera. The genus is made up of about 100 distinct species. Among these species, only *C. arabica* L. (arabica coffee) and *C. canephora* Pierre ex A. Froechner (robusta coffee) are economically important worldwide, while others are used for breeding purposes (Davies et al., 2006). Coffee is one the cash crops in Nigeria. In Nigeria, cultivation on a large scale started as far back as the 1940s but gained momentum in the early to mid-1950s. In the early 1950's farmers were motivated to plant coffee owing to good income made from it. By 1989, approximately 250,000 farmers cultivated coffee in Nigeria, thus providing livelihood for about 1 million people spread in fourteen states of Nigeria (William, 1989).

Justification: Breeding in coffee like many other crop plants depends on utilization of available germplasm (Walyaro, 1983). However, an understanding of the diversity of available germplasm is central to its utilization (Osuji *et. al*, 1995). A rational and efficient use of the available germplasm depends largely on the knowledge of the nature and amount of genetic diversity present in the collections as well as relationships among the various groups. Therefore, the objective of the study is:

To understand the diversity of *Coffea* sp in Nigerian coffee germplasm at phenotypic level

Materials and Methods

Accessions of coffee from the gene bank of Cocoa Research Institute of Nigeria (CRIN), Ibadan headquarter and Ibeku substation of the institute were used in the study for agro-morphological characterization.

Agro-morphological characterization: The descriptor for coffee was used for agro-morphological characterization.

Parameters taken are: Number of primary branching, trunk height (cm),trunk diameter (cm), leaf length, leaf width, leaf petiole length, stipule arista length, number of flower per axil, number of flower per fascicule, number of fascicule per node, plant height, overall appearance, plant habit, branching habit, leaf shape, leaf apex shape, stipule shape.

The data was analyzed using SAS package (version 9.1, SAS Institute Inc., Cary, NC, USA).

Result and discussion

Dendrogram generated from single linkage cluster analysis (SLCA), using morphological characters to illustrate the relationship between the Coffea genotypes at headquarters is presented in Figure 1. At 100% similarity level no Coffea genotypes was linked together while at similarity level of 22%, all the genotypes had formed a single cluster. The dendrogram also showed that the first linkage was formed between D57 and E106; C36 and C96 at 86% similarity level. At 60% similarity level, the dendrogram revealed four distinct groupings. Group I had four genotypes (A81- T921); group II and IV had one genotypes each. Group III had the highest number of genotypes (A110 – T1049.

Figure 2 showed the dendrogram generated between Togolese coffee in Ibeku. At 100% similarity level no genotypes was linked together while at similarity level of 15%, all the genotype had formed a single cluster. The dendrogram showed three distinct groups at 40% similarity level. Groups II and III had one genotypes each while group I had the highest number of genotypes.

In conclusion, the variability present is a basis for genetic materials selection for subsequent hybridization.

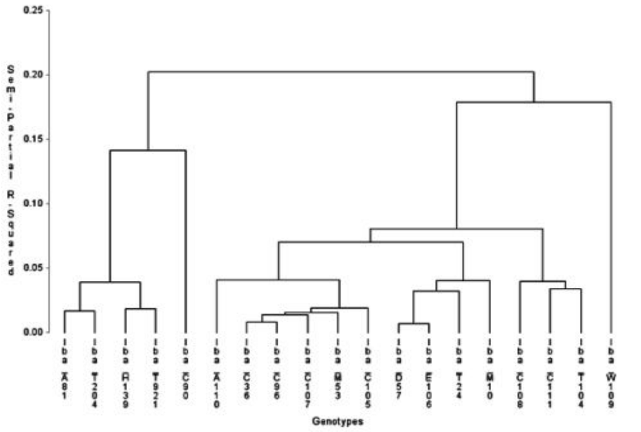


Figure1: the dendrogram representation of 19 genotypes at Ibadan

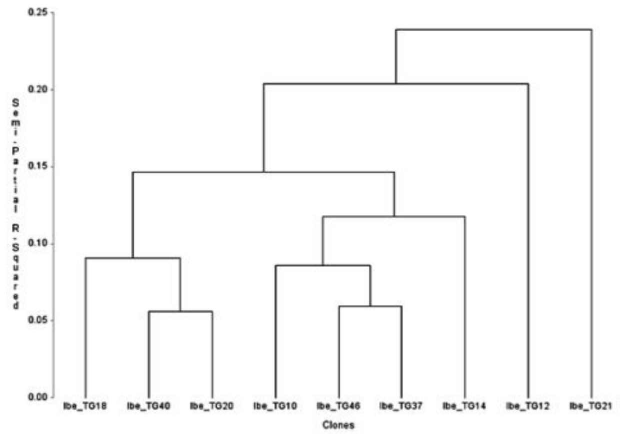


Figure 2: The dendrogram representation of 9 genotypes at Ibeku

Experimental Title: Determination of production potentials of coffee in Osun State Nigeria

Investigators: Famuyiwa, B. S. Famaye, A. O., Oyedokun, V., Oloyede A. A., Ogunjobi M.A.K., Okeniyi, M. O., Daniel, M. A., Mofolasayo, A. S., Adepoju, A. F., Keji, Dada, Taiwo O., Idrisu, M., Abdkarim I. F., Orisasona T. and Obatolu B. O.

Introduction

Coffee is one of the highly traded crops in the world market and globally the second consumed liquid after water. Coffee is an economic important crop grown in over 70 countries of the World and consumed throughout the world. However, the production is faced with soil depletion, prevalence of pests and diseases, inappropriate processing technology, which has resulted in poor marketing and consequently led to abandonment by farmers.

The major c*hallenges facing agricultural development, particularly in developing countries dominated by smallholder farming are increasingly framed in the context of weak innovation systems and capacities in the growing literature on agricultural innovation systems.*

Coffee has being identified as the most highly consumed liquid after water. This crop has suffered neglect after the liberalization of the commodity board.

Despite the favorable climatic conditions, and long history of Robusta production in all the southwest Nigeria, green coffee beans quality is declining from time to time due farmers' abandonment of their farms. Due to numerous advantages derivable from intercropping, it is therefore essential to investigate the potential of each of these states and the constraints, to proffers desirable way of encouraging the farmers to return to coffee production. Accurate knowledge of the diversity of the intercropping will encourage the farmers to increase their livelihood.

Objectives

The main objective is to determine the potentials in resuscitating coffee production in Southwest

Specific objectives are to;

1. Identify the viable growing areas
2. Identify the farmers in coffee production
3. Examine the varieties of coffee in the growing areas
4. Initiate a collaborative program with the member states
5. Examine intercropping of choice crop
6. Establishing the status of pest and diseases
7. Assess the factors mitigating coffee production in southwest, Nigeria

Methodology

Selection of three states from the six states that made up southwest. Multistate random sampling procedure was used.

Stage 1: Purposive selection of Osun

Stage 2: Advocacy visit to the state government

Stage 3: Advocacy visits to farmers' congress in each of the selected farmers' groups in the state

State 4: Establishment of state potentials in coffee production in the selected state

Stage 5: Two day sensitization and awareness creation of the farmers on coffee production

Stage 6: Power point presentations

CRIN on the 29th Feb., and 1st March 2016 commenced on a sensitization program and identification of potentials among coffee farmers Osun State to promote and encourage farmers going back to coffee production. The programme took place at Ijebu-Jesa town hall and FEG Agro Farms along Ijeda Road, Ijebu-Jesa. All Participants also visited some farms to know the status of coffee farming in the State.

Forty-two farmers were in attendance, drawn from groups such as; Cocoa Association of Nigeria (CAN), Sustainable Farmers Association (SUFA), Isoya Farmers Association in Esa-Oke, All Farmers Association (ALFAN), Ijesa North Anglican Diocese and Representatives from both Ministry of Agriculture and Osun State Agricultural Development.

Results and Discussions

Majority (71.40%) were male, while only 28.60% were female. The Participants were made to understand their potentials in coffee production. Altogether, the farmers promised in different farm sizes, to cultivate 352ha as soon as this year's rain is established.

Table1: Distribution of Participants among groups represente

		Frequency	Percentage
Group	CAN	15	35.71
	SUFA	8	19.05
	ISOYA	5	11.91
	ALFAN	8	19.05
	IJESA NORTH	2	4.76
	MINISTRY	2	4.76
	ADP	2	4.76
SEX	Male	12	28.60
	Female	30	71.40

The program was published in one of the National dailies – The Nation on page50 of 12th March, 2016 and reported on the Frequency radio on Impact Radio Business 92.5mhz 1.10 pm.

- *Participants talked about the constraints*
  Issues were also raised on the constraints to coffee cultivation

- *Farm visitations and sample collections*
  The participants visited three farm sites namely; Esa-Oke, Anglican Diocese of Ijesa North and Feg Agro in Ijeda Road Ijebu-Jesha (GIS maps attached)

- *Evaluating marketing problems*
  A Coffee Marketer was invited from Lagos (TRENDAGRO) but due to fuel scarcity he could not make the meeting. However, from the interaction with all the farmers, it was deduced that Marketers still come for coffee but farmers have problems of processing hence could not get the required quality they need. Once the Marketer cannot get what they wanted, they down price what they see; hence,

farmers gradually abandoned the Coffee for more economic crop.

- *Presentations*
  Roll on and Flex banners were made to facilitate awareness. Flyers were also distributed. Power point presentations were made in the following areas sated below to sensitize and create more awareness to participants

1. Importance of coffee and the consumption rate in the world
2. Extent of research work on breeding work from CRIN
3. Soil Management technics
4. Agronomic practices of coffee
5. Pests management in coffee production
6. Processing and quality control
7. Marketing opportunities in coffee production

FGD on the history of coffee production in Ife/Ijesa zone

'There were evidences that coffee was one of the crops farmers cultivated. In the 80s, farmers use to sell coffee to Ajanaku who was a big coffee buyer. Photographs shown below

Plate 1: Mr. Adegbenbo representing the Director coordinating Agric in State of Osun addressing the Participants

Feedback from participants

1. Participants were enthusiastic about the development.
2. The issues of marketing and planting materials were also raised.
3. It was critically requested that nursery should be sited in Ijebu-Jesha to allow easy distribution of planting materials
4. There was also a request on detailed processing procedure.
5. A farmer (FEG Agro) who participated in the program has shown interest to collaborate with CRIN in the area of coffee cultivation and value addition

Challenges.

1. Availability of CRIN products such as coffee wine, coffee blended chocolate to display to the Participants
2. There is need for CRIN to have approved and tested coffee processing procedure and processed coffee packs to show the farmers.

Impact of training on farmers in the zone

1. Many farmers requested for coffee seedlings for 2016 planting year
2. There was a request for coffee wine

Plates 4-7 show the presentations at the sensitization program.

Plates 3 & 4: Pests Control

Plate 5: Agronomic practices

Plate 6: Insect pests Management

Plate 7: GIS and climatic information

Plate 6: Geographic Information System and Agricultural Practices

Outcome of the Program

1. Identify the viable growing areas
   According to the group discussion, Ijesa axis was noted for coffee production before the problem of processing and consequent marketing that led to abandonment. The rainfall pattern between 2003 and

2013 showed that the dry spell period (November-April) may require supplementary irrigation as against wet season which is adequate for plant growth and development. Average relative humidity for Rainy Days (RH-RD) and Non Rainy Days (RH-NRD) was generally adequate, but high humidity beyond 80% experienced in some months may require effective management practices to promote good coffee bean quality. Potential growing areas were mapped using Geographical Information System (Figures 1 to 7).

2. Identify the farmers in coffee production
   Interested farmers were identified and there were promises to go into coffee production. The number of individual acreage of land were recorded

3. Examine the varieties of coffee in the growing areas
   It was established that Robusta coffee performed favorably well. The team was able to see some stands of Robusta coffee of about 50 years old.

4. Initiate a collaborative program with the member states
   Collaboration was initiated among the groups that attended the program, names, phone numbers and addresses were recorded for call-up meetings when necessary

5. Examine intercropping of choice crop
   The farmers planted arable crops such as; cocoyam, yam, plantain, cassava to mention few as intercrops. These they claimed will assist during the off season of coffee. Training through PowerPoint was demonstrated to show agronomic and cropping practices.

6. Establishing the status of pests and diseases
   There was a training also to show major pests of coffee. These included diseases and their control, Insect pests and their control. The farmers were also made to understand that some Insects are friends to farmers.

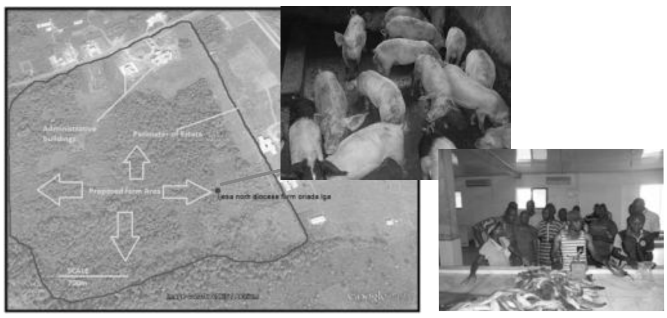
7. Assess the factors limiting coffee production in southwest, Nigeria
   Factors affecting coffee production were identified as: processing, marketing and pests.
   The issue of processing was handled as a Power Point training to show the farmers that good quality coffee attracts high premium. The issue of certification was also explained while a Marketer was allowed to address them.

7.687705° N 4.82793 7.686641°N

7.681477°N 4.8291 7.681066°N 4.834927°N

Figure 1: Map of Coffee farm location in Akinremi Esaoke Osun State
Showing the how farmers participated in the process and soil sample collection.

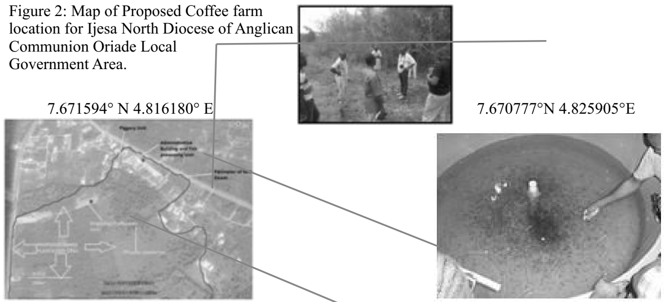
7.782394°N 4.837200°E 7.780080°N 4.900272°E



7.763647°N 4.577113°E 7.762522°N 894322°E

Figure 2: Map of Proposed Coffee farm location for Ijesa North Diocese of Anglican Communion Oriade Local Government Area.

7.671594° N 4.816180° E 7.670777°N 4.825905°E



7.665030° N 4.816616° E **7.664327° N 4.824269°E**

Figure 3: Map layout indicating location of proposed farm area for coffee production

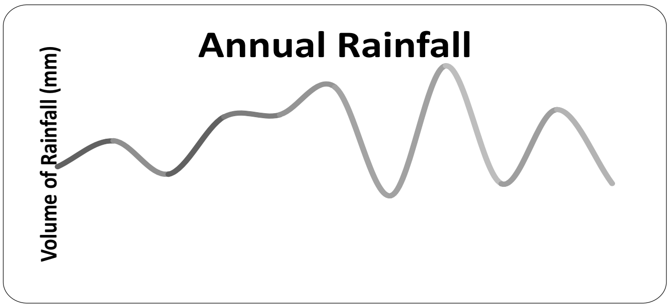


Figure 4. Average Annual distribution of Rainfall for the locations visited

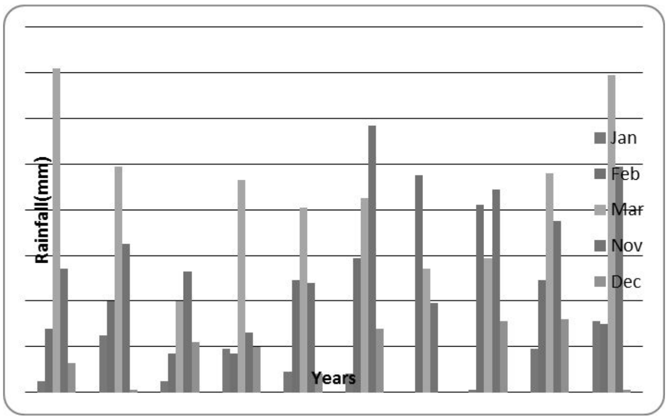


Figure 5. Average annual distribution of rainfall during dry spell months (2003-2013)

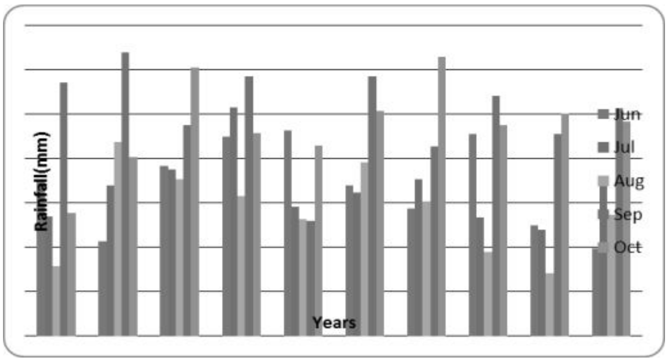


Figure 6: Average annual distribution of rainfall during raining season months (2003-2013)

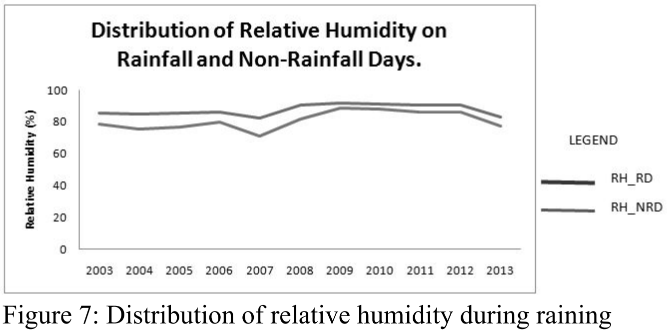


Figure 7: Distribution of relative humidity during raining and non-raining days (2003-2013)

CASHEW PROGRAMME

Experimental Title: Assay of fungal flora and mycotoxin potential of stored cashew nut
Investigators: Adeniyi D. O. and Adedeji A. R.

