



# CRIN Herald

A MONTHLY PUBLICATION OF COCOA RESEARCH INSTITUTE OF NIGERIA (CRIN), IBADAN.

ISSUE: 38 (April, 2024)

## TRACE Master Trainer Course on Climate-Smart Agriculture held at Uyo, Akwa Ibom State



Traceability and Resilience in Agriculture and Cocoa Ecosystems (TRACE) training was organised by the Institute in collaboration with the U. S. Department for Agriculture (USDA), Lutheran World Relief, International Institute of

Tropical Agriculture (IITA) and Akwa Ibom State Government for extension officers. The programme which took place from 12 to 15 March, 2024 at Rosmohr Hotel in Uyo, Akwa Ibom State attracted thirty participants which cut across extension agents and sustainability officers which include Cocoa Farmers Association of Nigeria (CFAN), Starlink Global, Afex Commodities, Tulip, Barry Callebaut, Sunbeth and JB Cocoa. The programme was meant to train Master Trainers on Climate-Smart Agriculture for Agricultural Extension Officers in cocoa producing States. The participants were selected from three participating States in the South-South zone of Nigeria: Uyo, Abia and Cross River States. The other three States that will also participate in the training are Ondo, Osun and Ekiti in the South-West. The training is geared towards the improvement of skills for extension officers and supervisors to provide technical advice on crop management topics for yield improvement and income diversification in this era of changing climate. This is intended to make lasting change in Nigeria cocoa productivity, traceability, enabling environment, and trade.

In his remarks, the CRIN Executive Director (ED), Dr Patrick Adebola stated that the hectares of land and quality of cocoa

seedlings cultivated are determinants of high yields, therefore, the State should consider these factors in cocoa production. Setting the tone for the event, good will messages were delivered by stakeholders. The Deputy Chief of Party, Lutheran World Relief (LWR), TRACE Project, Mr. Olawale Awoyeni disclosed that TRACE is a 5-year project funded by the USDA and LWR to support farmers to improve cocoa production, using the climate-smart technique as well as expand the market access for Nigeria cocoa. He stressed that their target is to strengthen the capacity of extension officers in cocoa producing States to deliver climate-smart techniques to farmers. The CRIN team include the Executive Director, Dr Patrick Adebola, Dr. S.O. Agbeniyi, Dr. A.R. Adedeji, Dr. M.O. Ogunlade, Dr. A. Muyiwa, Dr. F.O. Olasupo, and Mr. A.E. Agbongiarhuoyi as resource persons, while IITA was represented by Dr. Asare Richard and Mr. Kofi.



CRIN and IITA representatives



Group photograph with the trainees





# CRIN Herald

A MONTHLY PUBLICATION OF COCOA RESEARCH INSTITUTE OF NIGERIA (CRIN), IBADAN.

## GIZ-MOVE Cashew Technical Training

The Market Oriented Value Chain for Jobs and growth in the ECOWAS region (MOVE) - Gesellschaft für Internationale Zusammenarbeit (GIZ) translated in English as: German Corporation for International Cooperation GIZ-MOVE organised six - days cashew technical training from the 11<sup>th</sup> to 16<sup>th</sup> March, 2024 at Dam-Jay Hotel and Suites Akobo, Ibadan from 8am to 6pm each day. The dignitaries in attendance include Dr. Patrick Adebola, (CRIN ED), Mr Folorunsho Akintunde (NEPC South-West Regional Director), and Narcisse Kindohunde (GIZ Deputy Team Leader). The training centred on Cashew Market and Value Chain Concept, Cashew Sector Organisation and Adult Training Principles, Improved Planting Material Development, Nursery and New Plantation Establishment and Pest and Disease Management as well as field trip to CRIN. At CRIN nursery, grafting exercise was performed while practical application of field layout, top working, cultural practices and pollination exercise were carried out at Zones 3 and 4. Harvest, Post-Harvest Management and Warehousing, Processing Machine Selection, Operation and Maintenance, Marketing Consumption and Nutrition, and Gender Transformation Agenda in cashew value chain, Food Safety, Quality Standard and Processing Management, Processing Economics, Certificate Scheme for Cashew and KOR evaluation, Cashew Processing and Value Addition, practical on Cashew Apple Processing including Evaluation and Closure were also covered during the training. The program was attended by participants drawn from different segments of the value chain including trade officers, processors, farmers, farm managers, service providers and government agencies such as NEPC, Federal Ministry of Agriculture and Food Security,

Cocoa Research Institute of Nigeria, Summit University etc. Resource persons were drawn from Nigeria and Sub-region including scientists from CRIN, Subject and Cashew Value Chain specialists from within Nigeria and the sub-region, Master Trainers in the Nigerian cashew value chain, Officers from the Federal Ministry of Agriculture and Food Security (FMAFS), and Officers from Federal Ministry of Industry, Trade and Investment (FMITI).



