# COCOA RESEARH INSTITUTE OF NIGERIA, IBADAN

## 2000

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**PRINCIPAL ADMINISTRATION AND RESEARCH STAFF LIST AS AT 31ST DECEMBER, 2000**

## ADMINISTRATION

| | | | | |
|---|---|---|---|---|
| 1. Director/Chief Executive | - | Ayoola B. Fasina | - | B.Sc., Ph.D |
| 2. Asst. Director (CIM) | - | E.B. Esan | - | B.Sc., Ph.D |
| 3. " " " (CPS) | - | O.L. Idowu | - | B.Sc., Ph.D, DIC |
| 4. " " " (TTDP) | - | C.R. Obatolu | - | B.Sc., M.Sc. Ph.D |
| 5. " " " (CPFM) | - | A.A. Adeyemi | - | B.Sc., M.Sc. Ph.D |
| 6. Admin. Secretary | - | C. I. Aisueni | - | B.Sc; M.PA. |

## RESEARCH

*Plant Pathologists*

| | | |
|---|---|---|
| 1. E.A. Fawole | - | B.Sc., M.Sc. |
| 2. T.O. Adejumo | - | B.Sc., M.Sc., Ph.D |
| 3. S.O. Agbeniyi | - | B.Sc., M.Sc., M.Phil. |
| 4. A.R. Adedeji | - | B.Sc., M.Sc. |
| 5. A.H. Otuonye | - | B.Sc. |

*Plant Breeders*

| | | |
|---|---|---|
| 1. E.B. Esan | - | B.Sc., Ph.D |
| 2. K. Badaru | - | B.Sc., M.Phil. |
| 3. S.S. Omolaja | - | B.Sc., M.Sc. M.Phil. |
| 4. P.O. Adebola | - | B.Sc., M.Sc. M.Phil. |
| 5. O.M. Aliyu | - | B.Sc., M.Sc. |
| 6. P.O. Akpokpodion | - | B.Sc., M.Sc. |
| 7. C.J. Bright-Agidotan (Mrs) | - | B.Sc., M.Sc. |

*Agronomists*

| | | |
|---|---|---|
| 1. A.O. Famaye | - | B.Sc., M.Sc. |
| 2. E.A. Adeyemi (Mrs) | - | B.Sc., M.Sc. |
| 3. E.A. Olaiya | - | B.Sc., M.Sc. |
| 4. L.A. Hammed | - | B.Sc., M.Sc. |
| 5. A.O. Oloyede | - | B.Sc., M.Sc. |

*Entomologists*

| | | |
|---|---|---|
| 1. O.L. Idowu | - | B.Sc., Ph.D., DIC |

| | | |
|---|---|---|
| 2. F.A. Okelana (Mrs.) | - | B.Sc., M.Phil. |
| 3. T.C.N. Ndubuaku | - | OND, B.Sc. M.Sc. |
| 4. K.T.M. Ojelade | - | B.Sc., M.Sc. |
| 5. O. F. Adewola (Mrs) | - | B.Sc., M.Sc. |
| 6. E. U. Asogwa | - | B.Sc., M.Sc. |

*Soils & Plant Nutrition Scientists*

| | | |
|---|---|---|
| 1. C.R. Obatolu | - | B.Sc., M.Sc., Ph.D |
| 2. E. A. Ayodele | - | B.Sc., M.Sc. |
| 3. O. S. Ibiremo | - | B.Sc., M.Sc. |
| 4. R.R. Ipinmoroti | - | B.Sc., M.Sc. |
| 5. T.F. Olutimeyin (Mrs.) | - | B. Agric. |
| 6. M.A. Daniel | - | B.Sc. |

*Crop Processing & Utilisation Scientists*

| | | |
|---|---|---|
| 1. O. Olubamiwa | - | B.Sc., M.Sc., Ph.D |
| 2. T.O. Akinwale (Mrs) | - | B.Sc., M.Sc. |
| 3. C.O. Jaiyeola (Mrs) | - | B.Sc., M.Sc. |
| 4. R.A. Hamzat | - | B.Sc., M.Sc. |
| 5. L. E. Yahaya | - | B.Sc., M.Sc. |
| 6. M.I. Odufuwa | - | B.Sc., M.Sc. |
| 7. S.O. Aroyeun | - | B.Sc., M.Sc. |
| 8. S.O. Ogunwolu | - | B.Sc., M.Sc. |
| 9. A.A. Ajao | - | B.Sc., |