Introduction

The world annual production of all tree nuts in their raw state is 6.74 million tonnes as reported by (Pillai, 2008). Among them, cashew ranks first accounting for about 32% followed by almond (26.2%), hazelnut (14.3%), walnut (13.5%), pistachio (8.6%) and pecans (3.7%) making cashew production the subject of interest for development agencies, producers, government and advocates of sustainable economic and environmental development (Canbon, 2003). Postharvest food loss is one of the major sources of food insecurity in Africa. Pre-and post-harvest food losses in Africa are higher than the global average and impact more severely on already endangered livelihoods (NEPA, 2013). Mature agricultural products in the field go through a lot of production and processing techniques in order to convert them into suitable or acceptable forms for human consumption.

It is estimated that, at least 10% of Africa crop productivity is lost on and off farm, due to lack of farmers' access to appropriate production technologies, inadequate availability of food processing technologies and erratic climatic condition (Gyedu-Akoto *et al.,* 2014). The economic loss resulting from fungal and mycotoxin contamination of nuts is difficult to estimate. However, judging from the widespread occurrence of fungal and mycotoxin contamination and the large number of nuts affected, one can assume that such losses must be large. The preliminary investigation emphasizes farmers' post harvest practices in relation to mycoflora contamination vis-à-vis the safety and quality of cashew nuts for consumption.

Objective

To investigate the incidence and distribution of fungi flora associated with farmers post harvest handling practices and safety of cashew nut for consumption.

Materials and Methods

Samples of cashew nuts were collected from farmers' stores in Ochaja, Kabba, Ilorin, Ibadan and Ogbomoso) and were subjected to physical observation prior to kernel opening, cotyledon assessment and microbial assay. Halves of sectioned nut samples were assessed by visual observations for colour, deformity and microbial status. Associated mycoflora were cultured by pour plate method, total viable and mould counts were determined and fungi colonies identified according to morphological and microscopic characteristics (Pitt, 2008).

Results and Discussion

Farmers used different handling techniques for cashew processing. Most farmers package their nuts in water proof bags as storage material on bare floor. Some heap nuts on the farm land, floors of warehouses while others dry the nuts briefly on bare floor before storage. Cashew is one of the few commodities that travel a long distance between times of harvest and when consumed (Pillai, 2008). Nut spoilage may occur during the process of drying which is a vital step in the postharvest activity.

Healthy cashew cotyledons are commonly creamy-white when properly processed. However, some rotten ones were observed in nut samples from Kabba and Ilorin.

Table 1: Characteristics of cashew nut samples

Sample	Initial weight (g)	Final weight (g)	Moisture content (%)	Nut count//100g	Colony count (cfu/ml@10^{-5})
*Ibs	61.65	57.32	7.55	171	3.0
Iba	58.14	54.12	7.43	170	1.0
Kab	95.47	92.99	2.67	112	7.0
Och	41.58	39.50	5.27	258	52.0
Ilr	43.5	38.63	12.61	230	17.0
Ogb	45.0	40.76	10.40	220	4.0

**Ibs-Ibadan (sun-dry); Iba-Ibadan (air-dry); Kab-Kabba; Och-Ochaja; Ogb-Ogbomoso; Ilr-Ilorin*

The cashew nuts count ranged from 112 to 258 nuts in Ibadan, Kabba and Ochaja samples. The moisture content of nuts was 2.67 to 7.55%. Low moisture levels limit mould growth during storage, most of the nuts with moisture content above the acceptable level of 10-12% are due to farmers attitude of keeping nuts in water proof sacks (not jute bag), heap nuts on farm or under shade and not properly spread-dried and stored rightly. Ochaja has the highest (258) nut count followed by Ilorin (230) and least count of 112 in Kabba. The highest moisture content was recorded in Ilorin but the least in Kabba nut samples while the colony count of the isolated flora ranged from 1.0 to 52.0 x 10^5 in the nut samples (Table 1).

Mycoflora cultured from cashew kernels, shells and testa were mainly species of fungal genera *Aspergillus, Fusarium, Penicillium,* which are mycotoxins producing fungi. *Aspergillus* and *Penicillium species* are known to have strains that produce toxic metabolites (Cole and Cox, 1981). Thus, they pose a potential hazard to consumers' health. The species identified were *Aspergillus fumigatus, A. flavus, A. parasiticus, A. niger, A. repens* and another unidentified species of *Aspergillus. Penicillium* spp., *Fusarium* spp. and *Lasiodiplodia theobromae were also cultured from cashew. The percent occurrences of these isolates are reported in Table 2.*

Table 2: Occurrence of mycoflora associated with cashew nut

Sample source	*Aspergillus* spp.	*A. niger*	*Penicillium* spp.	*L. theobromae*	*A. fumigatus*	*A. flavus*	*A. parasiticus*	*A. repens*	*Fusarium* spp.
*Och	+	+	+	+	+	+	+	+	-
Kab	+	+	-	+	-	-	-	-	-
Iba	+	-	-	-	+	+	+	-	-
Ibs	+	-	+	-	+	-	-	+	-
Ilr	+	-	+	+	-	+	-	-	+
Ogb	-	-	+	-	+	+	-	-	+
% incidence	83.33	33.33	66.67	50.0	66.67	66.67	50.0	33.33	33.33

**Och-Ochaja;Kab-Kabba;Iba-Ibadan (air-dry);Ibs-Ibadan (sun-dry);Ilr-Ilorin; Ogb-Ogbomoso;Inc-Incidence Present (+); Absent (-)*

Incidence of fungi isolates depend on a number of factors including temperature, moisture and storage time (Chelack *et al.,* 1991). Poor postharvest management can also lead to the initiation of these fungal activities thereby causing losses of commercial and nutritional values in the nuts and more importantly, endanger the lives of consumers through exposure to mycotoxins infestation. The conditions generally known to influence the production of mycotoxins in foods and allied agricultural products include presence of a toxigenic mould, a suitable substrate for the growth of the mould, and an environment conducive for the toxin production by the mould (Betina, 1984).

Conclusion

Mycoflora profile in cashew nut could be link to post-harvest management techniques employ by farmers and the microbial infestation could pose serious health risk to consumers due to mycotoxins contamination.

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Experimental Title: Preliminary investigation on biological control alternative against *Lasiodiplodia theobromae* on Cashew

Investigator: Adeniyi, D. O.

Introduction

Cashew is a crop with high potential for foreign exchange and source of raw materials for Nigeria and other tropical countries (Olunloyo and Esuruoso, 1975). A common and wide spread disease of cashew in Nigeria is the inflorescence dieback which is expressed as a withering of the petals accompanied by progressive die back of the small peduncle from the tip downwards to the floral shoots which is characteristically caused by *Lasiodiplodia theobromae.* Some copper-based fungicides and other active ingredients have proved promising for protection against this pathogen, however the hazards to the environment and man, the high cost alongside the phytotoxicity and environmental effects caused by chemicals have necessitated research studies to assay the efficacy of eco-friendly alternative that could be effective to manage this pathogen on cashew. Some plant extract inhibit hatching, alter sporulation and vegetative growth (Abdel-Raouf, 2001.). Many researches have been conducted on the use of botanicals and several promising biocidal properties have been identified (Lale, 1995; Owolade *et al.,* 2000). Most of these plants have also been used *in vitro* and *in vivo* in the control of various plant diseases and pest.

Objectives

- Identify weeds and herbs with antifungal characteristics.
- Test the efficacy of the selected botanical against *Lasiodiplodia theobromae.*

Methodology

Floral shoot of cashew showing typical symptoms of inflorescence dieback were collected from the cashew germplasm of Cocoa Research Institute of Nigeria, in sterile ziplox sample bags, made airtight and transferred to the laboratory for isolation of the pathogen. Fresh leaves of *Red Acalypha, Chromolaena odorata, Azadirachta indica* and pod of *Tetrapleura tetraptera* were collected from the wild, dried under shade and milled separately. The efficacies of the aqueous extracts of these botanicals were assayed *in-vitro* at 10, 20, 40 and 80% against the mycelia growth of *L. theobromae.* Each of the treatment was replicated three times and the petri plates without botanical treatment served as control. Measurements of the mycelia extension of *L. theobromae* were made until growth in the control plate covers. The percent mycelia growth inhibition was calculated and data statistically analyzed using SAS software and mean separated by Duncan Multiple Range Test.

Results and Discussion

The preliminary investigation assayed four plant species *in-vitro* for their fungitoxic characteristics against mycelial extension of *L. theobromae.* The pathogen was exhibited with significant reduction in growth when subjected to different extracts concentrations. The extracts of *T. tetraptera* at 80% was found superior and

differ significantly from others. The least mycelia growth of *L. theobromae* was recorded in Red *acalypha* extract at 20% similar for *C. odorata* and *A. indica* while 80% *T. tetraptera* extract had the least growth of mycelia mat (Table 1), all of which differ significantly from other extracts concentrations. The presence of antifungal compounds in higher plants has long been recognized as an important factor to disease resistance (Mahadevan, 1982). Such compounds, being biodegradable and selective in their toxicity, are considered as valuable in controlling some plant diseases (Singh and Dwivedi, 1987). The fungi toxicity of the plant extract against *L. theobromae* was tested in the laboratory. The response of the isolate against various concentrations of plant extracts varied with the various concentrations.
Exploitation of naturally available chemicals from plants, which retards the reproduction and growth of plant pathogenic fungi, would be a more realistic and ecologically sound method for integrated plant disease management and will have a prominent role in the development of future commercial pesticides for crop protection strategies, with special reference to the management of plant diseases (Verma and Dubey, 1999; Gottlieb *et al.,* 2002) (Table 1).

Table 1: Effects of botanicals on mycelia growth of *L. theobromae*

Botanical extracts	*Red Acalypha*	*C. odorata*	*T. tetraptera*	*A. indica*
		Mycelia Growth of *L. theobromae* (mm)		
10%	49.33^{bc}	50.50^{b}	21.33^{cd}	$45.0b^{c}$
20%	40.33^{c}	31.83^{c}	42.33^{b}	36.50^{c}
40%	59.33^{b}	36.67^{bc}	39.50^{bc}	48.33^{bc}
80%	$49.0b^{c}$	37.83^{bc}	9.83^{d}	57.50^{b}
0% (Control)	85.0^{a}	85.0^{a}	85.0^{a}	85.0^{a}

Means followed by the same letter in each column are not statistically different (P = 0.05)

Percent growth inhibition of the phytoextracts against mycelia growth of *L. theobromae* shows 80% *T. tetraptera* demonstrated the highest growth inhibition of 88.44% and the least mycelia growth of *L. theobromae* (9.83m) and differ significantly from other extract concentrations and the control. Many workers have reported antifungal activities of different plant species and stressed the importance of plants as possible sources of natural fungicides (Ogbebor and Adekunle, 2005; Ogbebor *et al.,* 2007). *C. odorata* at 20% concentration shows 62.55% *L. theobromae inhibition* while *T. tetraptera* 74.91% inhibition at 10% extract. Each of the extracts of *Red acalypha, A. indica* and *T. tetraptera* at 20% concentration showed 52.55%, 57.06% and 50.20% growth inhibition of *L. theobromae* respectively while other extract concentrations showed varying degree of mycelia inhibition (Table 2).

Table 2: Percent growth inhibition of phytoextracts against *L. theobromae*

Plants spp.	Extract Conc. (%)	Mycelia Growth (m)	Percent Growth Inhibition (%)
Red Acalypha	10%	49.33^{bcd}	41.96
	20%	40.33^{cd}	52.55
	40%	59.33^{b}	30.2
	80%	$49b^{cd}$	42.35
C. odorata	10%	50.50^{bcd}	40.59
	20%	31.83^{de}	62.55
	40%	36.67^{de}	56.86
	80%	37.83^{de}	55.49
T. tetraptera	10%	21.33^{ef}	74.91
	20%	42.33^{bcd}	50.2
	40%	39.50^{cde}	53.53
	80%	9.83^{f}	88.44
A. indica	10%	45.0^{bcd}	47.06
	20%	36.50^{de}	57.06
	40%	48.33^{bcd}	43.14
	80%	57.50^{bc}	32.35
Control	0%	85.0^{a}	0

Means followed by the same letter in each column are not statistically different (P = 0.05)

The findings corroborate previous studies that earlier revealed the antifungal activity of leaf extract of *C. odorata, C. papaya* against *L. theobromae* (Adejumo, 2000b; Adejumo and Otuonye, 2002; Ilondu, 2011). The presence of antifungal activity in the leaves of the selected botanicals was demonstrated in the study. This was shown by their ability to inhibit the growth of the tested pathogen in culture. The difference observed in the fungitoxic activity of the extract is likely due to the solubility of the active compounds in the solvent (water or other solvents) or the presence of inhibitors to the fungitoxic principle (Qasem and Abu-Blan, 1996; Amadioha, 2000).

Conclusion

The efficacy of botanical extracts against *L. theobromae* is established and could be subjected to field trials to evaluate their performances in natural cashew ecology against the pathogen.

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Experimental Title: Studies on soil amendments to enhance cashew performance in the nursery
Investigator: Nduka, B. A.

Introduction

An evergreen perennial plant, *Anacardium occidentale* L. is an important tree-nut crop. Information concerning the optimum quantity of nutritional constituents in nursery pot soil for cashew seedling is limited. In most cases, top soils are scraped for use as nursery soils to raise seedlings. The survival of seedling at transplanting is partly dependent on the nutritional condition of the medium in which they developed. Poor nutrition for seedlings at the juvenile stage may result in growth and developmental defects, poor establishment of seedling on the field, slow growth, reduced survival percentage etc. Bulky organic residue from the processing of coffee (Coffee husk are available wastes in coffee plantation) contains degradable organic matter which can be utilized as composting product. Preethu *et al*., (2007) and Nguyen *et al*., (2013) indicated that coffee waste (coffee husk) is a valuable organic fertilizer, particularly for highly weathered soils of the humid tropics. However, its utility in the composting system for soil nutrient amendment is low. Thus, the study investigates the nutritional potential of coffee husk (organic fertilizer) and N.P.K (inorganic fertilizer) especially on cashew seedlings.

Objective

Investigate the effect of coffee husk, NPK amendment and coffee husk-NPK combinations on cashew performance in the nursery.

Methodology

The soil for the experiment was sandy loam, collected within the plantation premises of the Cocoa Research Institute of Nigeria (CRIN), Ibadan (Lat 7.01′N and Long 3.052′E) at the depth of 0-15 cm. The collected soil was mixed, air dried and sieved with a 2 mm mesh. Coffee seed coats (husk) were obtained after harvest and processing at CRIN, Ibadan. The husks were air dried under shade, crushed, blended into powder and screened through 1mm sieve, while the N.P.K fertilizer was obtained from open market in Ibadan.