Facilitation on grafting



Demonstration on grafting



Expose on field layout mechanisms





# CRIN Herald

A MONTHLY PUBLICATION OF COCOA RESEARCH INSTITUTE OF NIGERIA (CRIN), IBADAN.



Facilitators and trainees group photograph

## CRIN Scientists at MTP Programme Accra, Ghana

The African Cashew Alliance (ACA), together with the Market Oriented Value Chain for Jobs and growth in the ECOWAS region (MOVE) Former ComCashew, European Union (EU), Organisation of African, Caribbean and Pacific States (OACPS), the Ministry of Food and Agriculture (MOFA) and the Cocoa Research Institute Ghana (CRIG) invited CRIN scientists to the first session of edition 17 and 18 of the Master Training Program (MTP) for Cashew Value Chain Promotion which held from February 26 to March 01, 2024 and 18 March to 22 March, respectively, at Hill View Guest Centre in Accra, Ghana. The scientists were Mrs. E.A. Adeyemi, Mr. Agbogiarhuoyi Anthony, Dr. Osita Ibe, Dr. Akintobi Ogunsanwo and Mrs. Philo Olotie Orimoloye. They were sponsored by GIZ-MOVE. In the first session, participants were exposed to country data on cashew; food standards, safety, and certification; training materials development practical sessions; facilitation skills training; processing machine selection, operations and maintenance. Also, there was field trip to cashew processing factory.



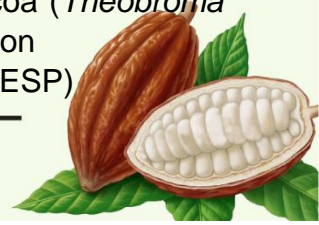
Mr. Anthony Agbogiarhuoyi and Mrs. Eunice Adeyemi at the edition 17 training programme



Dr. Osita Ibe, Dr. Akintobi Ogunsanwo and Mrs. Philo Orimoloye at the 18th edition

## In-House Seminar Programme

The Institute organised in-house seminar on March 11, 2024. Three presentations were made by staff of Plant Pathology and Extension Sections as well as the Human Resources and Administration Department. The presentations, centred on Evaluation of the Diversity of the Black pod pathogen (*Phytophthora* species) of cocoa (*Theobroma cacao* Linn.) in Nigeria, Adoption of Export Standard Practices (ESP)



among Coffee-based Farmers in Kogi State, Nigeria and Delegation, were delivered by Dr. A.H. Otuonye, Dr. I.F. Abdul-Karim and Mr. J.O. Onatunde-Onanuga, Director, Human Resources and Administration. The occasion was chaired by Dr. L.E. Yahaya., Director and Ag. Head Training Department.



The Chairman, Dr. Yahaya, the presenters and rapporteurs

## Evaluation of the Diversity of the Black Pod Pathogen (*Phytophthora* species) of Cocoa (*Theobroma cacao* Linn.) in Nigeria

- Abstract by Dr. Azuka H. Otuonye



Black pod of cocoa caused by *Phytophthora* species reduces cocoa production in Nigeria by 80%. Frequent resistance breakdown in cocoa genotypes is attributed to genetic diversity of the pathogen, a fact that needs to be ascertained in order to proffer an effective management strategy for the disease. A total of 152 isolates of *Phytophthora* species were collected from infected cocoa pods in cocoa producing states of Nigeria during the cropping seasons. Samples were evaluated using morphological, molecular and pathogenic variability techniques. Morphological characterization consisted of visual and microscopic examinations of 4-