*Economics & Statisticians*

| | | |
|---|---|---|
| 1. O.O. Oduwole | - | B.Sc., M.Sc. |
| 2. T.R. Shittu | - | B.Sc., M.Sc. |
| 3. R.A. Sanusi | - | B.Sc., M.Sc. |
| 4. K. A. Akanni | - | OND, B.Sc. M.Sc. |
| 5. T. E. Mafimisebi | - | B.Sc., M.Sc. |
| 6. A.S. Oyekale | - | B.Sc., M.Sc. |

*Health Centre*

| | | |
|---|---|---|
| 1. J. O. Coker | - | MBBS (Part-time Medical Officer) |

| | | |
|---|---|---|
| 2. F. J. Oloyede | - | D.R.N.; R.S.H. |
| *Officers-In-Charge of Substations* | | |
| G. O. Adeyemo | - | Ikom |
| T. B. Akintoye | - | Owena |
| R. A. Madehin | - | Mambillla |
| M. S. Efunla | - | Ibeku |
| Y.Emiola | - | Ochaja |
| J.A.O. Akinboboye | - | Uhonmora |

**YEAR 2000 FRESH APPOINTMENT**

| NAME | POST | DEPLOYMENT | DATE OF ASSUMPTION OF DUTY |
|---|---|---|---|
| E.U Asogwa | Res.Off. I. HATISS 8 | Entomology | 16/2/2000 |
| C.J. Bright-Agindotan (Mrs) | “ | P/Breeding | 7/8/2000 |
| A.S. Oyekale | Res. Off I. HATISS 8 | Econs & Statistics | 18/8/2000 |
| A. A. Ajao | Res.Off.II HATTIS 7 | CPU | 11/8/2000 |
| P. Ogiugo | Asst.Agric.Supt HATISS 05 | Mambilla S/S | 22/9/2000 |
| I.A. Lateef (Miss) | Data Processing HATISS 02 | Pension Office | 2/10/2000 |
| O.S. Olukotun | Admin Off. II HATISS 07 | Admin. Group | 14/8/2000 |
| O.A. Abe (Miss) | Accountant Gd.II HATISS 07 | Finance & Supply | 10/8/2000 |
| O. O. Onigbinde | “ | “ | 13/10/2000 |
| O. Nehikare | Higher Exe.Off. HATISS 07 | Admin.Group | 22/9/2000 |
| J. A. Agwinah (Mrs) | “ | Audit | 16/11/2000 |
| P.A.Farinola | “ | Finance&Supply | 5/12/2000 |
| H. Williams (Mrs) | Snr.Catering Attd. HATISS 02 | Rest House | 28/11/2000 |
| T. Bakare | Maint.Engr.II HATISS 07 | Engineering Service | 16/8/2000 |
| S.A.Yinusa | Asst. Craftsman HATISS 05 | “ | 4/12/2000 |
| A. Adisa | Asst Craftsman HATISS 02 | “ | 9/2/2000 |
| T. Oyebanjo | “ | “ | “ |
| S. Njoku | Motor Driver HATISS 02 | “ | 2/10/2000 |
| A. T. Ajiroba | “ | “ | 9/10/2000 |
| A.I. Enoduwenben | “ | “ | 27/11/2000 |
| F. Kpeleye | “ | “ | 7/12/2000 |
| F. Tijani | “ | “ | 8/12/2000 |
| W. Oguntoyinbo | “ | “ | 11/12/2000 |
| O. Odeku | “ | “ | 11/12/2000 |
| E. Obi (Miss) | F/Attd. I HATISS 02 | Admin.Group | 4/9/2000 |
| D. Egbuta | Hd. Watchman HATISS 01 | Security | 13/12/2000 |
| G.E. Ihejirika | “ | “ | 15/12/2000 |
| K. Babayemi | “ | “ | 18/12/2000 |
| K. Fajutu | “ | “ | 14/12/2000 |
| O.V. Ajukwu | “ | “ | 14/12/2000 |
| F. Ajulo | “ | “ | 13/12/2000 |
| A. Nwaolise | “ | “ | 18/12/2000 |
| M. Ogbechie | “ | “ | 15/12/2000 |