Disease-free and viable Cashew nuts of medium size obtained from the cashew germplasm plot at CRIN, Ibadan were planted at one nut per polythene bag. The experiment was laid out in completely randomized design with three replications. Following the recommendation of Zake et al. (2000), the treatments were incorporated into the soil by ring application at 2weeks after planting. Plant height, stem girth, leaf area and the number of leaves/plant were recorded at every four weeks until the 20th weeks after planting when the experiment was terminated. The nutrients uptake of the Cashew leaves were determined at harvest for each treatment.

The data were subjected to the statistical analysis using SAS, version 9.2, SAS (2007). Analysis of variance was done using the PROC GLM procedure in SAS.

Results

The results of the physico-chemical properties of the soil and the chemical compositions of the coffee husk (CH) before the experiment are presented in Table 1. The soil was high in sand and clay fractions with moderately high Ca and Mg content; this indicates that the textural class of the soil used is sandy loam. The soil was moderately acidic with pH of 5.3 (Table 1).

Table 1: The Properties of the Soil and the Coffee Husk

Physical Properties	Soil	Coffee Husk
Sand	60.80 g kg^{-1}	-
Silt	9.00 g kg^{-1}	-
Clay	30.20 g kg^{-1}	-
Textural class	Sandy Loam	-
Chemical Properties		
Soil pH (H_2O) 1:1	5.30	7.41
Organic matter	1.22%	-
Organic carbon	3.03g/ kg	-
Total Nitrogen	0.06g	0.48%
Available Phosphorus	1.03mg kg^{-1}	19.10mgKg^{-1}
Exchangeable Bases		
K^{+}	0.27 cmol /kg	5.71mgKg^{-1}
Ca^{2+}	4.10 cmol /kg	8.00mgKg^{-1}
Mg^{2+}	2.00 cmol /kg	0.46mgKg^{-1}
Na+	0.92 cmol /kg	2.40mgKg^{-1}

Table 2: Treatment combinations and concentrations of the treatments applied to the soil

S/N	Treatments	Treatment codes	Concentration(g^{-1}Kg)
1	Control	T1	-
2	6.25gCH	T2	0.00208CH
3	12.5gCH	T3	0.00416CH
4	18.75gCH	T4	0.00625CH
5	6.25gCH + 0.5gNPK	T5	0.00208CH + 0.00016NPK
6	0.5gNPK	T6	0.00016NPK

CH – Coffee Husk

From Table 3, the values of leaf count and stem girth for the five intervals differs significantly ($P \leq 0.05$) in the first four treatments, T1 to T4. The five periodic measurements of the plant height of the cashew seedlings differed significantly ($P < 0.05$) under treatments T1, T3, T4 and T5. However, each of the five periodic intervals of the leaf area assessed significantly ($P \leq 0.001$) differed under each of the six treatments. Leaf count and stem girth did not differ in treatments T5 and T6. On the other hand, results from seedlings with sole NPK treatment were not uniquely different from the seedlings treated with CH. The highest means were observed in treatments T1, T2, T3, and T6 for leaf count (15.26), stem girth (0.62 cm), plant height (22.02 cm) and leaf area (28.3) respectively (Table 3).

Table 3: Variation and mean of the six treatments with respect to five intervals of data recording on leaf count, stem girth, plant height and leaf area.

		Mean Squares					
	DF	T1	T2	T3	T4	T 5	T 6
Leaf Count	4	33.15*	35.35*	16.60*	10.16*	14.18	1.35
Error	8	7.95	6.57	2.69	2.24	11.94	3.28
Mean		14.06	15.26	12.93	13.00	10.30	9.87
CV (%)		20.04	16.79	12.69	11.51	33.56	18.34
Stem Girth	4	0.11**	0.11***	0.04***	0.09***	0.23	0.05
Error	8	0.01	0.01	0.01	0.01	0.35	0.02
Mean		0.58	0.60	0.62	0.51	0.70	0.47
CV (%)		16.51	8.46	12.40	17.35	84.39	35.23
Plant Height	4	3.91***	15.14	14.77*	30.76*	37.16*	58.25
Error	8	0.39	13.46	2.97	4.94	11.53	98.09
Mean		18.70	21.12	22.02	20.24	20.38	18.76
CV (%)		3.34	17.37	7.82	10.98	16.66	52.78
Leaf Area	4	49.03***	53.11***	31.69***	31.98***	23.88***	43.34***
Error	8	0.45	1.62	1.27	1.94	0.49	2.08
Mean		10.24	14.60	16.45	23.06	18.35	28.30
CV (%)		6.58	8.71	6.86	6.04	3.85	5.10

*DF- Degree of freedom, CV (%) -Coefficient of Variation, *, ** and *** - Significance at P = 0.05, 0.01 and 0.001*

Table 4 revealed the amount of various nutrient present in the leaves of cashew seedlings after being grown under different nutritional treatments. Among the six treatments, T4 had the highest N, P, K, Mg, Ca and Na; T6 followed in magnitude with respect to the mean values of P, K and Na (Table 4). The least mean for each nutrient was however obtained in T1 (control). The coefficient of variation for the six treatments ranged between 0.61% (P) and 18.27% (Ca).

Table 4: Treatment means for the basic nutritional uptake by the cashew seedlings at the termination of the experiment.

Treatments	N(%)	P(mg/Kg)	K(mg/Kg)	Mg(mg/Kg)	Ca(mg/Kg)	Na(mg/Kg)
T1	0.23c	11.52d	2.02d	0.34c	4.95bc	0.22d
T2	0.33a	14.22f	2.48f	1.43d	8.27bc	0.42e
T3	0.46c	16.43e	4.87c	2.34c	10.14ab	0.45e
T4	0.76b	31.44a	10.45a	2.84a	11.75a	2.14a
T5	0.43c	22.84b	7.25b	2.74b	10.74ab	0.83b
T6	0.32d	21.13c	4.41e	2.33c	5.40c	0.72c
Mean	1.45	20.76	5.68	2.34	9.04	0.86
CV(%)	1.70	0.16	1.85	1.59	18.27	2.91

Means with the same alphabet are not significantly different

DiscussionDüring and Gäth (2002) and Lal (2008) had remarked that the production of urban and industrial organic wastes is increasing worldwide; agricultural wastes are equally on the increase in most farms; sometimes to the level of becoming a menace in plantations and fields (Chintala et al., 2013, 2014b). The use of coffee husk as an organic amendment has been reported and recommended by Veeken et al. (2005), Janvier et al. (2007), Lazcano et al. (2009) and Yadessa et al. (2010). According to them, amending agricultural soils with coffee husk as compost supplies plant nutrients and helps to improve the physicochemical and biological properties of the soil. The effectiveness of using the combination of coffee husk and NPK as one of the treatments in this experiment was reflected on leaf mineral composition and growth parameters. This is in line with the report of Ofori et al. (2003) on the combination of cocoa pod husk and NPK. According to them, the macronutrients, N, P and K present in the organic chemical structures are usually converted into inorganic forms before subsequent release into the soil as mineral nutrient. The reduction in mineral fertilizer application through their supplementation with organic sources, such as coffee husk makes the use of soil nutrient amendments affordable to small holder farmers, guarantees and improves soil life.

Conclusion

The study clearly showed that coffee husk improved the morphological development of the cashew seedling. Since good morphological development of seedling enhances their better field establishment, the use of coffee husk to amend nursery soil is recommended. The appropriation of this organic material in agricultural system of nursery seedling production will profitably claim the waste (i.e. coffee husk) and ultimately supply nutrient to growing seedlings without adverse impact on soil biomes

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Report of Training of Farmers on Good Agricultural Practices (Gap) in the Management of Cashew Farms in Nigeria Held at Oke-Onigbin, Kwara State, Nigeria on 17th And 18th February, 2015

The training programme which took place on the 17th and 18th February, 2015 attracted participants from 3 Local Government Areas of Kwara State; these are; Isin, Ifelodun and Oyin Local Government Areas.

The 40 selected cashew farmers who benefited in the training programme were members of Cashew Farmers Association of Nigeria (CFAN) and also belonged to cooperative group which made them to see the training a big opportunity for the areas.

The training exercise that took place on a selected farmer's cashew farm commenced at exactly 10:30am with opening prayer by Elder Gbadegesin. The Extensionist, Mr. Adebiyi in a power point presentation explained the roles of farmers' organization and extension methodologies in cashew production. He stressed the importance of farmers' organization and its benefits. According to the presentation, farmers who belonged to farmer's organization will have easy access to production inputs and purchase them at a minimum cost. Also, farmers' organization can help the farmers to get good market for their cashew nuts. However, small scale/cottage industries that can process apple into juice and wine, cashew nuts into kernel and cashew nut shell into liquid can be achieved through farmers' organization.

It was also proved that coming together as a group can facilitate financial supports (loans) from government and banks. In spite of government policy, training and capacity building are meant for farmers who belonged to farmers' organization.

The soil scientist in the team educated the farmers on the various types of soil sampling techniques, various sampling tools used in collection of soil sample such as soil auger, hand trowel, digger etc. He encouraged the use of fertilizer both organic and inorganic but warns that soil testing should be carried out to ascertain limiting nutrient before fertilizer recommendation is made. He advised farmers to use good cropping system particularly cover crops to prevent the soil surface from the sun and also as an agent to prevent soil erosion.

The breeder (Mrs. Adeigbe) advised farmers to grow good varieties that are high yielding and disease resistance. She advised farmers to obtain planning materials from reputable sources such as Seed Company or research Institutes. She was of the opinion that cashew nuts should be raised in the nursery and such should be transplanted to the field at the right period. She explained different maintenance operations various sanitation methods and pest management in the nursery.

The Agronomist (Mrs. Adeyemi) in her presentation advised farmers to follow all step required in land preparation. She opined that, cashew should be planted in-situ/sowing at stake. She advised farmers to observe Good Agricultural Practices such as weed management, pruning, fire tracing and timely harvesting in their cashew farms.

The harvesting, post-harvest handling and processing of cashew was anchor by Dr. S.O. Ogunwolu. According to him, harvesting is easy when farm is clean and tidy, he observed that the harvesting period is between February and March and may last for 16 weeks. He encouraged farmers to follow proper steps in post-harvest handling in other to retain the quality of the nuts.

He encouraged farmers to have small cottager processing firm for their economic gain according to him, products obtainable from cashew are cashew apple wine, cashew apple powder, cashew jam, cashew nut butter cashew nut protein isolate and cashew kernel chocolate.

The farmers in appreciation thanked the Institute for organizing the training exercise for their communities they demanded for further training most especially on management of moribund cashew farms which have been abandoned as a result of low productivity and pests/diseases attack.

Training of Cashew Farmers at Enugu on Good Agricultural Practices (Gap) in The Management of Cashew farm held at Nsukka, Enugu State between 27th and 29th January, 2015

On the 27th January, 2015 at the ADP building around 12noon, the training programme started with an introduction speech from Mr. Agbongiarhuoyi A. E. He introduced the Institute and the Scientists after which an opening speech was delivered by Mr. Uwagboe, E. O. (Head Extension section)

The first presenter was Mrs. Iloyanomon who started by asking the farmers if they use fertilizer in their farms. One of the participants (Hon. Shedrack Ugwu) responded that he doesn't, because according to him, the cost of fertilizer and his low income from the cashew nuts, makes the use of fertilizer unrealistic. Mrs. Iloyanomon on her part responded that "Cashew, unlike cocoa is a very faithful crop and that the little attention given to it, the little it gives back, hence the use of fertilizer is very important. However, the participants agreed that NPK and Urea are the only types of fertilizer they know and have never used organic fertilizer.

At the end of her presentation, the following questions were asked:

- ✓ His Royal highness (Igwe Remi Nwodo) asked that since Enugu has loamy and sandy soil, if fertilizer like NPK can improve their soil?
- ✓ Mr. David asked what age can fertilizer be applied? If the cashew has attained old age, will they continue to apply fertilizer?
- ✓ How do you test the soil?
- ✓ Mr. Lazarus ask (1) should fertilizer be applied in the nursery stage (2) should the leave litters be gather around the tree or leave on the plantation, when they become rotten it turns to manure?
- ✓ Another participant asked the cashew group to help

develop a machine to be used in maintenance of the plots.

- ✓ Is there any chemical to be apply to enable the leaves litter in the plot rotten on time because it takes very long time for the leave to decompose?

  Mrs. Iloyanomon (presenter) responded that the leaves should be left to decompose slowly because it provides nutrients.

Responses

- ✓ For sandy soil organic fertilizer or organic fertilizer fortified with inorganic fertilizers like NPK (organo-mineral) is beneficial. This is because of the slow release of nutrient by organic and organo-mineral fertilizers. This makes the nutrient available over a long period of time which is beneficial for tree crops such as cashew this prevents loss of nutrients through leaching. Apart from supplying nutrients, the soil organic and organo-mineral fertilizers has soil improving properties. To get the best out of NPK in sandy soil, it is beneficial to apply it with organic materials.
- ✓ When to apply fertilizer is determined by the age and need for fertilizer. If cashew has passed its productive stage, application of fertilizer alone will not be of much benefit. Here, there is need for rehabilitation of the cashew plantation. However, if the cashew plant has not passed its productive stage soil test is carried out to determine the type and amount of nutrient to apply.
- ✓ Fertile top soil should be used to raise cashew seedlings. If this is done, there is no need for fertilizer application. However, if fertile top soil is not used soil testing will determine the need and amount of fertilizer to apply.
- ✓ Leaf litter for cashew should not be removed from the cashew plantation. This is because it is an important source of nutrient. It should be left to decompose to return nutrient back into the soil.
- ✓ No chemical is recommended yet to enhance decomposition of leaf litter but the leaf litter should be left on the field to allow slow decomposition on the field.

  The second presentation was made by Mrs. Nduka who presented on Agronomic practices for sustainable cashew production in Nigeria.

1. The participant asked – which should be adopted, nursery sowing or planting in situ
2. Hon. Shedrack (a farmer) said that after pruning he observed gum exuding from the branches.

   The presenter Mrs. Nduka responded that both Nursery and Planting in-situ have their advantages and disadvantages, and both methods are recommended but strict compliance of good management practices should be given to any method chosen. Painting the surface of the plant surface after pruning can be used to avoid/prevent diseases.

   The third presenter was Mr. Adeniyi. He spoke on cashew diseases and their control after his presentation the questions raised were as follows:

- ➢ The issue of IPM should be explained by the presenter
- ➢ Chemical name used in cashew production should be named
- ➢ The chemical hi-shape and up cut, if both are good in cashew production
- ➢ Mr. Omeje asked how long after spraying before the cashew fruit can be eaten.
- ➢ The presenter should explain page 37 (all the different kind of disease cashew fruiting suffers from)
- ➢ Lastly a participant asked about the chemical he can use in his moriga and Aloevera plantation because he observed that the root of the plant in the nursery bags are getting rotten and dying in their nursery stages.

Response – The presenter explained that, the use of chemical in combination with IPM method of combating diseases is economical to farmers couple with good spacing and the right farm management should be adopted.

- ➢ He recommended a chemical "force let" in the control of diseases.
- ➢ He also recommended that chemical should not be applied when the fruits have been formed and that it's better to control the disease before flower opening and should be stopped before fruit formation.
- ➢ Also the participants should check their plantation regularly because some might be new diseases.

The fourth presenter was Mr. Asogwa – he spoke on the best farm practices to control cashew insect pest menace in Nigeria. He observed that most of the farmers are using wrong insecticide since some insect are beneficial to cashew by enhancing flowering and the chemical kills some of the beneficial insect and advice that when the fruit is ripen, cultural control or hand picking (physical control) should be adopted and also farmer should differentiate fungicide and insecticide and that timing is very important.

There was a lunch break by 2:30pm.

By 3pm – the last two presenters Mr. Agbongiarhouyi, A. E. taught the farmers on role of farmers organizations and extension methodologies in cashew production and Mr. Mokwunye, F. C. on Good Agricultural Practices (GAP) of harvesting, post-harvest handling and processing of cashew.