and 10- day old axenic cultures of the isolates on carrot and potato dextrose agar media to determine colony and sporangia characteristics. Molecular characterizations were done by amplification of Polymerase Chain Reaction (PCR) products of the *Phytophthora* isolates and sequencing of the Internal Transcribed Spacer (ITS) region of Ribosomal Deoxyribonucleic acid. Pathogenic variability was evaluated on two susceptible cocoa clones (N38 and ICS1) and two resistant cocoa clones (PA150 and IMC47) using the Leaf Discs (LD) test method in a Completely Randomized Design with three replications. Data were obtained on pedicel length, sporangia length-breadth ratio, lesion score and disease incidence (DI; %) on LD and subjected to Analysis of Variance. Means were separated using Duncan's Multiple Range Test. Morphological studies revealed that three *Phytophthora* species (*P. megakarya* (Pm) *P. palmivora* (Pp) and *P. capsici* (Pc)) were associated with black pod symptoms. Five groups of colony patterns formed by the isolates of Pm and Pp discriminated the *Phytophthora* species. Mean pedicel length ranged from 0.25 - 3.00  $\mu$ m (Pp), 5.35 - 10.00  $\mu$ m (Pm), and 12.50 - 18.75  $\mu$ m (Pc) in 2012/2013 collections. In 2014/2015, pedicel length ranged from 1.10 - 4.80  $\mu$ m (Pp), 5.00 - 29.60  $\mu$ m (Pm) and 31.43 - 94.22  $\mu$ m (Pc). Length-breadth ratio ranged from 1.3 to 1.8 (Pp), 1.1 to 1.6 (Pm) and 1.8 to 1.9 (Pc) in 2012/2013 collections. In 2014/2015 collections, the length-breadth ratio ranged from 1.4 to 1.9 (Pp), 1.1 to 1.6 (Pm) and 1.5 to 1.9 (Pc). Principal component and Single linkage cluster analysis of the morphometric sporangia characters, colony diameter (4 days after plating) and disease severity differentiated a distinct species, Pc. Molecular analysis identified 58 of the 60 *Phytophthora* isolates as Pm. Mean lesion scores on LD showed that the reactions of the *Phytophthora*





# CRIN Herald

A MONTHLY PUBLICATION OF COCOA RESEARCH INSTITUTE OF NIGERIA (CRIN), IBADAN.

isolates differed significantly, with isolate PNON008 inducing highest lesion score (2.40) and 48.0% DI in 2012/2013 collections. *Phytophthora* isolate PNOY071 induced the highest lesion score (4.84) and DI of 96.8% in 2014/2015 collections. Two *P. megakarya* isolates (PNCR015 and PNOY071) were highly virulent as they produced 97% DI on leaf discs of cacao genotypes. Of the 152 isolates, 107 and 34 were Pm and Pp, respectively, while 11 were a new species (Pc) found to be associated with cocoa in Nigeria. This study concluded that diversity exists in the *Phytophthora* population in Nigeria. Further studies should be devoted to elucidate the impact of the new species on cocoa.

## Adoption of Export Standard Practices (ESP) among Coffee-based Farmers in Kogi State, Nigeria

- Abstract by Dr. Ibrahim F. Abdul-Karim



The study investigated the adoption of Export Standard Practices (ESP) among coffee-based farmers in Kogi State to unravel the level of adoption. Specifically, the study

identifies the farmers' sources of information on ESP; examined farmers' knowledge level on ESP; determined the adoption level of ESP; examined the perceived effect of the adoption of ESP on farmers' productivity, and identified the constraints to farmers' adoption of ESP in the study area. The population of the study comprised of 227 registered coffee farmers in Kogi State. The study used a structured interview schedule to collect the data. The data collected were analysed using descriptive and inferential statistical tools. Hypotheses were tested with the binary logistic regression model respectively. The

findings of the study revealed that: the majority (84.1%) were male, 86.8% were married, 45.8% had secondary education, and 23.3% had primary education. Similarly, 89.9% of the farmers' cultivated Robusta variety; a little below average (48.0%) acquired their farmland by inheritance, very few (5.3%) of the respondents indicated their awareness of ESP. Also, the information sources were: Fellow farmers (94.7%), Coffee Farmers' Association (88.5%), and electronic media (such as radio 19.8% and Television 12.8%) were among the lists indicated.

Furthermore, harvesting ripe berries weekly at the peak period 53.3% and 43.2% did regular harvesting of berries fortnightly. Also, 100.0% of the farmers knew about fermentation. Only 30.4% of them were knowledgeable about the storage room ventilation conditions, while about 35.7% knew the thickness of layers of drying. Also, drying of beans on a raised lab (Mean = 2.98), and sorting of berries after harvest (Mean = 2.76). However, 91.6% indicated that they were not aware of ESP, while 8.4% were aware of the regular harvesting of ripe berries fortnightly and weekly at peak periods as one of the ESP that was adopted. Also, factors associated with the adoption of ESP were access to information (Mean = 2.69), and improved seedlings (Mean = 2.64). Other significant factors are: training on wet processing (Mean = 2.42) and adequate maintenance of farms (Mean = 4.15) with high perceived effects on farmers' productivity. Similarly, inadequate extension visits (97.4%), and poor dissemination of information (78.9%) were the major constraints to the adoption of ESP. Poor market prices (Mean = 3.99) was also found as highly severe constraints to the adoption of ESP. Furthermore, there was a positive correlation between the





level of education (Odd ratio = 6.129), experience in coffee cultivation (Odd ratio = 5.008), and awareness of ESP (Odd ratio = 15.16) as significant variable that influence the level of adoption of ESP. The study concluded that the farmer's socio-economic characteristics influenced the level of adoption; the source of information was very low for the adoption of ESP; the effect of adoption of ESP was negative to the path of the farmers' and knowledge of ESP was very low to the adoption of ESP. Therefore, coffee farmers should be trained on the ESP of coffee on regular basis. CRIN should be strengthened to improve her extension performance.