| NAME | POST | DEPLOYMENT | DATE OF ASSUMPTION OF DUTY |
|---|---|---|---|

| | | | |
|---|---|---|---|
| S. Oloyede | Hd.Watchman HATISS 01 | Security | 13/12/2000 |
| C. Emaku | “ | “ | 14/12/2000 |
| S. M Utobo | “ | “ | 14/12/2000 |
| A. Oladejo | “ | “ | 18/12/2000 |
| A. Adeyemo | “ | “ | 18/12/2000 |
| O. Okeowo | “ | “ | 13/12/2000 |
| M. Salami | “ | “ | 14/12/2000 |
| A. Farinde, | “ | “ | 14/12/2000 |
| J. Babalola | “ | “ | 18/12/2000 |
| L. Ganiyu | “ | “ | 14/12/2000 |
| J. Babalola (Miss) | “ | “ | 13/12/2000 |
| A. K Omogbehin (Mrs) | “ | “ | 15/12/2000 |
| B. Quadri | “ | “ | 19/12/2000 |
| M. Adeogun | “ | “ | 15/12/2000 |
| G. Ayoade | “ | “ | 14/12/2000 |
| H. Olatubosun | “ | “ | 14/12/2000 |
| F.Ugwu | “ | “ | 15/12/2000 |
| B. Boi | “ | “ | 18/12/2000 |
| L. Olunloyo | “ | “ | 19/12/2000 |
| R. Bakare | “ | “ | 19/12/2000 |

**1999 PROMOTION**

| NAME | PROMOTION FROM THE POST OF | PROMOTED TO THE POST OF | EFFECTIVE |
|---|---|---|---|

| | | | | DATE |
|---|---|---|---|---|
| 1. | A.A. Adeyemi (Dr.) | CRO HATISS 13 | Asst. Dir.HATISS 14 | 1/10/99 |
| 2. | C.R. Obatolu (Dr.) | " | " | " |
| 3. | E.A. Fawole | PRO " 11 | ACRO HATISS 12 | " |
| 4. | S.S. Omolaja | SRO " 09 | PRO " 11 | " |
| 5. | S.O. Agbeniyi | " | " | " |
| 6. | K.T.M Ojelade | " | " | " |
| 7. | P.O. Adebola | " | " | " |
| 8. | T.O. Akinwale (Mrs) | " | " | " |
| 9. | D.D. Tokun | ACLT HATISS 12 | Chief Lab Tec HATISS 13 | " |
| 10. | J.O.Olumakinde (Mrs) | " | " | " |
| 11. | F. Adesokan | " | " | " |
| 12. | O.A. Olajide (Mrs) | Prin.Lab Tech HATISS 11 | Asst.Chief LabTech HATISS 12 | " |
| 13. | M.A. Osuntokun (Mrs) | " | " | " |
| 14. | J.D. Ogunsola | " " | " | " |
| 15. | J.O. Egbadon | " | " | " |
| 16. | R.A. Aturamu | Snr.Lab Tech HATISS 09 | Princ. Lab. Tech HATISS 11 | " |
| 17. | S.O. Adio | Lab Tech 1 HATISS 08 | Snr Lab.Tech HATISS 09 | " |
| 18. | A.L. Sunmonu | " | " | " |
| 19. | S.O.Ogunwolu | " | " | " |
| 20. | R.O. Akintola | Princ. Agric. Supt I HATISS 11 | Asst. Chief. Agric. Supt. HATISS 12 | " |
| 21. | G.A. Layode | " | " | " |
| 22. | S.E. Akinrowo(Mrs) | Princ. Agric. Supt II HATISS 09 | Princ.Agric Supt I. HATISS 11 | " |
| 23. | T.B. Akintoye | " | Prin Agric Supt. I HATISS 11 | " |
| 24. | L. Okojie | " | " | " |
| 25. | A.A. Adebambo | Snr Agric. Supt HATISS 08 | Princ. Agric. Supt II HATISS 09 | " |
| 26. | J. Oyeniyan | " | " | " |
| 27. | T. Ojeyemi | " | " | " |
| 28. | J.O. Odutolu | Prin Stat.Officer HATISS 11 | Asst.Chief Stat.Officer HATTIS 12 | " |
| 29. | L.A. Busari (Mrs) | Higher Stat. Officer HATTIS 07 | Snr. Stat. Officer HATTIS 08 | " |
| 30. | O.O. Fagbami | Snr. Librarian HAT.09 | Prin Librarian HATISS 11 | " |
| 31. | G.A. Ben-Nana (Mrs) | Snr. Library OffIcer HATTIS.08 | Prin Library Off icer HATISS 09 | " |
| 32. | C.I. Aisueni (Mrs) | Chief Admin Off. HAT 13 | Hd of Admin HATISS 14 | " |
| 33. | J.A. Odunmorayo | Snr.Exe.Off. HAT.08 | Prin.Exe Off. II HATISS 09 | " |
| 34. | G.W. Williams (Mrs) | Snr. Typist HAT. 07 | Chief Typist HATISS 08 | " |
| 35. | A.M. Akintoye (Mrs) | Conf. Sec Gd III HATISS 06 | Conf.Sec.II HATISS 07 | " |
| 36. | M.O. Orok | Higher Works Supt HATISS 07 | Snr Works Supt HATISS 08 | " |
| 37. | O. Paul | Foreman HATTIS 05 | Snr. Foreman HATISS 06 | " |
| 38. | S. Raji | " | " | " |
| 39. | M.Y. Aligbe | Snr.Motor Driver/Mech HATISS 05 | Chief M. Driver /Mech HATISS 06 | " |
| 40. | W.T. Anikudi | " | " | " |
| 41. | L. Olukanni | ACAS HATISS 12 | Chief Agric Supt HATISS 13 | " |
| 42. | L. Ajao | Snr. Agric Field O'seer HATISS 04 | Asst Agric Field HATISS 05 | " |
| 43. | O. A. Ojo | " | " | " |
| 44. | F. Ayankegbe | " | " | " |
| 45. | F. Wahabi | " | " | " |
| 46. | A. Mgbe | Agric Field Overseer 03 | Snr. Agric Field HATISS 04 | " |
| 47. | K. Onyukwu | " | " | " |
| 48. | J. Okafor | " | " | " |
| 49. | A. Adesina | " | " | " |
| 50. | D.E. Samuel | " | " | " |
| 51. | R.O. Akpan (Mrs) | Agric.Field Attd. GdII HATISS 01 | Agric Field HATISS 02 | " |
| 52. | Y. Amusa | " | " | " |
| 53. | B. Alani | " | " | " |
| 54. | J. Haruna | " | " | " |
| 55. | I. Lasisi | " | " | " |
| 56. | O. Onipe | Agric. Field Att.II HATISS 03 | Agric. Field Att. I HATISS 02 | |
| 57. | E. O. Adewumi (Mrs) | Lib. Asst HATISS 03 | Lib.Tech Tr. HATISS 04 | |
| 58. | F.A. Ige | Press Att. HATISS 02 | Snr Press Att. HATISS 03 | |
| 59. | A. Adediran (Mrs) | Clerical Off. Gd.I HATISS 04 | Snr Clerical Off HATISS 05 | |
| 60. | F. O. Olawole (Mrs) | Clerical Off. Gd.I HATISS 04 | Clerical Off Gd.I HATISS 04 | 1/10/99 |