Questions from farmers

1. How many days can we dry the apple before grinding into flower?
2. How much is the cost of machine used for processing?
3. How many days after harvesting should cashew nuts be packaged?
4. Is it true that pilots used the oil extracted from cashew nut?
5. Can CRIN do analysis for them or should the farmers go and look for laboratory?
6. How can they get a good drying machine instead of sun?
7. If after boiling, the cashew juice can still retain its flavor? Will it still remain natural after boiling?
8. Does the color of the apple affect the nutrient composition?

The presenter's response:

1. Sliced cashew apple should be dried slowly in the sun. The drying time depends on the climatic condition. You should dry until the moisture content reduces to less than 10%.
   To reduce the moisture content of the apple depend on the seasons. 2 – 3 days for dry Season, 2weeks in rainy season.
2. The cost of the cashew processing machine depends on the capacity of the machine ordered. The cashew juice processing machine may cost between 0.5M-1Million Naira
3. Cashew apple is a perishable produce and must be processed within 48 hours
4. The scientist responded that, he did not know about the pilots using cashew oil in aircraft but he was sure that cashew nut shell liquid (CNSL) is used for tyres, paints, brake pads etc
5. CRIN is building a central laboratory. The construction is on-going now, but CRIN can direct you to a laboratory for your analysis
6. CRIN Engineers can construct a dryer if the farmers contact CRIN.
7. Boiling will definitely denature some of the vitamin C which is the main nutrient in cashew apple. Boiling will definitely increase the flavor of cashew apple by destroying the tannins which causes astringency.
8. The color of the apple either yellow or red has thesame nutrient composition.

After Mr. Agbongiarhuoyi's presentation, he asked the farmers the amount they sell cashew nuts - they replied that it was very small 50kg (12 buckets) for ₦2500 and each bucket was for ₦150 – ₦200 depending on the time of the year. He also asked the farmers if they had co-operatives society. They responded that, they had and some of their cooperative groups are listed below:

- ✓ Pastor Alumona, James O. Chairman (08032687439)
- ✓ Trinity Nkpologu farmers Multi-purpose Co-operative Society Ltd.
- ✓ Chinyere Ugo F.M.C.S. Ltd. (Secretary – Emma Eze Sunday – 08066751371).
- ✓ Eziafa Ugbo – Ogele F.M.C.S Ltd. – Chairman – Hon. Shedrack Ugwu – 07089898951.
- ✓ Suma Agro and Industrial Marketing Ltd. Director – Hon. Shedrack Ugwu.
- ✓ United labour F.M.C.S Ltd. Chairman Nnad Ikechukwu 08033606976.
- ✓ Divine prosperous Nsukka Co-operative farmers Ltd. – 07064713612 (Secretary of the Society)
- ✓ Iruka Okpatu Fadama cashew producers Ogbuzor Romanus O. – 08066870289.
- ✓ Ckukenemaka Multi-Purpose Farmers' Co-operative Nsukka. Asogwa Kelvin – 08130185800.

The chairman of the event Mr. Uwagboe, E. O. thanked all the participants present and asked them to fill the questionnaire given to them to be returned the next day where a field demonstration will be done.

The farmers' group chairman Hon. Shedrack Ugwu thanked CRIN for organizing the training and called for a follow up training to ascertain the effect of the training they have received. Also, he called on CRIN to assist in eliminating the role of middle men in cashew marketing as they act as price stakes which culminates into low pricing of cashew nut.

He later prayed and the event ended at 5pm.

Second Day – 28 January, 2015

Arrival at the field of training site (Umu-Osigide Obollo Etiti/Ohie) at 9am. Mr. . Agbongiarhuoyi started the occasion by welcoming us to the community and the opening prayer was done by Pastor Alumona James O. and the prayer on the Kola nut was done by His Royal Highness (Igwe). Mr Uwagboe, E. O. (The head of Extension Section) welcomed everybody to the practical training.

Mrs Iloyanomon started the presentation on the practical use of soil auger for soil sampling and use of fertilizer

Questions from farmers

- ✓ How many percentage of fertilizer to be applied?
- ✓ Is it true that the amount of cashew fertilizer to be applied is determined by the size of canopy?
- ✓ How do we identify which crop to be planted if the plantation is sandy soil and the type of crop that can kill weeds?
- ✓ What type of crops can be grown in sandy soil?

Responses

- ✓ For fertilizer to be applied, soil test should be carried out before fertilizers application. This is to prevent over or under application.
- ✓ Fertilizer should be applied under the canopy of the cashew plant. In a young seedling new establishment. Fertilizer should be applied in a circular groove. At 20-25cm from the base of the plant and covered with soil to prevent loss of fertilizer nutrient. For older trees fertilizers should be applied at a distance of 60cm – 1metre from the trunk of the tree.
- ✓ Type of crop planted with cashew on sandy soil as intercrop in Enugu is melon. This reduces the need for weeding.

Question for Mrs. Nduka

- ✓ The presenter asked the farmers the methods of nursery they use? The farmers responded that they weren't used to polythene bags but direct ridge and do carry the seedlings with little soil on a tray to where they transplant.
- ✓ Their way of planting was slant not flat.
- ✓ If one farmer does pruning and the other doesn't what should they do. The presenter advised that they should create good relationship among themselves because once there is disease outbreak, it spreads.

The presenter said it was wrong for them to raise nursery on ground ridge because during uprooting for transplanting, the root may be injured but when the tree is not producing, coppicing should be done and that pruning should be carried out before the onset of flowering.

Mr. Adeniyi showed the farmer the physiological behavior of cashew flower. He stated that if a flower dies another part will rejuvenate from that place. He also showed the farmers the brown coloration of the branches that prevents flowering.

Questions

- ✓ His Royal highness asked what the white patches found all over the plant represented.
- ✓ The presenter explained that cashew white patches is not significant as the leave does photosynthesize but in cocoa it is a serious problem because cocoa produce cherelles from the trunk.
- ✓ Leaf blight was explained to them.

A brief exercise among the farmers was coordinated by Mr. Agbongiarhuoyi.

Mr. Mokwunye told the farmers of the price range of N150, 000 for steaming and pasteurizer but the Extractor was about N300, 000 depending on the size and the capacity of the fuel tank.

Question

1. The problem of NAFDAC number, and they were told to put ceiling board in the processing hall.
2. His Royal highness told the team that since firewood is used for boiler, he was recommending gas or electric stove.
3. The farmers requested that, CRIN should give them certificate so that NAFDAC will know what they were doing and the constrains they had.

- ✓ Why does the cashew fluid burn the body?
- ✓ Do we need preservatives for the cashew juice?
- ✓ If not, how long can the juice stay before it goes bad?.
- ✓ Can CRIN provide the machine while the farmers make installment payment?

Responses

1. Scientist responded that, farmers should comply with NAFDAC rules.
2. The reason why CRIN recommended firewood was because the small scale processing is expected to be done within the confines of the farm where firewood is available and cheap. Electricity may not be available or may be costly.
3. Cashew apple contains some enzymes which must be deactivated to prevent browning reaction that could turn the color of the juice to brown. Pasteurizing destroys some spoilage microorganisms.
4. He also said that cashew juice is not acidic but contain some chemical substances called Tannin
5. Scientist responded that, preservatives are added to cashew juice in order to increase the shelf life of the juice.

Questions from farmers to the Entomologist (Mr Asogwa)

1. In a high tree, how can you apply chemical?
2. Termite is everywhere in the tree and it's not allowing the honey boxes to stay, they eat up the honey boxes so they asked what type of chemical can be applied to kill ant hill.
3. Observation showed that, there was an insect in the soil that eats the new hair root after that it enter the old root (white and green insect found in the soil).

Response from Mr. Asogwa – The entomologist asked the farmers to pick the insect pest with the tool "go to hell" and burn/kill the insect afterwords. 'The leaf miner is a minor pest of cashew but when it is much, photosynthesis is reduced'. He further stated that, all insect were not pest because some of them are beneficial to plant for examples, bees, butterfly etc.

He advised the farmers not to spray the ant nets. When it is observed that, the nets are about 500 or more then, you should know that the environment is not clean. They were asked to simply use ashes to drive the insects away, pruning should be done so that sun comes in and the ants will go away.

There are natural methods of controlling termite hill by breaking it down, or remove the king/queen. Do not use battery or engine oil. Farmers were told to use local method by applying water used in soaking cassava or ogi for about 3weeks.

Later in the day certificates of attendance were issued to the farmers.

FOURTH DAY – 29 JANUARY, 2015 (VISIT TO FARM HOUSES)

At Akwari Eha-Alumona, Nsukka LGA, Eziafa Ugbonog Ele Akwani Eha-Alumona FMES, Ltd. At 10am. The team was welcomed by Hon. Shedrack the chairperson who briefed the gathering that they were to give the team a communiqué but their chief stopped it due to lack of time. He told the team that, lots of seminars had been conducted with State Government officials who made unrealistic promises. He said they had the problem of market unavailability which made Cashew farmers poor. However, they appealed that the team come to their aid by creating joint marketing. CRIN was asked to intervene in the extortion of the middlemen in order to have better price.

Secondly, income generation was a problem as their land is good only in cashew production, other crops were failing because of the type of soil (sandy soil). Their co-operative was not organized and he solicited for CRIN's assistance with respect to having a formidable co-operative. He said he had acquired a cashew processing machine recommended by CRIN.

Mrs. Nduka (CRIN Agronomist) observed that, the fruiting was much on the cashew trees but the nuts were small which does not attract high price. Hon. Shedrack informed the team that, jumbo nut was available for planting and that their cashew produces more fruit than any other part in Nigeria.

The head of Extension promised to link the farmers with marketers/exporters and said he was happy that they were collaborating with CRIN. Mr. Agbongiarhuoyi also told him that marketing was a general problem and asked if he was a member of National Cashew Association. He said no but he had heard of Africa Cashew Alliance.

The team was informed that 2 bags of fertilizer and 25kg of cashew was sold for **N**6, 000 from CRIN to Enugu farmer but the farmers could not buy due to the high cost. Mr. Agbongiarhuoyi later called the president of NCAN who spoke to the team and the farmers and promised rendering assistance on the condition that, the farmers organized themselves and their produce have good quality. He said he obtained his cashew nuts from ADP and he started cashew cultivation since 1986. However, the apple was not initially utilized but due to the directive from CRIN, they had started processing through Anacadium. He later took the team to the processing houses still under construction, where he showed different chambers and rooms to be used for extraction, filling and packaging of cashew juice.

Mr. Agbongiarhuoyi thanked Hon. Shedrack on behalf of CRIN before leaving.

LESSONS LEARNT

1. Budding: Need for cross breeding Jumbo and local varieties
2. Marketing: Low pricing of cashew nuts
3. Processing: There was the need for farmers to be encouraged in processing of cashew apple
4. There was the need for the formation of formidable cashew cooperative society in Enugu.
5. Burning of leaf litters under cashew canopy in the farms needed to be discouraged

The 7 CRIN Research officers that were resource persons in the training

Group photo of the CRIN resource persons with the Enugu cashew farmers

Group photograph of the Enugu female cashew farmers with female CRIN Scientists at the Training

The participants (Enugu cashew farmers) with their certificates

The Head of Extension (Mr E. O. Uwagboe) awarding certificate to the Igwe

A cross section of the participants (Enugu cashew farmers)

The Igwe blessing the kola nut offered by the participants

TEA PROGRAMME

Experimental Title: Status of tea consumption in southwestern Nigeria
Investigators: Oluyole, K.A., Yahaya, A.T. and Agbebaku, E.E.

Introduction

Tea (*Camellia sinensis* (L) Kuntze) belongs to the family of *Theacea*. It is an evergreen bush which if kept at low level through pruning produces more young shoots. It is these shoots that produce the tea leaves which are processed as beverage. Tea is one of the most popular and lowest cost beverages in the world and consumed by a large number of people (Sowunmi *et al*, 2009). A lot of tea is consumed in European countries as well as countries where it is produced. In Nigeria, consumption of tea is common among different categories of people. Tea is mostly drunk as hot beverage during cold weather and as iced tea during hot weather. Tea is very important health-wise as it is a source of anti-oxidant such as carotenoids and ascorbic acids; it makes the body resistant to bacterial infection; it reduces the incidence of diabetics; it inhibits the growth of cancer cells; it increases body's immunity against viral infection; it is a cardio-protective agent; it protects the brain; it is an anti-inflammatory and anti-fibriotic; it increases alertness and also speeds up heartbeat and breathing rate thus reduces the incidence of hypotension (Aroyeun *et al*, 2013). However, with all the robust benefits of tea, there is information gap regarding its status of consumption in the Sothwestern, Nigeria thus necessitating the study.

Objectives

1. To determine the socio-economic characteristics of tea consumers in the study area
2. To ascertain the status of tea consumption in the study area

Methodology

The study was carried out in Oyo and Ogun States. Three Local Government Areas (LGAs) were randomly selected from the two States which includes Oluyole and Ido LGAs in Oyo States and Ijebu North LGA in Ogun State. Random sampling technique was used to select tea consumers from the study area. A total of 120 tea consumers were randomly selected from the three LGAs viz: 48 respondents from Oluyole LGA, 20 respondents from Ido LGA and 52 respondents from Ijebu North LGA. Structured questionnaire was used to elicit information from the randomly selected respondents. The data retrieved from the information collected was analyzed with the use of descriptive statistics (such as frequency, percentage, mean, standard deviation) as well as Ordinary

Least Square multivariate regression analysis. The model is specified as follows:

$Q_i = \beta o + \beta_i X_i + e_i$

Where:
Q_i = Vector of endogenous variable (quantity of tea consumed in gramme);
X_i= Vector of exogenous variables (predictors);
β = Regression coefficients;
e_i = Random error term.

The exogenous variables included in the model are:

X_1 = Age of consumer (years);
X_2 = Gender of the consumer (male = 1; female= 2);
X_3 = Educational status (no formal education = 1; primary education = 2,
Secondary education = 3, tertiary education = 4);
X_4 = Marital status (single = 1, married = 2);
X_5 = Household size (in number);
X_6 = Primary occupation (farming = 1, trading = 2, technical/craftsmanship = 3, civil service/paid job = 4);
X_7 = Monthly income (₦);
X_8 = Association membership (member = 1, non-member = 2);
X_9 = Brand of tea consumed (Lipton tea = 1, highland tea = 2, top tea = 3, home cup tea = 4);
X_{10} = Frequency of tea consumption (daily = 1, 3 times/week = 2, 2 times per week = 3,
Weekly = 4, occasionally = 4);
X_{11}= Price of tea (₦);
X_{12} = Purchasing point (around home = 1, market = 2);
X_{13} = Purpose of tea consumption (because of the taste = 1, because it is good for health = 2, because it is used as a stimulant = 3).

Results and Discussion

Table 1 revealed that tea is consumed by all age categories of consumers. However, tea is consumed mostly by the respondents with the age bracket 31-40 years as it represents 29.2% of the total respondents while it is consumed less among the respondents with age more than 50 years as they constituted just 8.3% of the total consumers. This shows that tea is least consumed by the old people in the study area. The higher proportion (55.0%) of the consumers are males showing that, tea is consumed more by males than the females in the study area. As regards the educational level, tea consumption cut across all the educational levels of the respondents. Hence, tea is consumed by all the categories of people whether literates or illiterates. However, the highest proportion of the consumers (37.5%) was among the respondents with secondary school education.

The status of tea consumption in the study area is shown in Table 2. The table shows that 91.7% of the respondents consume tea showing that tea is widely consumed in the study area. Meanwhile, the brand of tea that is mostly consumed by the consumers is Lipton tea. This is because majority (85.8%) of the consumers consume Lipton tea while 5.9% consume top tea. However, it could be observed from table 2 that none of the consumers consume either highland or Home cup tea. This shows that these two brands of tea are not so popular in the study area. Hence, the producers of the brands would need to organize enlightenment programme in order to popularize the products in the study area. As regards the frequency of tea consumption, most (42.5%) of the consumers consume tea occasionally while 24.2% consume tea daily. It could be noted that the proportion of the consumers that consume tea daily is very low. Therefore, it is necessary to sensitize the consumers in the study area on the need to consume tea on daily basis. It could also be observed in table 2 that majority (72.5%) of the consumers submitted that they consume tea because it is good for their health while 14.2% of the consumers claimed that they consume tea as a stimulant. However, a good development from this finding is that it is interesting to note that, tea consumers are aware of its health benefits. Result of the analysis as shown in Table 2 revealed that most (50.0%) of the consumers consume between 1 and 3 sachets of tea per week while 15.0% consume between 7 and 9 sachets per week.