## Delegation

Abstract by J. O. Onatunde-Onanuga  
Director, Human Resources and Admin.



Delegation is the entrusting of duties and authority by a superior to his subordinates and the creation of accountability for performance.

Delegation occurs when a supervisor or

manager allocates part of his duties to a subordinate, gives him the authority to make decisions and act on his behalf and holds him accountable for what is done. As noted earlier, authority can be delegated but not responsibility. It is to be noted as well that delegation does not mean abdication. It does not mean giving a man a task and the authority with the minimum of supervision, guidance, and control and leaving him to sink or swim. Managers must have interest in how the staff under them are able to cope with what they are asked to do. They must correct errors as at when necessary.



The Executive Director, Dr. Patrick Adebola commenting during the seminar



Cross section of participants at the seminar

## CRIN Inaugurates Gender Policy Unit

The Gender Policy Unit of the Cocoa Research Institute of Nigeria (CRIN) was formally inaugurated on March 11, 2024, by the Executive Director of CRIN, Dr. Patrick Adebola. The inauguration was done in conjunction with the 2024 International Women's Day Celebration, which had as its theme: "Inspire Inclusion." The constitution of the gender unit is in accordance with the directive of the Agricultural Research Council of Nigeria (ARCN), which requires that such a unit be established in all





# CRIN Herald

A MONTHLY PUBLICATION OF COCOA RESEARCH INSTITUTE OF NIGERIA (CRIN), IBADAN.

research institutes in the country. The CRIN Gender Policy Unit (CGPU) is made up of five members. Part of the task of the unit is to promote diversity and inclusiveness in the workplace with a focus on gender equity, a key ideal contained in the Millennium Development Goals, and which is enshrined in the Constitution of Nigeria (1999). Gender equity principles prohibit discrimination against people on the grounds of gender. Again, the National Gender Policy of Nigeria states that the government shall promote full participation of women, men, youths/ adolescents, by involving both the public and private sectors as agents of development. The CRIN Gender Policy Team is expected to ensure that women, men, and youths are accorded respect and equally represented at CRIN. Members of CRIN Gender Policy Team includes: Dr. C.O. Jayeola (VAR), Mrs. Olaide Williams (Extension), Dr. F.T. Agulanna (Economics), Mr. Kunle Adio (Pathology) and Mr. Ganiyu (Library).

the Institute, Dr. Patrick Adebola was on ground to see to the successful conduct of the exercise.



Cross section of staff during the exercise



Group photograph of members with the ED

## Staff Verification Exercise



The physical manpower verification exercise directed by the Head of the civil service of the Federation held in the Institute on March 28, 2028. The officers were warmly welcomed by the amiable staff of the Institute and the exercise was held in the expansive Lawrence Opeke Conference Hall. The Executive Director of

## Health News

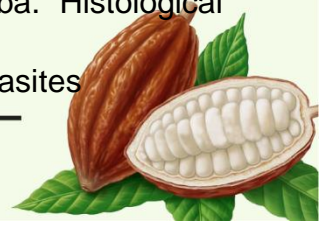
### Dysentery - Mrs. Bosede Famaye



Dysentery is a gastrointestinal disease. It causes severe diarrhoea that contains blood or mucus. There are two main types of dysentery:

1. Amoebic dysentery (amoebiasis): The parasite is Entamoeba. Histological

is one of the main causes of Amoebic dysentery. Other parasites





# CRIN Herald

A MONTHLY PUBLICATION OF COCOA RESEARCH INSTITUTE OF NIGERIA (CRIN), IBADAN.

that cause Amoebic dysentery include *Balantidium coli* (B.coli) and strongyloidiasis.

2. Bacillary dysentery: A bacterial infection causes bacillary dysentery. Some of the most common bacteria that causes bacillary dysentery includes Shigella, Salmonella, campylobacter and *Escherichia coli* (*E. coli*). Bacillary dysentery is the most common type of dysentery.