Table 3 shows the factors that determine tea consumption in the study area. The table revealed that out of the 13 variables investigated, 6 variables were found to have significantly affected tea consumption. The variables are age of consumer $p<0.05$, gender of consumer $p<0.05$, household size $p<0.01$, frequency of tea consumption $p<0.01$, purchasing point $p<0.01$ and purpose of tea consumption $p<0.01$. Other factors such as educational status, marital status, primary occupation, monthly income, association membership, brand of tea consumed and price of tea do not affect tea consumption significantly.

Conclusion and recommendation

Tea is consumed by all the categories of people in the study area and the brand of tea that is mostly consumed is Lipton tea while highland tea is rarely consumed. Most tea consumers consume it on health ground. Some of the factors that determine tea consumption in the study area are age of consumer, gender of consumer, household size, and frequency of tea consumption, tea purchasing point and the purpose of tea consumption.

The study hereby recommends that, the producers of the brands that are rarely consumed in the study area (such as highland tea) would need to organize enlightenment programme in order to popularize the products. Also, tea consumers should be sensitized on the need to consume tea on daily basis.

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Table 1: Socio-economic characteristics of Tea consumers

Variables	Frequency	Percentage
Age of consumer (years)		
≤ 20	25	20.8
21-30	29	24.2
31-40	35	29.2
41-50	21	17.5
> 50	10	8.3
Total	120	100.0
Gender		
Male	66	55.0
Female	54	45.0
Total	120	100.0
Educational Level		
No formal education	30	25.0
Primary education	34	28.3
Secondary education	45	37.5
Tertiary education	11	9.2
Total	120	100.0
Marital status		
Single	26	21.7
Married	94	78.3
Total	120	100.0
Household size		
≤ 4	70	58.3
5-8	26	21.7
> 8	24	20.0
Total	120	100.0
Primary occupation		
Farming	17	14.2
Trading	66	55.0
Technical/Craftsmanship	33	27.5
Civil service/paid job	4	3.3
Total	120	100.0
Association membership		
Member	61	50.8
Non-member	59	49.2
Total	120	100.0

Source: Field survey, 2015.

Table 2: Status of tea consumption among Tea consumers

Variables	Frequency	Percentage
Tea consumption		
Consumers of tea	110	91.7
Non-consumers of tea	10	8.3
Total	120	100.0
Brand of tea consumed		
No response	10	8.3
Lipton tea	103	85.8
Highland tea	0	0
Top tea	7	5.9
Home cup tea	0	0
Total	120	100.0
Frequency of tea consumption		
No response	6	5.0
Daily	29	24.2
3 times/week	21	17.5
2 times/week	9	7.5
Weekly	4	3.3
Occasionally	51	42.5
Total	120	100.0
Purpose of consuming tea		
No response	7	5.8
I just like the taste	4	3.3
It is good for my health	87	72.5
I used it as a stimulant	17	14.2
I used it to take bread	5	4.2
Total	120	100.0
Quantity of tea consumed per week (satchets)		
No response	12	10.0
1-3	60	50.0
4-6	12	10.0
7-9	18	15.0
> 9	18	15.0
Total	120	100.0

Source: Field survey, 2015.

Table 3: Determinants of tea consumption among the tea consumers

Variables	Coefficients	p-values
Constant	11.9242	0.026
Age of consumer	-0.1605	0.018**
Gender of the consumer	4.0330	0.016**
Educational status	-0.1444	0.887
Marital status	1.1821	0.602
Household size	3.4417	0.006***
Primary occupation	0.5247	0.653
Monthly income	-0.0022	0.631
Association membership	-2.0454	0.120
Type of tea consumed	-0.2654	0.865
Frequency of tea consumption	3.4914	0.004***
Price of tea	-0.0896	0.443
Purchasing point	2.8766	0.013***
Purpose of tea consumption	-3.4444	0.003***
R-squared	0.6566	
Adj R-squared	0.5663	
Overall p-value	0.0015	

Source: Field survey, 2015.

Experiment Title: Evaluating Fertility Status in Low land Tea Field at Ibadan and Uhonmora
Investigators: Akanbi O.S.O and Ipinmoroti R.R.

Introduction

Tea production in Nigeria is restricted to the Mambilla plateau in Kusuku and its' environ in Taraba state. Its extension and adaptation to the lowland areas of Nigeria has been ongoing for the past few years with the sole aim of establishing adaptable commercial clones in these areas in connection with nutrient availability to the plant for sustenance needs to be sequentially assessed since this will form the basis of what types of farming and soil management practices to be employed hence the needs for the study.

Objective

The objectives of this study therefore was to:

1. Evaluate nutrient status of lowland areas for quality tea production in Ibadan and Uhonmora and
2. Provide a baseline information on the fertility status of the lowland areas for further tea development in the zones.

Methodology

The study was carried out at CRIN Headquarters, Ibadan and Uhonmora CRIN Substation in Edo state, Nigeria. Twelve soil samples were collected, air dried, 2mm sieved and prepared for laboratory analysis using IITA (1979) standard procedures.

The soil pH was measured electronically with glass electrode pH meter in soil/water ratio of 2:1 organic carbon 100 was by Nelson and Somers methods, total N by micro Kjedhal digestion while available P by the colorimetry method; cations was extracted with IN neutral NH40AC at pH 7, the K and Na in the leachates was determined with flame photometer while Ca and Mg by atomic absorption spectrophotometer. The exchangeable acidity (Al^{3+} and H+) was by leaching the soil with IN kcl and ECEC by summation of exchangeable acidity and bases. The P, K, Ca and Mg by wet digestion using acid mixtures. The P was determine using vanado-molybdate yellow method and read using Uv-Vis recording spectrophotometer (Uv 2400PC) at 420nm, the K by flame photometer while Ca and Mg was determined by AAS.

Result and Discussion

Physical and Chemical Properties: The chemical properties of the soils on which the trials were conducted are presented in Table 1 for Ibadan and Uhonmora respectively. The Ibadan soil contained 673.0, 113.0 and 214.0gkg^{-1} sand, silt and clay respectively while the corresponding values for Uhonmora experimental site were 610gkg^{-1} sand, 152.82gkg^{-1} silt and 237.15gkg^{-1} clay respectively. The Uhonmora soil contained more clay (237.15gkg^{-1}soil) compared to Ibadan soil (214.0gkg^{-1}soil). This implies a better water retention and holding capacity for the Uhonmora soil than for Ibadan soil. The clay + silt contents of 327.0 and 389.97gkg^{-1}soil for Ibadan and Uhonmora soils were sufficient enough to hold adequate soil moisture for good cocoa growth and guide against short duration of drought during the five months of dry spell (November - March). On the other hand, there would be need to prevent loss of water through evaporation on the soils through mulching and improvement of the soil organic matter (SOM) contents especially on Ibadan soil. The expected improvement on the micro - climate would help sustain Cocoa seedlings as well as reduce the mortality rate of stands on the field during the long dry spell.

Table 1: Results of the physical analysis of Ibadan and Uhonmora soils

Properties	Units	Ibadan	Particle Size Uhonmora
Sand	gkg^{-1}	673.00	610.00
Clay	gkg^{-1}	113.00	152.85
Silt	gkg^{-1}	214.00	237.15
Textural class	-	*SL*	*SCL*

SL= Sandy loam; SCL= Sandy clay loam.

The organic carbon contents (OC) of Ibadan site soil was 10.05 while that of Uhonmora soil was 12.95gkg^{-1}, the values were considered low and below the soil critical value of 30gkg-^{1}soil. The soil pH values were 6.11and 6.53 for Ibadan and Uhonmora sites indicating that the soils at both sites were acidic. However, the values fall within the range of 4.5 – 6.5 permissible for tree crops production in Nigeria**.** Compare to Uhonmora soil, Ibadan soil contained 0.60% total nitrogen (N), this value is relatively lower than what was obtained in Uhonmora soil (0.70%N). The exchangeable Ca, Mg, K and Na contents of Ibadan site were 6.15, 0.60, 0.59 and 0.51cmolkg^{-1} respectively while it was 6.37, 0.73, 0.41 and 0.67comlkg^{-1} for the same nutrient elements at Uhonmora.

Table 2: Chemical properties of Ibadan and Uhonmora soil prior to the experiments

		Locations	
Soil chemical properties	**Units**	**Ibadan**	**Uhonmora**
pH(1:1 H_2O suspension)	-	6.11	6.53
Organic carbon (OC)	(gkg^{-1})	10.05	12.95
Nitrogen (N)	(%)	0.60	0.70
Available Phosphorus (P)	gkg^{-1}	4.61	3.56
Exchangeable cations			
Calcium (Ca)	$cmolkg^{-1}$	6.15	6.37
Magnesium (Mg)	$cmolkg^{-1}$	0.60	0.73
Potassium (K)	$cmolkg^{-1}$	0.59	0.41
Sodium (Na)	$cmolkg^{-1}$	0.51	0.67

Micronutrient contents: The Ibadan soil contained 27.56, 3.46, 100.08 and 78.64mg/kg, Zn, Cu, Mn and Fe respectively, while it was 12.49, 0.84, 47.08 and 69.15mg per kg soil at Uhonmora. The exchangeable acidity (Al^{3+}, H^+) values recorded for Ibadan soil were 0.13 and 0.04$cmolkg^{-1}$ respectively while Uhonmora soil had 0.13 and 0.27$cmolkg^{-1}$ soil (Table 3).

Table 3: Micro-nutrient contents of Ibadan and Uhonmora soil prior to the experiments

Micro – nutrients	**Units**	**Ibadan**	**Uhonmora**
Zinc (Zn)	gkg^{-1}	27.56	12.49
Copper (Cu)	gkg^{-1}	3.46	0.84
Manganese (Mn)	gkg^{-1}	100.08	47.08
Iron (Fe)	g/kg	78.64	69.15
Exchangeable acidity			
Al^{3+}	cmolkg-1	0.13	0.10
H^+	cmolkg-1	0.04	0.27
CEC	$cmolkg^{-1}$	8.85	8.18
ECEC	cmolkg-1	18.97	13.27

Conclusion
Although the soils from Ibadan and Uhonmora sites were slightly lower in the soil organic matter and some other nutrient elements, production of lowland tea is achievable with good Agricultural practices more especially at Ibadan and Uhonmora.

END USE PROGRAMME

Experimental Title: Efficacy of cocoa powder on the weight and fasting blood glucose level of normal and alloxan-induced diabetic albino rats
Investigators: Jayeola, C.O., and Olubamiwa, O.

Background
Diabetes mellitus is a public health problem which is increasing all over the world, various contributions to its prevention and management is crucial. Cocoa powder as a food ingredient has been discovered to have medicinal purposes most especially in the treatment of cardiovascular diseases. This study was conducted to determine the efficacy of cocoa powder in experimental diabetic albino rats

Methodology
Sixty matured albino rats with an average weight of 200g housed in metabolic cages were randomly divided into 10 groups of 6 rats which include the normal and diabetic control and 8 treatment groups. Diabetes was induced intra-peritoneally and the treatments include 1-4% natural cocoa powder mixed feed. Data on the consumption of feed and water intake, body weight and fasting blood glucose were determined. The data collected was analyzed using Statistical Package for Social Sciences (SPSS) version 17.0.

Result
The study revealed a significant decrease in the fasting blood glucose and water intake as well as an increase in the +nal body weight of the diabetic treatment groups when compared to the diabetic control group ($P<0.05$). The diabetic group fed with 4% cocoa powder feed showed the lowest water intake (29.6±8.41ml) as well as the lowest +nal fasting blood glucose level (101±3.26mg/dl) when compared to the diabetic control group while the normal group fed with 4% cocoa powder had the lowest body weight (204±11.6g) when compared to the normal control group. There was a significant decrease in the annual feed intake of both the diabetic and normal treatment groups when compared to the normal control group.

Conclusion
The results showed that cocoa powder treatments lowered the blood glucose of the diabetic albino rats, reduced polydipsia as well as reverse weight loss observed in diabetes mellitus.

EXTENSION PROGRAMME

Achievements

1. Adopted villages and schools

Extension activities in adopted village and school were carried out during the year

i. Maintenance of cocoa demonstration plots at Aba-Agbo village and Mamu community comprehensive high school.

ii. Occasional visits to the farmers at Aba-Agbo village during their cooperative society meeting. The farmers were organized into group which metamorphosed into cooperative society.

iii. West Africa Agricultural Productivity (WAAPP) donated fund for the construction of poultry pen with battery cage at Aba Agbo, Mamu community comprehensive school and Prospect High School, Abanla.

2. CRIN Extension demonstration plot was well maintained and cocoa pods were harvested from the plot thereby increasing the annual cocoa production in the Institute.

3. Establishment of Extension exhibition room

4. Students on excursion and Industrial training

Attending to students of various institutions of learning on excursion visit.

The schools that visited during the year were:

	No. of students	Date
1. Stars Comprehensive College Sawmill, Ibadan	- 65students	29/1/15
2. Emmanuel Alayande College of Education Oyo (Lanlate campus)	38 students	04/02/15
3. Obafemi Awolowo University Ile-Ife	- 8 students	9/2/15
4. St Andrew Basic School, AraOje	- 53 students	10/2/15
5. Golden Beryl School, Ologuneru Ibadan	- 39 students	11/2/15
6. Ini-Oluwa Group of schools, Adeyemo Layout Molete Ibadan	- 49 students	17/2/15
7. University of Benin, Benin City	- 90 students	4/03/15
8. Federal College Animal Health production Technology	35 students	6/03/15
9. ObafemiAwolowo University Ile Ife	46 students	6/03/15
10. Premier Private Collage Oyo State	43 students	12/03/15
11. NDA Kaduna State	61 students	23/03/15
12. All Saints College Jericho Ibadan	85 students	12/05/15
13. AGRO ALLIED CDS Group Oluyole (Cooper)	24 students	14/05/15
14. Jesus the rock college Jegede	24 students	15/05/15
15. Belthel Comprehensive College Ibadan	36 students	26/05/15
16. TSPC College Tollgate Ibadan	63 students	01/06/15
17. Christ the King International School Gbagada Lagos	34 students	03/06/15
18. Justice Development and Peace International Ekiti Diocese	25 students	19/06/15
19. Faculty of Agriculture University of Nigeria	60 students	07/07/15
20. Faculty of Agriculture University of Nigeria	62 students	21/07/15
21. Federal College of Forestry Ibadan	25 students	23/07/15
22. Federal College of Forestry Ibadan	45 students	06/08/15
23. Kogi State University	189 students	09/09/15
24. Christ covenant school	24 students	28/09/15
25. Ogunsanya Girls Science Academy	20 students	28/09/15
26. TASCE, OmuIjebu-Ode	- 69 students	28/09/15

5. Students on industrial training scheme (3 students) of Ladoke Akintola University of Technology, Ogbomoso and Federal University of Technology, Akure received training on extension methodologies and CRIN mandate crops.

6. REFILS: Attendance of the 28th Annual South West REFILS workshop at IAR&T Ibadan. MrAgbongiarhuoyi

7. Exhibition: Synod which took place at St David Cathedral Kudeti on 5/6/15 was atended by Dr. Ndagi I (Extension) Imasogie M. (Marketing) and Miss Ene A.P (CPU)

- RESEARCH PROJECTS CARRIED OUT

1. A 2-day training programme on the Extension of CRIN Technologies to Cocoa Farmers in Owena, Ondo State Farmers were trained on compost manure using cocoa pod husk, making of soap with cocoa pod husk and bakers were trained on production of bread with cocoa powder
2. Training of farmers on good agricultural practices (GAP) in the management of cashew farms in Nigeria held at Oke-Onigbin, Kwara State, Nigeria.
3. Training of farmers on Good Agricultural Practices at Enugu State

Farmers were trained on:

1. Cashew soil requirements and fertilizer management for optimum productivity.
2. Nursery practices for sustainable cashew

cultivation.
3. Agronomic practices for sustainable cashew production in Nigeria.
4. Field guide for insect pest management in cashew plantation.
5. Nigeria cashew diseases management and control
6. Cashew harvesting, post-harvest handling and processing in relation to good agricultural practices (GAP).
7. Trust building for participatory rural approach among cashew farmers.
8. Marketing and farm records for sustainable cashew production in Nigeria
4. Evaluation of Market and Marketing Opportunity of Coffee Production in two ecological zones (Ekiti and Kogi states) of Nigeria.-The project examined the Socio-economic characteristic of the respondents, determined farmers source of information in the study area, evaluated methods used by the farmer during post harvesting handing of Coffee in Study areas and investigated market and marketing system of the study area.
5. Manuals and posters were printed.