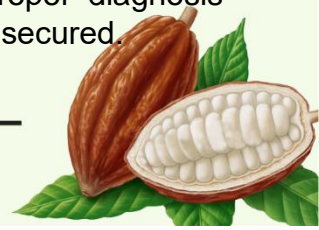
Without proper treatment, dysentery can be fatal. Anyone can get dysentery. It's a more common condition in tropical areas of the world with poor sanitation. Dysentery is common and according to studies, there are about 1.7 billion cases of dysentery every year in the world. Dysentery symptoms vary slightly according to what type of dysentery you have. Many people who have Amoebic dysentery do not have any symptoms. Mild symptoms of amoebic dysentery may include: diarrhoea, high fever, nausea and vomiting, weight loss, stomach upset. In rare cases, the parasite may move to other areas of the body and cause an abscess. Symptoms of Bacillary dysentery may include: diarrhoea containing blood or mucus, high fever, nausea and vomiting, painful stomach cramps (abdominal pain).

The parasitic and bacterial infections that causes dysentery are very contagious. People usually transfer the parasite or bacteria to each other when poop (faecal matter) from an infected person gets into another person's mouth. Transmission can occur during: Food preparation by someone who does not wash hands or has poor hygiene; Drinking contaminated water and Sexual contact, especially involving the anus. Bacillary dysentery occurs when foreign bacteria enter the body and the infection becomes severe.

From symptoms presented, Physical examination and laboratory tests like stool

culture for presence of bacteria, parasites or ova (parasite egg cells) and Sigmoidoscopy (examining the inside of lower sigmoid), colon and rectum are recommended. If one have amoebiasis, it's important to rid the body of the parasite. Medication like metronidazole treats parasitic infections, ORS, also antibiotics and intravenous fluids. In rare cases, one may need a blood transfusion. If one has bacillary dysentery, most people feel better without treatment in a few days to a week. If one requires medical attention, treatment may include antibiotics and intravenous fluids. The infected should avoid antidiarrheal medications like loperamide which can worsen symptoms. Drink plenty of fluids to prevent dehydration, which is a common side effect of diarrhoea and use non-steroidal anti-inflammatory drugs (NSAIDS) to reduce pain and fever.

The best way to prevent dysentery is to practice good hygiene. The hands should be thoroughly washed with soap and running water after going to the bathroom and before handling or eating food. Don't share personal items with other people, including toothbrushes, drinking glasses and towels, Use clean and sterile water for cooking and brushing your teeth; Stay away from people who have dysentery; Wash all fruits and vegetables with clean running water and peel them before eating them; Thoroughly cook all food; Avoid ice cubes, fountain drinks, water or soft drinks that are not in a sealed container and unpasteurized dairy and juice products. If one has dysentery, the following tips can help prevent the spread of the infection: Avoid contact with other people; Don't have sexual contact; Don't prepare food for other people; Don't swim; Regularly clean toilets, sinks and door handles with disinfecting products. With proper diagnosis and treatment, one's health is secured.







# CRIN Herald

A MONTHLY PUBLICATION OF COCOA RESEARCH INSTITUTE OF NIGERIA (CRIN), IBADAN.

## Market Survey

### Reports on local prices of cocoa beans and raw cashew nuts (RCN) in selected producing states in Nigeria

This report shows the local prices in the selected states at the stated times of the year. The data were collected from different locations within the states and the average price per state was recorded for the purpose of this report. This data shows the trend of price changes and movement within the different periods. For cocoa, the best price was experienced in Ondo states and while for RCN, Abia state had the best price for RCN throughout the period under review and it consistently increased from month to month.

#### Cocoa Cost/Kg (Local Price)

Month	State	Min. Price (₦)	Max. Price (₦)	Average Price (₦)
Dec. 2023	Oyo	6,500	6,500	6,500
	Abia	6,800	6,900	6,850
	Kwara	7,300	7,500	6,425
	<b>Ondo</b>	8,000	8,000	<b>8,000</b>
	Edo	7,500	7,500	7,500
Jan. 2024	Oyo	7,000	7,000	7,000
	Abia	7,300	7,400	7,350
	Kwara	7,800	8,000	7,925
	<b>Ondo</b>	9,000	9,000	<b>9,000</b>
	Edo	8,000	8,000	8,000
Feb. 2024	Oyo	7,500	7,500	7,500
	Abia	7,800	7,900	7,850
	Kwara	8,300	8,500	8,425
	<b>Ondo</b>	10,000	10,000	<b>10,000</b>
	Edo	8,500	8,500	8,500
Mar. 2024	Oyo	8,000	8,000	8,000
	Abia	8,300	8,400	8,350
	Kwara	8,800	9,000	8,925
	<b>Ondo</b>	11,000	11,000	<b>11,000</b>
	Edo	9,000	9,000	9,000