WORKSHOP/ CONFERENCE

i. Nigeria Rural Sociology association conference at LAUTECH attended by Dr. Famuyiwa B.S.
ii. Workshop with the theme local added value creation through knowledge transfer in Cocoa and Chocolate processing held at Great University Belgium sponsored by Belgian Government for 26/8/15 to 11/9/15 attended by Agbongiahoyi, A. E

STAFF POSTING

1. Mr. Ajirotutu .S. was posted to Uhonmora substation
2. Mrs. Adewusi E.M.A was posted from Admin and Supplies to Extension
3. Mrs. Osho Olajumoke was posted from Health Centre to Extension

NEEDS

1. Partitioning of office No. 15 in ERLS building for Head of Extension office /Secretarial Assistant/Clerical Staff.
2. Stocking of WAAPP constructed Poultry pen at adopted village and schools.
3. Organizing Radio and T.V programme.
4. Organizing a Farmers' field day.
5. Repairs of leaking roof in office No 19, 21, and 22 in ERLS building
6. Electricity supply from Institute generator
7. Anti-Virus for the section Desktop Computer.
8. Laptop for the section and Flash drive
9. Photocopier
10. Repairs of 3 bad flexi banners
11. 4 Printer toners for HP Laserjet P2055 and HP 1102
12. 15 Reams of A4 paper

LIBRARY INFORMATION AND DOCUMENTATION DEPARTMENT HEAD, LID

(Fagbami, O.O.)

Personnel: They are as specified in the divisions and sections of the Department

Functions:

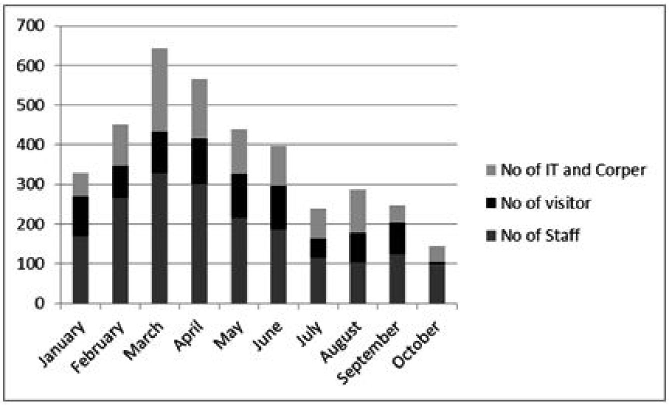
* Allocation of job schedule for divisional heads
* Request for departmental proposal from divisional heads
* Receipt and collation of proposal from divisional heads
* Hold meetings on proposal with divisional heads
* Set a prototype for the implementation of proposal
* Source for expert on the proposal and cost implication
* Communicate the proposal to the Executive Director
* Discuss the idea at the management meeting of IMC and PPC
* Access the implementation of the proposal

Achievements

* Library patrons were well attended to and there was increase in library user's patronage
* More professional IT students in Library, Information and Communication Technologies have been trained.
* Digitization of library materials has increased.
* Allocated money has been well utilized and improved reading environment has been enhanced.
* Provision of amenities for conducive research environment was provided in the library

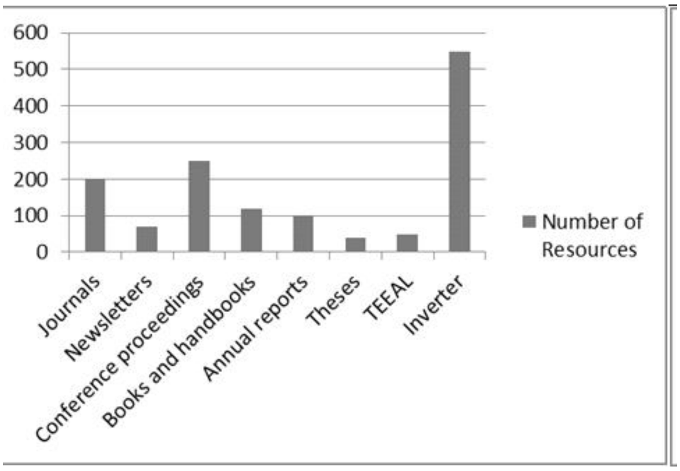
Library Division (Dr (Mrs). Ogunjobi T.E. – Acting Head, Library Division)

Between January 2015 and 31, December 2015, a total number of 1,907 staff were recorded, 826 visitors were received. 1,009 Industrial training and Corp members visited the library. The breakdown on monthly basis is shown below



The figure above showed that the month of March had the highest number of users while the least number of users was recorded in the month of October. No user was recorded in the month of November and December due to internal crisis experienced at the Institute headquarters.

The library had the record of facilities used by CRIN staff and visitors, the number and facilities used were listed below



The figure above revealed that inverter, conference proceedings and journals were majorly used while theses and teal were least used.

The following were also done:

Compilations of Bibliography and CRIDAN on CRIN mandate crops are in progress. Overdue books and journals were retrieved from users, used books and journals shelved, while shelf readings were done occasionally, Charging and discharging of library materials were done regularly. Moreover, books that were newly bought for the library were catalogued and classified. Also, Articles published on CRIN mandates crops by CRIN scientists and other scientists outside CRIN were added to database in the library. Paper cutting was not left out, all matters on CRIN mandate crops and agriculture related matters were kept for consultation of scientists and all interested users. Accessioning, stamping and displaying of new information resources were done on regular basis. Four industrial attaché sent to library division were trained.

Documentation

- Research reports submitted were processed and edited. Occasional publications written by Scientists were deposited in the library.
- Crop book on CRIN mandate written by Scientists were collated for printing.
- The Essential Electronic Agricultural Library (TEEAL) data base was procured.
- Reports and other publications by Private and Government Organizations receive during the year were processed.
- The Division was also involved in the production of staff identity cards for all categories of staff.

ADMINISTRATION AND SUPPLIES DEPARTMENT

The Administration and Supplies Department of the Institute applied itself meritoriously to its primary responsibilities of supporting and assisting the Executive Director in the day-to-day administration of the Institute in conformity with the Institute's Mandate and mission statements.

STRUCTURE OF THE DEPARTMENT

To facilitate the activities of the Department, the Department is structured into three (3) Divisions, viz Administration Division, Supplies Division and Health Services Division.

Two of these Divisions are further structured into the following Sections.

Administration Division	-	Human Resources Management Section, Legal and Corporate Matters Section, Pension Section and Catering Services Section.
Supplies Division	-	Purchase and Supply Section and Stores Section.

STAFF STRENGTH

The department has a total number of 77 staff.

They are summarized as follows:

10 Professional in Administration 20 Executive Officers; 1 Confidential Secretary 11 Secretarial Assistants; 18

Clerical Officer; 10 Nurses 4 Health Attendants; 1 Data Processing Assistant, 2 Catering Offices; 2 Catering Assistants; 2 Stewards; 1 Store Officer, 4 Store Keeper; and 2 Field Attendants.

FUNCTIONS/ACTIVITIES OF THE DEPARTMENT

Detailed reports of the functions of the Department are as follows:

(i) Cost-effective management of all the administrative activities of the Institute, including all elements of Personnel function, Legal and Corporate Matters, incorporating Governing Board affairs and Public Relations.

(ii) Planning, organizing, co-coordinating and control of all activities, personnel, funds, materials, equipment and infrastructural resources in the Administration and Supplies Department of the Institute.

(iii) Identifying, articulating, formulating and reviewing from time to time the administrative activities of the Institute in compliance with the statutory mandate of the institute, current Government policies and priorities, as well as all rules and regulations for the management of Government Institutions and they affect the Institute, the demands of farmers for the Institute mandate crops and manufacturers of products derivable from the Institute's mandate crops, promotion of staff welfare and public image of the Institute.

(iv) Human Resources Management, including appointments, staff training and development, promotions, discipline, disengagement, post-disengagement and staff welfare. Records of the aforementioned administrative functions are highlighted below:

ACHIEVEMENT/PROGRESS OF THE DEPARTMENT PROMOTIONS

Year 2015 promotions.

TRAINING

As at 31 December, 2015 thirty five (35) Research Scientists were on training for their PhD/Mphil/Msc. Programmes while one (1) Programme Analyst is on PhD training and ninety eight (98) Non Research Staff were also on training on part time and self sponsorship basis. The table shows the list of Research Staff on Training as at 31 December, 2015.

PROGRAMME ANALYST CURRENTLY ON TRAINING AS AT DECEMBER, 2015

S/N.	NAME/ DESIGNATION	CONR AISS -	PROPOSED COURSE OF STUDY	NAME OF INSTITUTION	DATE OF COMMENCEMENT	REMARKS
1.	Mr. Ibe Osita (Programme Analyst)	08	PhD (Physics, lower atmosphere physics)	University of Ibadan, Ibadan	20/11/2012	

LIST OF RESEARCH OFFICERS ON TRAINING AS AT DECEMBER, 2015

S/NO	NAME/ DESIGNATION	CONR AISS	INSTITUTION	DATE OF COMMENCIN G THE PROGRAMME / DATE COURSE STARTED	TYPE OF COURSE/ DEGREE IN VIEW	REMARKS
1	Mr. Shittu, T. R. (Prin. Research Officer)	11	University of Ibadan	2003/2004	PhD in Agric. Econs.	
2	Oloyede Amos A. Prin. Research Officer	11	University of Ibadan	2002/2003	PhD in Forest Resources Mgt.	
3	Mr. Oluyole K. A. Prin. Research Officer	11	University of Ibadan.	2012	PhD in Agric. Econs	

4	Iloyanomon Cecilia I. Prin. Research Officer	11	University of Ibadan	2004	M.Phil./PhD Agronomy
5	Ogunjobi Moruf Ayinla K. Prin. Research Officer	11	Federal University of Agric. Abeokuta	24/5/2004	PhD in Food Processing & Storage Technology
6	Uwagboe Eghosa Prin. Research Officer	11	University of Ibadan	2012/2013	PhD in Agric. Extension & Rural Development
7	Adebowale B. A Principal Research Officer	11	University of Ibadan	2005 (pls see page 109 of file	PhD in Fisheries Management
8	Agbongiarhuoyi E. A. Prin. Research Officer	11	University of Ibadan	2005/2006	M.Phil. (Agric. Extension & Rural Development)
9	Otunonye A. H. Prin. Research Officer	11	Fed. University of Agriculture Abeokuta	29/10/2009	PhD in Plant Pathology (Crop Protection)
10	Engr. Mofolasayo Adewale S. Prin. Research Officer	11	Federal University of Agriculture Abeokuta	2009	PhD in Agric Engineering
11	Idris Ndagi Prin. Research Officer	11	Fed. University of Tech. Akure	2011/2012	Agric. Econs. & Extension (PhD)
12	Adejobi Babatunde k. Prin. Research Officer	11	Fed. University of Tech. Akure	2010/2011	Crop, Soil & Pest Mgt.
13	Adeniyi Omoyele Dele Prin. Research Officer		Fed. University of Tech. Akure		PhD in Crop, Soil and Pest Mgt.
14	Adeigbe O. Oluwatosin Prin. Research Officer	11	University of Ibadan	2005	PhD in Genetics & Plant Breeding
15	Adenuga O. O. Prin. Research Officer	11	Federal University of Agric. Abeokuta	2008	PhD Plant Breeding
16	Keji Dada E. Research Officer I	08	University of Ilorin	Master Degree in Plant Biology	Nil
17	Idris Mohammed Snr. Research Officer	09	Fed. University of Tech. Akure	2012/2013	PhD in Crop, Soil and Pest
18	Akanbi S. O. Snr. Research Officer I	09	Fed. University of Tech., Akure	2007 - 2008	Crop, Soil & Pest Mgt.
19	Mr. Olaniyi Olayinka O. Snr. Research Officer I	09	Federal University of Agriculture, Abeokuta	5/11/12	Plant Breeding (PhD)
20	Mr. Kolawole O. O. Research Officer I	08	University of Ibadan, Ibadan	23/2/2009	Micro-Biology (PhD)
21	Taiwo Nnenna Snr. Research Officer I	09	University of Ibadan	2008/2009	PhD in Agronomy
22	Mrs. Adepoju Abigail Snr. Research Officer I	09	Fed. University of Agriculture, Abeokuta	2012	Plant Breeding
23	Mr. M. O. Okeniyi Principal Research Officer	11	Fed. University of Agriculture, Abeokuta	10/5/2010	PhD in Nematology

24	Mr. Olasupo Festus Research Officer I	08	University of Ibadan,	2008/2009	Crop Protection and Environmental Biology (PhD)	
25	Mrs. Mapayi E. F. Snr. Research Officer	08	Federal University of Agric., Abeokuta	2012	Plant Breeding (PhD)	
26	Miss Odey Chinyere F. Snr. Research Officer	09	University of Ibadan	2010	Plant Breeding & Genetics M.Phil./PhD	
27	Mr. Ugioro Osasogie Snr. Research Officer	09	Federal University of Agric. Abeokuta	2010	Plant Physiology (PhD)	
28	Mrs. Nduka Beatrice A. Snr. Research Officer	09	Fed. University of Tech. Akure, Ondo	2012 - 2013	Crop Soils & Pest Mgt. (PhD)	
29	William Olaide Abisola Snr. Research Officer	09	Fed. University of Agric. Abeokuta	2007 – 2008	PhD in Agricultural Extension & Rural Development	
30	Yahaya A. T. (Mrs) Senior Research Officer	09	University of Ibadan	2010	M. Phil in Economics	
31	Adeosun A. Seun Snr. Research Officer	09	University of Ibadan, Ibadan	20/2/13	Crop Protection& Environmental Biology (PhD)	
32	Taiwo Olayinka Snr. Research Officer	09	University of Ibadan	2012/2013	PhD in Agricultural Economics Approval was granted vide page 35	
33	Mrs. Mokwunye I. U Principal Research Officer	11	University of Ibadan	2014	PhD in Entomology	
34	Asowata Frank E. Research Officer I	08	University of Ibadan	2014/2015	M.Sc in Soil Physics	
35	Mrs. Lawal J. O	11	University of	2012/2013	PhD in Agric	

LIST OF NON-RESEARCH OFFICER ON TRAINING AS AT DECEMBER, 2015

S/N	NAME/ DESIGNATION	DEGREE IN VIEW	AWARDING INSTITUTION	DATE ON COMMENCING THE PROGRAMME	COURSE OF STUDY	REMARKS
1	Enagu Victor Principal Agric Superintendent I	M.Sc	Federal University of Technology, Akure	2010/2011	Crop Soil & Pest Management	
2	Mr. Mohammed Idi Principal Agric Superintendent I	Master Degree	Federal University of Technology, Akure	2012/2013	Crop Soil & Pest Management	
3	Olayiwola A.M Principal Agric Superintendent I	M. Tech	Federal University of Technology,	2008/2009	Crop Soil & Pest Management	
4	Baoku F. A (Mrs) Matron I	B.Sc	Ladoke Akintola University of Technology, Ogbomoso	2012/2013	Nursing	
5	Mr. Adigun A. B Senior Agric Superintendent I	Master Degree	Federal University of Technology, Akure	2009/2010	Crop Soil & Pest Management	
6	Mrs. Oduola A. O Principal Nursing Sister II	Master Degree	University of Ibadan, Ibadan	2012/2013	Social Work (Health option)	
7	Mr. Osita Ibe Programme Analyst I	PhD	University of Ibadan, Ibadan	2011/2012	PhD (Lower Atmospheric Physics)	
8.	Mrs. B. B. Ogunbosoye Statistician I	PGD	Federal University of Technology, Akure	2012/2013	Mathematical Science/Statistics	
9	Mrs. Abulele I. B Statistician I	M.Sc	Olabisi Onabanjo University Ago Iwoye	2013/2014	Statistics	
10	Mr. Babafemi I. B Senior Programme Analyst	Professional Certificate	Zabeel International Institute of Mgt. and Technology Dubai United Arab Emurates (UAE)	Sept., 2014	Certified Network Association (CCNA) Microsoft Certified systems Engineer and project Mgt.	
11	Babalola E. A. (Miss) Senior Agric. Superintendent II	PGD	LAUTECH	2012/2013	Agronomy	
12	Balogun S. T Lab Technologist II	M. Tech	LAUTECH	2008/2009	Environmental Biology	