Source: 2024 Field Survey, Economics/Statistics Section, CRIN

#### Cashew Cost/Kg (Local Price)

Month	State	Min. Price (₦)	Max. Price (₦)	Average Price (₦)
Dec. 2023	Oyo	950	950	950
	Enugu	750	850	800
	<b>Abia</b>	900	1,200	<b>1,000</b>
	Kogi	810	1,250	976.7
	Kwara	850	1,000	955
Jan. 2024	Oyo	1,000	1,000	1,000
	Enugu	800	900	850
	<b>Abia</b>	1,000	1,300	<b>1,100</b>
	Kogi	860	1,300	1026
	Kwara	900	1,050	955.1
Feb. 2024	Oyo	1,000	1,000	1,000
	Enugu	900	1,000	950
	<b>Abia</b>	1,100	1,400	<b>1,200</b>
	Kogi	960	1,400	1,126.7
	Kwara	1,000	1,150	1,155
Mar. 2024	Oyo	1,200	1,200	1,200
	Enugu	1,000	1,100	1,050
	<b>Abia</b>	1,200	1,500	<b>1,300</b>
	Kogi	1,060	1,500	1,226.7
	Kwara	1,100	1,250	1,155

Source: 2024 Field Survey, Economics/Statistics Section, CRIN

## Excursion Visits

Toyosi Model College students were on excursion visit to the Institute on the 5th of March, 2024. Students were engaged on educational activities such as history, mandate, objectives and achievements of the Institute. There was interaction with expert from Value Addition Research Department who educated the students on some health benefits of CRIN products. The visit was anchored by Dr. Abdulkarim, Mrs Mustopha, Mr. Awodumila, Mrs. Ogenegueke and Mr. Garb.

Also, 32 students from Adeyola Kiddies Nursery and Primary School, Omi-Adio Ibadan Oyo State were on an





# CRIN Herald

A MONTHLY PUBLICATION OF COCOA RESEARCH INSTITUTE OF NIGERIA (CRIN), IBADAN.

excursion visit to the Institute on the 7th March, 2024. In the same vein, the Sunshine Model College, Ibadan had their excursion visit on the 14th March, 2024. The Students were engaged on educational activities and achievements of the Institute. Products and by-products from CRIN were displayed. Health benefits of the products were explained in details to the students. They were taken to the Extension Demonstration plot where the 5 mandate crops were grown. The visit was anchored by Dr. Rahman, Mrs. Mustopha, Mr. Awodumila, Mr. Mohammed, Mr. Atiku and Dr. Adebisi. One of the students, on behalf of the College, appreciated the ED and the Institute.



Group photos with students of Toyosi Model College, Adeyola Kiddies Nursery and Primary School and Sunshine Model College, Ibadan

## PhD Defense: Dr. Akintobi Ogunsowo



Dr. Akintobi O. Ogunsowo successfully defended his PhD in the Department of Biochemistry, Faculty of Life Sciences, University of Ilorin, on March 4, 2024. In his abstract, he

defined diabetes as a chronic metabolic disorder characterized by hyperglycaemia due to insufficient insulin production, impaired insulin utilization or both. The growing number of individuals with diabetes and the adverse effects of synthetic drugs underscore the need to explore safer plant-based alternatives. While *Cola acuminata* seeds (CAS) have been traditionally acclaimed to alleviate diabetes, scientific validation is still limited. His study investigated anti-hyperglycaemic activity and safety profile of fractions of aqueous extract of CAS (AECAS) in streptozotocin-induced hyperglycaemic rats. The specific objectives were to determine: (i) percentage yield of solvent-partitioned fractions of CAS; (ii) antihyperglycaemic activity of AECAS and AECAS fractions in hyperglycaemic rats; (iii) *in-vivo* antioxidant property of AECAS sub-fractions; (iv) safety profile of AECAS sub-fractions by assessing liver function indices, kidney function indices and lipid profile; (v) active principles of the most active AECAS sub-fraction using Gas Chromatography-Mass Spectrometry, (vi) inhibitory and activating capabilities of these principles on glucose metabolism and oxidative stress. AECAS was partitioned with n-hexane (AECAS-NHF), ethylacetate (AECAS-EAF) and n-butanol (AECAS-NBF) with the remaining residual fraction (AECAS-RF) using standard procedures. Most effective fraction (ethylacetate) was separated by column chromatography.





# CRIN Herald

A MONTHLY PUBLICATION OF COCOA RESEARCH INSTITUTE OF NIGERIA (CRIN), IBADAN.

AECAS, its fractions and sub-fractions were screened for their effect on fasting blood glucose concentrations (using Accu-Chek glucometer), while antioxidant and safety profile assessments were achieved by standard spectrophotometric methods. Chemical constituents of most effective sub-fraction were analyzed using GC-MS and *in-silico* effects on antihyperglycemia and oxidative markers were determined with Autodock vina. Data were analyzed using one-way analysis of variance and separated by Duncan Multiple Range Test at  $p < 0.05$ .

Findings from this study include:

- (i) the yields of AECAS-NHF, AECAS-EAF, AECAS-NBF and AECAS-RF were 0.70%, 2.68% and 79.48% respectively;
- (ii) streptozotocin significantly ( $p < 0.05$ ) increased fasting blood glucose concentration (FBGC) in rats, but treatment in mg/kg bw with AECAS (40, 80 and 120), AECAS-NHF, AECAS-EAF, AECAS-NBF, AECAS-RF (0.102, 0.397, 2.371 and 11.507) and sub-fractions A, B, C of AECAS-EAF (0.66, 0.58 and 1.16 respectively) significantly ( $p < 0.05$ ) decreased the elevated FBGC;
- (iii) glucose-6-phosphatase, fructose-1,6-bisphosphatase and glycogen phosphorylase activities were significantly ( $p < 0.05$ ) decreased while hexokinase, glucose-6-phosphate dehydrogenase activities; hepatic glycogen and serum insulin concentrations were significantly ( $p < 0.05$ ) increased in streptozotocin-induced hyperglycaemic rats.
- (iv) AECAS-EAF sub-fractions A, B and C significantly ( $p < 0.05$ ) reduced serum malondialdehyde concentration while activities of superoxide dismutase, catalase and reduced glutathione

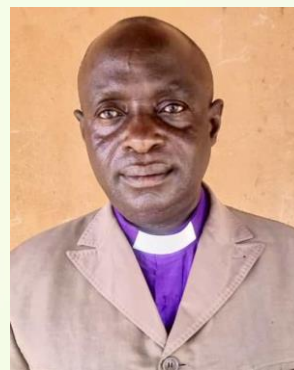
concentration in liver, kidney and pancreas were significantly ( $p < 0.05$ ) increased in streptozotocin-induced hyperglycaemic rats.

- (v) AECAS-EAF sub-fractions A, B and C ameliorated the significantly altered ( $p < 0.05$ ) liver and kidney function indices of hyperglycaemic rats;
- (vi) AECAS-EAF sub-fractions C (the most effective) contained 25 chemical constituents such as 9-octadecanoic acid 2,2,3,3,4,4,4-heptafluorobutyl ester (OAHE), nervonate methyl ester (NME) and 2-Monoolein (2MO).
- (vii) OAHE exhibited putative high activating capability on catalase and glutathione peroxidase 1; also high activating capability on sirtuin 1 but inhibitory activity on human sodium-glucose co-transporter type 2.

The study concluded that AECAS-EAF sub-fraction C demonstrated both anti-hyperglycaemic activity and safety in hyperglycaemic rats. Therefore, this study recommended that the sub-fraction could be explored for the development of effective and safer antihyperglycaemic drugs.

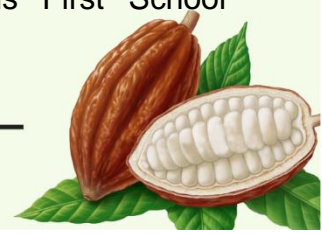
## Staff of the Month: Mr. Augustine

### Mari



Mr. Augustine Mari was born on December 19, 1973 at Warwar Mission Hospital, now General Hospital, via Kusuku village Sardauna LGA. Taraba State. He attended Kusuku Special Primary School from

1981-1986 and obtained his First School Leaving Certificate. He later proceeded to Government





# CRIN Herald

A MONTHLY PUBLICATION OF COCOA RESEARCH INSTITUTE OF NIGERIA (CRIN), IBADAN.

Secondary School Gembu from 1987-1992 for his post primary education and obtained the Senior School Certificate. In pursuance of higher academic qualification, he bagged National Diploma (ND) in Agric. Technology and Higher National Diploma (HND) from College of Agric. Jalingo, Taraba state in Crop Production from 2003 - 2004. He gained employment with the Cocoa Research Institute of Nigeria (CRIN) in June 26, 2001 as Assistant Agricultural Superintendent (AAS), promoted to Agric. Superintendent on October 01, 2005. He advanced to the post of Higher Agric. Supt. on October 01, 2006, Senior Agric. Supt. on October 01, 2009, Principal Agric, Supt. II on October 01, 2012, Principal Agric. Supt.1 on October 01, 2015, Asst. Chief Agric. Supt. on January 01, 2019 and Chief Agric. Supt. on January 01, 2022. Since employment to date, Mr. Augustine Mari works as superintendent on plantation. He is a member of the Association of Agricultural Technologists of Nigeria (AATON). He is married with children.