13	Mrs. Titiloye O. E.M. N Admin. Officer I	Master Degree (M.M. P)	University of Ibadan,	2011/2012	Managerial Psychology
14	Baba Nista Mohammed Principal Agric Superintendent II	M.SCc	Federal University of Technology, Akure.	2010/2011	Crop, Soil & Pest Management
15	Suraju Kareem Senior Executive Officer	B.Sc	University of Ado – Ekiti	26/8/2010	Accountancy
16	Adegboye Jibola (Mrs) Senior Agric. Superintendent II	M.Sc	Federal University of Technology, Akure	2013	Crop Management
17	Mr. Ogiugo Philip Higher Agric. Superintendent	HND	College of Agric. Agenebode Campus, Edo State	24/10/2010	Crop Science
18	Mr. Adewoye G. Adebowale Lab. Technologist II	M.Sc	Olabisi Onabanjo University, Ago – Iwoye, Ogun State	2011/2012	Environmental Science with option in Environmental Toxicology
19	Ibrahim Wasiu Adewale Executive Officer	B.Sc	LAUTECH Ogbomoso	18/3/2013	Accountancy
20	Mr. Alli S. O Executive Officer	B.Sc	University of Ibadan.	2010/2011	Economics
21	Akinrinola O. A Executive Officer	HND	Federal Polytechnic,	2009/2010	Accountancy
22	Sekoni O. E Asst. Executive Officer	HND	Akwa – Ibom State Polytechnic, Ikot Osura	2009/2010	Business Admin.
23	Mr. Ugwoke Joseph C. Asst. Agric. Superintendent	HND	Federal College of Agric., Moor Plantation, Ibadan	2013/2014	Agriculture (Crop Production Technology option)
24	Mrs. Fagbami D. O Chief Secretarial Asst.	HND	The Polytechnic, Ibadan	2013/2014	Office Technology & Management
25	Olaosebikan O. A Chief Secretarial Asst.	HND	The Polytechnic, Ibadan	11/1/2010	Office Technology & Management
26	Mr. Ojo Oluseye Abioye Asst. Agric Superintendent	HND	Federal College of Agric., Moor Plantation, Ibadan	10/12/2012	Crop Production Technology
27	Ogunde Oluwatosin Ajoke Secretarial Asst. II	B.Sc	University of Ibadan	2008/2009	Psychology

28	Mrs. Adepoju O. A Confidential Secretary	PGD	National Open University, Ibadan	2011/2012	Public Admin.
29	Alade B. F. (Mrs) Senior Secretarial Asst II	ND	The Polytechnic, Ibadan	2010/2011	Office Technology & Management
30	Ojo Oluwabunmi (Mrs) Secretarial Asst.	ND	The Polytechnic, Ibadan	6/12/2010	Office Technology & Management
31	Oyefi J. A (Mrs) Senior Store Officer	HND	The Polytechnic, Ibadan	2008/2009	Purchasing & Supply
32	Oketokun Grace Olusola Asst. Agric. Superintendent	HND	Federal College of Agric., Moor Plantation, Ibadan	2012/2013	Crop Production Technology option
33	Miss Idris Fatima Asst. Agric. Field Overseer	ND	Akperan Orshi College of Agric. Yandev, gboko Benue State	2013/2014	Agric. General Tech
34	Ekundayo Benson J. B (Mrs)	NCE	Federal College of Education (Special) Oyo	13/3/2008	English Social Studies
35	Igbinadolor A. joy Secretarial Asst.	ND	The Polytechnic Ibadan	2013/2014	Office Technology & Management
36	Mrs. Alaba Olubukola O. Secretarial Asst. II	HND	The Polytechnic, Ibadan	6/12/2010	Office Technology & Management
37	Haruna John Agric. Field Attendant I	Certificate course	Agricultural Training Centre, Ochaja	7/3/2011	Agricultural Technical Field Assistant (ATFA)
38	Mr. Idris Garba Senior Agric. Field Overseer	ND	Federal College of Agric, Moor Plantation, Ibadan	10/12/2010	Agric Technology
39	Abiade Bilikisu O Clerical Officer I	ND	Osun State College of Technology, Esa - Oke	2011/2012	Accountancy
40	Mr. Ibine I. B Clerical Officer II	ND	The Polytechnic Ibadan	6/12/2012	Public Admin.
41	Fawusi Oluwatobi Clerical Officer I	ND	The Polytechnic Ibadan	11/01/2010	Business Admin
42	Oghenegueke Gift Agric. Field Attendant III	ND	Federal College of Agric, Moor Plantation,	12/12/2011	Agric. Technology

43	Oladepo Kemi Clerical Officer II	ND	The Polytechnic Ibadan	6/12/2010	Accountancy
44	Miss Lawal Esther Clerical Officer II	ND	Osun State College of Technology, Esa – Oke	2009/2010	Accounting
45	Adio Oludare T. Asst. Craftsman	ND	The Polytechnic Ibadan	15/10/12	Electrical Engineering
46	Mrs. J. O. Ojo Clerical Officer II	HND	The Polytechnic Ibadan	11/1/2010	Accountancy
47	Mr. Akano Joseph Clerical Asst. II	ND	The Polytechnic Ibadan	24/10/2011	Business Administration
48	Mr. D. B. Durodoye Agric. Field Attendant II	ND	Federal College of Agric., Moor Plantation, Ibadan	2011/2012	Agric. Technology
49	Obi Samuel l. Clerical Assistant	HND	The Polytechnic Ibadan	24/10/2011	Business Admin.
50	Etuke Charles Clerical Assistant II	B.Sc	National Open University of Nigeria, Sango, Ibadan	2012/2013	Political Science
51	Ajulo Felix Security Guard	ND	The Polytechnic, Ibadan	6/12/10	Business Admin.
52	Asein Fredrick Clerical Officer II	ND	Osun State College of Technology, Esa Oke	2013/2014	Business Administration
53	Olagunju Rasaki Agric. Field Attendant II	ND	College of Agric. Moor plantation, Ibadan	25/1/2013	Agric. Technology
54	Mrs. Ogundare O. A Asst. Chief Agric. Field Overseer	ND	Federal College of Agric, Moor Plantation, Ibadan	2009/2010	Agric. Technology
55	Mr. Adebiyi Oluwabukayomi S. Statistical Officer	B. Sc	Open University of Nigeria (NOUN)	2013/2014	Mathematics
56	Mr. Fajutu Kayode S. Head Security	ND	Ogun State Institute of Tech. Igbesa	2012/2013	Business Admin.
57	Oghenegueke John Security Guard	ND	Ogun State Institute of Tech. Igbesa	2012/2013	Business Admin.
58	Akosile Isaac Gbenga Clerical Officer I	ND	Osun State College of Technology, Esa – Oke	2013/2014	Business Administration

59	Onifade Wasiu Agric. Field Attendant II	B.Sc	National Open University of Nigeria	20/2/2013	Accounting
60	Iyamu I. Anthony Clerical Officer II	B.Sc	National Open University of Nigeria (NOUN)	2013/2014	Political Science
61	Miss Adesina Motunrayo C. Agric. Field Attendant I	ND	The Polytechnic Ibadan	06/12/2010	Accountancy
62	Mrs. Ijoma J. N Principal Science Lab. Technology	PGD	Olabisi Onabanjo University, Ago Iwoye.	2007/2008	Biotechnology
63	Obatoye A. O Principal Science Lab. Technologist	PGD	Olabisi Onabanjo University Ago – Iwoye.	2007/2008	Biotechnology
64	Okere Monday J Chief Agric Field Overseer	HND	Federal College of Agric, Moor Plantation, Ibadan	2011/2012	Crop Production Technology
65	Ikpefua Anthony E Data Processing Officer	HND	The Polytechnic, Ibadan.	No Admission letter presented for the programme	Computer Engineering
66	Mogaji Mohammed Higher Agric. Supt.	PGD	The Federal University of Technology, Akure	2014/2015	Agric. Engineering
67	Musa Ibrahim Yahaya Asst. Executive Officer	HND	The Federal Polytechnic, Idah	20/11/2010	Accountancy
68	Okoji Bright Michael Agric. Field Attendant II	ND	Fed. College of Agric, Moor Plantation, Ibadan	2013/2014	Agric. Technology
69	Mrs. Mohammed Bashir O. W Prin. Technical Officer II	PGD	Ladoke Akintola University of Technology, Ogbomoso	2014/2015	Agric. Engineering
70	Mrs. Ganiyu Janet F Agric. Field Attendant II	ND	Fed. College of Agric, Moor Plantation, Ibadan	10/12/14	Agric. Technology
71	Awodunmila David J. Prin. Agric Superintendent II	M.Sc	Olabisi Onabanjo University, Ago – Iwoye, Ogun State	2014/2015	Agricultural Extension and Rural Sociology
72	Bolarinde O. J Snr. Science Lab. Technologist	PGD	Ladoke Akintola University of Technology, Ogbomoso	2014/2015	Food Science

73	Tijani Akeem A. Agric. Field Attendant I	PGD	Fed. University of Agriculture,	11/02/15	Crop and Plant Protection Technology
74	Lawal Taofeek O Agric. Field Attendant	ND	Fed. College of Agric, Moor Plantation, Ibadan	5/12/14	Agric Technology
75	Adebayo Kayode Senior Agric Superintendent	PGD	Fed. University of Agric, Abeokuta	11/02/15	Crop production Technology
76	Mr. Asein Uwaifo	ICAN	Institute of Chartered Accountant of Nigeria (ICAN)		ICAN
77	Mr. Shittu Abu	B.SC	Olabisi Onabanjo University		Accounting
78	Mr. Otasowie O. S	Professional Course (ICAN)	Institute of Chartered Accountant of Nigeria (ICAN)		ICAN
79	Mrs Babalola E. A	PGD			
80	Mrs. Sulaiman Atinuke S	B.Sc			
81	Mrs. Bakare Bose H	ND	Business Admin.		
82	Edeh Tochukwu S.				
83	Mrs. Musa Yahaya Adishetu	ND	Agricultural Training Centre, Ochaja, Kogi State.	2012/2013	Agric. Field Tech. Asst
84	Mr. Eguavoen Lucky	Professional Course (ICAN)	Institute of Chartered Accountant of Nigeria (ICAN)	29/10/2010	ICAN
85	Mr. Adio Stephen Olukunle	PGD	Olabisi Onabanjo University, Ago – Iwoye, Ogun State	2014/2015	Plant Science and Applied Zoology Option
86	Mr. Tijani Abul Akeem Abiodun	M. Agric	Federal University of Agriculture, Abeokuta.	25/1/2016	Crop Protection (Pathology option)

LIST OF STAFF THAT WERE GRANTED APPROVAL TO ATTEND INTERNATIONAL ANNUAL CONFERENCES, WORKSHOPS, AND SHORT TERM TRAINING

S/N	NAMES	TITLE/ PLACE	DATE	REMARK
1	Mrs. J.O. Lawal Principal Research Officer	2015 Agricultural and Applied Economics Association Conference at U.S.A.	23 - 31 July, 2015	
2	Dr. (Mrs.) C.O. Jayeola Chief Research Officer	The International Meeting on Sustainable and Traceable Cocoa at Ecuador	01 - 06 June, 2015	
3	Mrs. I.U. Mokwunye Principal Research Officer	63rd Annual Meeting of the Entomological Society of American at U.S.A.	13 - 24 Nov., 2015	Not yet attend
4	Mrs. Abigail Funmilayo Adepoju Senior Research Officer	Contemporary approaches to Genetic Resources Conservation and use at Wageningen University Netherland	13 April - 01 May, 2015	Fellowship
5	Mr. A.E. Agbongiarhuoyi Principal Research Officer	Cocoa and Chocolate Processing at Ghent University, Belgium	26 August - 10 September, 2015	Scholarship
6	Miss. F.C. Anagbogu Research Officer 1	Borlaug Enhancement Leadership Programme at University of Davis, U.S.A.	01 September 2014 – 31 October, 2015	Fellowship
7	Mrs. I.U. Mokwunye Principal Research Officer	African Women in Agriculture Research and Development (Africa)	01 January, 2013 – 31 March, 2015	Fellowship
8	Mr. O.O. Kolawole Research Officer I	Norman E. Borlaug Leadership Enhancement in Agriculture Program at U.S.A.	13 January, 2014 - 26 January, 2015	Fellowship
9	Dr. B.S. Famuyiwa Senior Research Officer	The Mashav Course on the Intergration between Research, Extension and Applied Agriculture at Isreal	23 January - 13 February, 2015	Scholarship
10	Dr. (Mrs.) L.N. Dongo Director (P & T)	Workshop on Mobilizing Strategic National Stakeholders (Partners) for Intergrated System (Approach) to sustainable Agric - based livelihoods at Kigali	08 - 09 October, 2015	

LIST OF STAFF THAT WERE GRANTED APPROVAL TO ATTEND LOCAL CONFERENCES, WORKSHOPS AND SHORT TERM TRAINING

S/N	NAMES	TITLE/ PLACE	DATE	REMARK
1	21 Agricultural Superintendent Officers	Cocoa Rehabilitation at CRIN	26 - 30 January, 2015	CRIN Sponsorship
2	Dr. M.O. Ogunlade (C.R.O) Dr. A.V. Oyedokun (S.R.O)	The maiden meeting on Harmonization of Cocoa Training Manuals Nigeria at Akure	07 - May, 2015 02 – 07 , 2015 - 23-07, 2015	
3	Mr. K.B. Adejobi (Senior Research Officer)	IDH Cococa Fertilizer Proposal writing Committee Meetiing at IITA, Ibadan	05 May, 2015	
4	Mrs. I.U. Mokwunye(P. R. O) Mr. F.C. Mokwunye (P.R.O)	Workshop on Research Proposal Writing and use of Apropriate Statistics tools for Analysis at FRIN, Ibadan	23 25 September, 2015 6 – 8 October, 2015	Self Sponsorship
5	Dr. M.O Ogunlade (C.R.O), Dr. S.B. Orisajo (C.R.O) and Dr. V.A. Oyedokun (S.R.O)	Compilation of Second Draft of Cocoa Training Manual Harmonization Meeting at Ibadan	02 July, 2015 – 23 July, 2015	
6	Mrs. J.A. Agwimah (Principal Accountant)	The mandatory Continuing Professional Development Programme at Umuahia	10 - 13 August, 2015	Self Sponsorship
7	Dr. (Mrs.) L.N. Dongo Director (P & T)	Planning Committee Meeting of Cocoa Development Initiative at Akure	02 September, 2015	
8	22 Science Laboratory Technologists	An educational tour of laboratories at IITA Ibadan	22 October, 2015	
9	Mr. O.M. Omoregie (Snr. Science Lab. Technologist)	10th Annual Conference / Workshop of the Mycotoxicology Society of Nigeria at IITA Ibadan	13 - 15 July, 2015	Self Sponsorship
10	Dr. (Mrs.) F.A. Okelana (Director)	46th Annual Conference of The Entomological Society of Nigeria at Lagos	06 - 08 October, 2015	Self Sponsorship
11	Mrs. I.U. Mokwunye (Principal Research Officer)	3rd Annual General Meeting of the 2015 Nigeria Women in Agriculture Research and Development (NiWARD) at Abuja	28 - 29 September, 2015	Self Sponsorship
12	Mr. K. M. Fabowale (Chief Accountant)	Internal Audit workshop at Akure	05 - 09 October, 2015	
13	Dr. S.B. Orisajo Head (FSR & E)	Training Workshop on Youth Involvement in Cocoa Value Chains Development at Ilesa	21 May, 2015	
14	Mr. A.E. Agbongiarhuoyi (P.R.O.) Dr. S.B. Orisajo (Head FSR & E) Mr. I.F. Abudulkarim (S.R.O.) Mrs. O.A. Williams (R.O)	RE FILS Workshop at I. A. R. & T, Ibadan.	27 – 30 April, 2015	
15	Mr. D.O. Adeniyi (Senior Research Officer)	40th Annual Conference of the Nigeria Society for Plant Protection (NSPP) at Abuja	17 - 20 March, 2015	
16	Fabowale K.M (Chief Accountant)	International Public Sector Accounting Standards(IPSAS) Accrual at ASCON Badagry, Lagos State	25 -30 October, 2015	CRIN Sponsorship

17	Onifade A.O. (Asst. Chief Accountant)	International Public Sector Accounting Standards(IPSAS) Accrual at ASCON Badagry, Lagos	25 -30 October, 2015	CRIN Sponsorship
18	Sorinolu O. (Prin. Accountant)	International Public Sector Accounting Standards(IPSAS) Accrual at ASCON Badagry, Lagos	25 -30 October, 2015	CRIN Sponsorship
19	Shitu A (Senior Accountant)	International Public Sector Accounting Standards(IPSAS) Accrual at ASCON Badagry, Lagos	25 -30 October, 2015	CRIN Sponsorship
20	Mrs. P.A. Ubebe (Chief Amin. Officer)	The role of BOT in Pension Administration	17 – 20 September, 2015	
21	Mr. Onifade A. (Asst. Chief Accounting Officer)	The role of BOT in Pension Administration	17 – 20 September 2015	
22	Mr. K.M. Fabowale (Chief Accountant)	The role of BOT in Pension Administration	17 – 20 September 2015	
23	Mrs. Oluwadare S.E., (Prin. Admin. Officer)	The role of BOT in Pension Administration	17 – 20 September 2015	
24	Mr. Olukotun O.S. (Asst. Chief Admin. Officer)	The role of BOT in Pension Administration	17 – 20 September 2015	
25	Mrs. J.A. Agwimah (Prin. Accountant)	The role of BOT in Pension Administration	17 – 20 September 2015	
26	Mrs. Ayobami Kuforiji (Prin. Executive Officer I)	The role of BOT in Pension Administration	17 – 20 September 2015	
27	Mrs. Olawole F.O. (Senior Executive Officer)	The role of BOT in Pension Administration	17 – 20 September 2015	
28	Mrs. Hammed I.A.A. (Chief Data Processing Asst.)	The role of BOT in Pension Administration	17 – 20 September 2015	
29	Mr. Akinrinola Akeem (Executive Officer)	The role of BOT in Pension Administration	17 – 20 September 2015	
30	Mr. Oguntoyinbo W. (Asst. Executive Officer)	The role of BOT in Pension Administration	17 – 20 September 2015	
31	Prof. M.O. Akoroda (Executive Director)	International Public Accounting Standards(IPSAS) by the VOSTEC Consulting at Ijebu Ode Lagos	26-28 February, 2015	
32	Mrs. P.A. Ubebe (Chief Admin. Officer)	International Public Accounting Standards(IPSAS) by the VOSTEC Consulting at Ijebu-Ode	26-28 February, 2015	
33	Mr. Onifade A. (Asst. Chief Accounting Officer)	International Public Accounting Standards(IPSAS) by the VOSTEC Consulting at Ijebu Ode	26-28 February, 2015	
34	Mr. K.M. Fabowale (Chief Accountant)	International Public Accounting Standards(IPSAS) by the VOSTEC Consulting at Ijebu-Ode	26-28 February, 2015	
35	Mrs. Oluwadare S.E., (Prin. Admin. Officer)	International Public Accounting Standards(IPSAS) by the VOSTEC Consulting at Ijebu	26-28 February, 2015	
36	Mr. Olukotun O.S. (Asst. Chief Admin. Officer)	International Public Accounting Standards(IPSAS) by the VOSTEC Consulting at Ijebu	26-28 February, 2015	
37	Mrs. J.A. Agwimah (Prin. Accountant)	International Public Accounting Standards(IPSAS) by the VOSTEC Consulting at Ijebu	26-28 February, 2015	

38	Mrs. Ayobami Kuforiji (Prin. Executive Officer I)	International Public Accounting Standards(IPSAS) by the VOSTEC Consulting at Ijebu	26-28 February, 2015	
39	Mrs. Olawole F.O. (Senior Executive Officer)	International Public Accounting Standards(IPSAS) by the VOSTEC Consulting at Ijebu	26-28 February, 2015	
40	Mrs. Hammed I.A.A. (Chief Data Processing Asst.	International Public Accounting Standards(IPSAS) by the VOSTEC Consulting at Ijebu	26-28 February, 2015	
41	Mr. Akinrinola Akeem (Executive Officer)	International Public Accounting Standards(IPSAS) by the VOSTEC Consulting at Ijebu	26-28 February, 2015	
42	Mr. Oguntoyinbo W. (Asst. Executive Officer)	International Public Accounting Standards(IPSAS) by the VOSTEC Consulting at Ijebu	26-28 February, 2015	
43	Mrs. P.A. Ubebe (Chief Admin. Officer)	International Public Accounting Standards(IPSAS) by the VOSTEC Consulting at Ijebu	26-28 February, 2015	
44	Mr. Onifade A. (Asst. Chief Accounting Officer)	International Public Accounting Standards(IPSAS) by the VOSTEC Consulting at Ijebu	26-28 February, 2015	
45	Mr. K.M. Fabowale (Chief Accountant)	International Public Accounting Standards(IPSAS) by the VOSTEC Consulting at Ijebu	26-28 February, 2015	
46	Mrs. Oluwadare S.E., (Prin. Admin. Officer)	International Public Accounting Standards(IPSAS) by the VOSTEC Consulting at Ijebu	26-28 February, 2015	
47	Mr. Olukotun O.S. (Asst. Chief Admin. Officer)	International Public Accounting Standards(IPSAS) by the VOSTEC Consulting at Ijebu	26-28 February, 2015	
48	Mrs. J.A. Agwimah (Prin. Accountant)	International Public Accounting Standards(IPSAS) by the VOSTEC Consulting at Ijebu	26-28 February, 2015	
49	Mr. Kuforiji E.O (Prin. Accountant)	International Public Accounting Standards(IPSAS) by the VOSTEC Consulting at Ijebu	26-28 February, 2015	
50	Dr. S.B. Orisajo (CRO) Dr. M.O. Ogunlade (CRO) Dr. V.A. Oyedokun (SRO)	Second validation Workshop of Cocoa training Manua;s Harmolizaton at the Royal Bird Hotels and towers Akure	29 October, 2015	
51	Mr. Akinrinola Akeem (Executive Officer)	International Public Accounting Standards(IPSAS) by the VOSTEC Consulting at Ijebu	26-28 February, 2015	

2015 LEFT THE SERVICE

S/N	NAME	SEX	DESIGNATION	SALARY GRADE	DATE OF BIRTH	DATE OF FIRST APPT	DATE OF LAST PROMOTION	DATE OF RETIREMENT
1	Ugbashi Innocent	M	Agric Field Attd I	3	1/1/55	12/9/96	1/10/03	1/1/15
2	Nweke Samuel	M	Agric Field Attd	3	14/10/55	1/12/97	1/10/04	3/2/15
3	Mrs. Alagbe Oluremi	F	Asst. Chief Sc. Lab. Tech.	12	14/5/62	1/9/99	1/10/12	25/2/15
4	Ogungbade Babatunde Taofik	M	Chief Clerical Offr	6	20/6/65	1/9/95	1/10/07	30/3/15
5	Musa Paul Tinemu	M	Head Watchman	3	10/3/67	2/1/09	1/10/14	16/8/15
6	Fabayo Patricia Ifeanyi	F	Chief Secretarial Asst	8	10/5/57	11/6/80	1/10/01	11/6/15
7	Olaoye Moshood	M	Chief Clerical Offr	6	4/5/56	3/6/80	1/10/08	3/6/15
8	Ajiboye Stephane	F	Clerical Officer I	4	5/2/76	6/12/11	1/10/14	2/8/15
9	Ogbaji Godwin	M	Security Guard	4	7/5/55	12/1/97	1/10/05	7/5/15
10	James Ehizonomen	M	Snr. Agric Field Overseer	4	7/7/55	6/2/03	1/10/12	7/7/15
11	Lasisi Rafiu Alao	M	Head Security Guard	5	26/10/55	9/1/93	1/10/10	26/10/15
12	Bassey Moses Egbeng	M	Chief Motor Driver/Mech.	6	11/11/55	20/8/87	1/10/07	11/11/15
13	Areoloegbe Amos	M	Accountant II	7	27/12/74	2/3/11	2/3/11	1/6/15
14	Ijadunola Noah	M	Security Guard I	3	12/4/66	2/1/09	1/10/13	15/11/15
15	Mrs. Onifade Elizabeth	F	Prin. Nursing Supt. I	11	29/5/81	6/9/05	1/10/14	2015

INSTITUTE'S REST HOUSE

FUNCTIONS

1. Generation of revenue through the accommodation of private guests that are officially introduced to the Institute guest house by any CRIN Staff.
2. General Cleaning and Maintenance of CRIN Internal Management Committee meeting venue.
3. Accommodation of CRIN official guests from Auditor General's Office, Abuja.
4. Catering and provision of accommodation for officers on transfer to the Headquarters for 28 days (in lieu of accommodation allowances).
5. General Cleaning of the Rest House surroundings and interior parts.

CHALLENGES

(1) ***Imprest:*** sir, the official imprest of ten thousand naira allocated to this section was only given once in the last quarter of the year. My personal money was used for the first and second quarter of the year for the up-keep of the Rest House which supposes not to be so. Ref: cash imprest log book.

(2) ***Borehole:*** Following the advice of the Institute project consultant and contractor that the borehole pumping machine needed to be allocated a dedicated 10KVA petrol engine gen set and the approved procurement quotation had been done since May, 2015 and up till the present moment nothing has been done.

(3) ***Rectification of the faulty plumbing system and general linkage of water to the over head tanks:-*** More than two-third of the water closet system is bad which requires immediate rectification.

ACHIEVEMENT/ SCOPE OF THE FUTURE

The guest house has been generating reasonable revenue for the Institute and immediately the guest house was given face-lift through renovation works, good image maker for the Institute because of warm reception tactics and goof maintenance of CRIN mandate crops planted at the frontage of the Rest House.

HEALTH SERVICE

DISPENSARY

Between January – December, 2015 a total of 6,616 cases were seen at the dispensary section.

MATERNITY

Between January – December, 2015, a total of 790 cases were seen amongst whom were pregnant women and children under 1 year.

DELIVERY

24 Babies were delivered normally by spontaneous

vaginal delivery without any complication.

FAMILY PLANNING
52 clients attended the family planning clinic.

DEATH
No death was recorded.

SICK OFF
42 staff was given sick off.

REFERRALS
14 staff and 26 non-staff were referred to the hospital for expert management.

IMPREST
A total amount of N80,000 was received for running the clinic.

IMMUNIZATION
This exercise took place sequentially for children and Adult.

DEWORMING/BLOOD PRESSURE CHECK
This exercise was conducted in September, 2015 and about 380 staff benefited from the exercise.

UNIFORM ALLOWANCE
The Nurses in Headquarters including one Substation (Ajassor) received N20,000.00 each as
Uniform Allowance this year. A total amount of N200,000.00 was received.

FUMIGATION
This exercise took place in June, 2015 to prevent termite infestation.

STAFF EDUCATION
None of the Nurses or subordinate staff was sponsored for any seminar or workshop in year, 2015.

BABIES PARTY
This annual event does not take place this year due to the lingering crisis during the period.

INCOME GENERATED
Total income generated from both the Dispensary and Maternity was two hundred and sixteen
thousand six hundred naira only (N216,600.00).

		₦
Dispensary	-	141,400.00
Maternity	-	75,200.00
Total	-	**216,600.00**

CASH ADVANCE FOR DRUG PURCHASE
Total grant of five hundred and fourteen thousand naira only (N514,000.00) was received for drug Purchase for Headquarters and Substations in March, 2015.

ACHIEVEMENTS WITHIN THE PERIOD
1. Screening of the staff for Hepatitis and Immunization given to those who are screened negative in March, 2015.

2. Anti-malaria drug (ACT) through malarial control programme were received from the Federal Ministry of Health via State and Local Government to rule out malarial disease in Nigeria.

3. De-worming Exercise/Blood pressure check of staff in September, 2015. This was possible due to the grant received from CRIN Management to promote perfect Health of all staff. About 380 staff were captured.

CHALLENGES
1. Shortage of water especially during dry season at the Health Centre.

2. Failure to implement the NHIS programme since accreditation.

3. Lack of seminar/refresher course for staff at the Health Centre.

4. Shortage of personnel: There is need to employ Nurses and Health Assistant for the smooth running of the clinic.

SUPPLIES DIVISION
The Division was merged to Procurement Unit, as a division to make it a Procurement Division on November 23rd 2014, the Division was under Procurement for the period under reviewed under the Headship of the Senior Procurement Officer Mr. P.A. Farinola.
The Supplies Division has five units. Namely:
(i) Research or Chemical store, (ii) Stationery store,
(iii) Technical store, (iv) Medical store, (v) Fuel and lubricant store.
The staff strength of the Division is eight numbers presently.
The names and designation and their duty post materials is as follows:
(1) Akinwande, O.O. (Mrs.) - Assistant Chief Executive Officer

(2) Oyefi J. A. (Mrs.) - Senior Store Officer
(3) Oyebode F. A. (Mrs.) - Higher Executive Officer
(4) Akinwale A. O. (Mr.) - Chief Store Keeper
(5) Olabiyi B.M. (Mrs.) - Executive Officer
(6) Ogbechie B.M. (Mrs.) - Assistant Executive Officer
(7) Origbemide O.C. (Mrs.) - Store Keeper
(8) Ogundeji Adekunle (Mrs.)- Store Keeper

Functions of the Supplies Division

Some of the store function is as follows:

1. To receive incoming materials after proper checking and inspection of the goods.
2. To release materials from its custody to the user department.
3. Maintain proper records of items received and issued all the store units.
4. Periodic checking of stores and stock.
5. To dispose materials that have stay long in the store during preservation process.
6. To preserve materials in the store till required for usage.
7. To inspect incoming consignment and ensure they conform to the quality and quantity required.
8. Maintaining and taking care of store and store items.

During the period under review the store start work by balancing all the ledgers in the various stores for the end of year 2014. After which the stock taking list were extracted from the store ledgers in preparation for the annual stock counting exercise.

Other duties performed during the year are as follows:

- Annual physical stock counting exercise for the year ending 2014 was carried out in the first to second week of the month of January 2015. This exercise involved the staff of Account, Audit and Store and it covered both Headquarters and the entire Substation in which a team of staff travelled to the Substations and the report were forwarded for further action. The excess of this is to generate correct schedule of stock and accurate stock balance as at the year end.
- All materials delivered into the Institute's store either purchased by the Procurement or individual user or through the contractor or supplier were checked and certified to ensure the conformity of the material to the quantity and quality required.
- Store ledgers were always checked and balanced at the end of every month.
- Materials were issued out to users as at when requested.
- Tally cards were always intact on the materials on the store racks.
- Obsolete materials were fished out from various stores and hand over to Board of Survey Committee for boarding thereby generating some money for the Institute and creating enough space for incoming materials in the store.
- Caring for store items and cleaning of the store environment were carried out time to time.
- All the stores were arranged properly as well as the stock their in.
- Both Internal and External Auditors visited store were well attended to and observation were noted and adjusted.

Materials supply to store through award of contract during the year under are listed below:

1. Supply of Journals and books for the Institute by Safari Books Limited vide ref. No. PV 265/14 at a total amount of N4374,2786.
2. Supply of medical drugs for both Headquarters and Substations by Yemkot Pharmaceutical vide PV 265/17/1 at a total amount of N514,000.
3. Supply and installation of Atomic Absorption Spectrophotometer Bioreactor, electrophoresis and HPLC by Winteck (Nig) Limited vide Adm. 264/34.
4. Replacement of parts and repairs of KIA Sportage vehicle (No. FG 627 V03) by Combine System Int'l Ltd Kia motors vide Adm. 264 at a total sum of N1, 060,351.19

CHALLENGES

Some of the challenges facing the Supplies Division are highlighted below:-

- Obsolete chemical materials are still lying down in the Research Store for disposal. Please there's need for quick action on this because these chemicals are very dangerous to the health of staff in this store please.
- The Division urgently needs Secretarial Assistant to be attached to the Division as the one working with the Division has been redeployed to another Division.
- Non-availability of imprest to take care of the Division urgent expenses the Division urgent expenses the Division was maintained with our personal money throughout last year.
- Provision of protective clothing and other working tool for the staff in the Division.
- Personnel training of staff for effective productivity.
- Provision of toilet to Technical store.
- Construction of proof for security of stores.
- Construction of door net at Medical store is urgently needed.

CRIDAN

List of publications:

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