## April Birthday Galore

Hearty birthday celebrations to the members of staff that will be celebrating their birthdays this month. Wishing you all the very best in your life endeavours. Congratulations!



Emmanuel Tolulope Angela 01-Apr  
Gbalajobi Kehinde 01-Apr

Olabiya Bosede Mojisola 01-Apr  
Adekoya Olaoluwa Adebayo 02-Apr  
Adesoji Ronke 02-Apr  
Bakare Adeyemi 02-Apr  
Patrick Caroline 02-Apr  
Fawusi Oluwatobi Amoo 03-Apr  
Rabiu Akeem Adekunle 03-Apr  
Ariyibi Esther Olayemi 04-Apr  
Bakare Mary Abike 04-Apr  
Enya Monday 04-Apr  
Farinola Patrick Adekunle 04-Apr  
Obi Esther Ogom 04-Apr  
Duruaku Ogochukwu Maureen 06-Apr  
Gimba David Augustine 06-Apr  
Ishola Ropo 07-Apr  
Ismaila Tajudeen 07-Apr  
Ajinisi Mary Oluwaponmile 08-Apr  
Isaac Emmanuel 08-Apr  
Adebayo Olusola 09-Apr  
Isong Ekama Blessing 09-Apr  
Okontah Kehinde 09-Apr  
Agbongiarhuoyi Eghe Anthony 10-Apr  
Akinsola Kabir 10-Apr  
Olawole Florence Olufunmilola 10-Apr  
Onifade Adebisi 10-Apr  
Akinola Wasiu 11-Apr  
Ehidiamen Joseph 11-Apr  
Alawode Suleman Adewale 12-Apr  
Oyekunle Emmanuel 13-Apr  
Adewoye Gabriel Adebawale 14-Apr  
Lawal Dorcas Oyinyechi 15-Apr  
Okpanachi Nda 15-Apr  
Abdullahi Olasunkanmi 17-Apr  
Anijese Funmilayo 17-Apr  
Huseini Usman Dang 17-Apr  
Olorungbami Nike 17-Apr





# CRIN Herald

A MONTHLY PUBLICATION OF COCOA RESEARCH INSTITUTE OF NIGERIA (CRIN), IBADAN.

Adeyanju Kehinde Hussain	18-Apr
Ibitoye Folake	18-Apr
Ogunde Oluwatosin Ajoke	18-Apr
Ojo Olawale	19-Apr
Ologunwa Tope C.	19-Apr
Adeyemo Samuel Ayanfe	20-Apr
Ajewole Bamidele	20-Apr
Akinyode Olubisi Emily	20-Apr
Aransi Ramoni	20-Apr
Idowu Omoleke	20-Apr
Iruobe Elizebeth	20-Apr
Oni Nike	20-Apr
Agboola Lydia Ololade	21-Apr
Fadahunsi Fatai Salami	22-Apr
Imade Charles Osa	22-Apr
Ojewale Oluwafemi Ezekiel	22-Apr
Ademola Sunday	24-Apr
Lawal Kafayat	24-Apr
Nweke Paul Chukwu	24-Apr
Samuel Ladi Esther	24-Apr
Babalola Remi	25-Apr
Oyawale Muniru Babatunde	25-Apr
Babatunde Adeyinka Sherifat	26-Apr
Dahiru Adamu Tanko	26-Apr
Dare Ayo Omokore	26-Apr
Edeh Tochukwu	26-Apr
Onyemachi Oyinyechi Fidelia	26-Apr
Akinrelere Oluwakemi Abosede	27-Apr
Ifidon Ikhuso	27-Apr
Agbebaku Halima Caroline	28-Apr
Matthews Dare Feyisayo	28-Apr
Wakaps Francis John	28-Apr
Oyinlade Folake Banke	28-Apr
Ikokoh Loveth Ufuoma	29-Apr
Amosu Sunday	29-Apr
Salami Kamoru	29-Apr
Ola Olanike	30-Apr
Sekoni Olaide Sakirat	30-Apr



**COCOA RESEARCH INSTITUTE OF NIGERIA**

**Products and Services**

- Research and Consultancy
- Training on Best Agricultural Practices
- Supply of high yielding, disease resistant, early maturing and improved Cashew, Cocoa, Coffee, Kola and Tea varieties
- Nursery and Field Establishments
- Agrochemical Screening
- Cocoa Flavour Laboratory Services
- Value Additions
- Soil and Biological Services

[www.crin.gov.ng](http://www.crin.gov.ng) | 
 [directorcrin@yahoo.com](mailto:directorcrin@yahoo.com) | 
 +2348039784154