| | | | | |
|---|---|---|---|---|
| 61. | A. Akinrinola | Clerical Officer Gd II HATISS 03 | Clerical Off I HATISS 04 | “ |
| 62. | M. A. Olaoye | Asst. Clerical Off HATISS 02 | Clerical Off. II HATISS 03 | “ |
| 63. | A. B. Taiwo | “ | “ | “ |
| 64. | L. I. Imoudu (Mrs) | “ | “ | “ |
| 65. | U. Umenregimi | “ | “ | “ |
| 66. | F. A.Bolarinde (Mrs) | “ | “ | “ |
| 67. | F.O. Enya | Snr. Messenger HASTISS 02 | Hd. Messenger HATISS 03 | “ |
| 68. | C. Onyebuchi | Messenger HATISS 01 | Sn. Messenger HATISS 02 | “ |
| 69. | A.M. Adeniyi (Miss) | Typist Gd. III HATISS 03 | Typist Gd II HATISS 04 | “ |
| 70. | M.O. Ogbechie (Mrs) | Asst Typist HATISS 02 | Typist Gd. III. HATISS 03 | “ |
| 71. | E. Ajewole | Snr. Security Asst. HATISS 03 | Snr.Agric (Security) HATISS 04 | “ |
| 72. | O. Rufai | “ | “ | “ |
| 73. | C. Ezeugweke | “ | “ | “ |
| 74. | A. Ajayi | “ | “ | “ |
| 75. | A. Iwere | Security Guard HATISS 02 | Hd. Security Guard HATISS 03 | “ |
| 76. | M. Oko | “ | “ | “ |
| 77. | D. Nwachukwu | “ | “ | “ |
| 78. | L. Oladipupo | “ | “ | “ |
| 79. | J. Imoke | “ | “ | “ |
| 80. | J. Ayambim | “ | “ | “ |
| 81. | S. Gastong | “ | “ | “ |
| 82. | F. Oladokun | “ | “ | “ |
| 83. | F. Williams | “ | “ | “ |
| 84. | D.A. Apejua | Hd. Watchman HATISS 01 | Security Guard HATISS 02 | “ |
| 85. | R.A. Lasisi | “ | “ | “ |
| 86. | J. Sacktan | “ | “ | “ |
| 87. | S. Akubo | “ | “ | “ |
| 88. | J. Wada | “ | “ | “ |
| 89. | A. Emmanuel | “ | “ | “ |
| 90. | S.E. Ocheni | Snr. Craftsman HATISS 04 | Foreman HATISS 05 | “ |
| 91. | F. Onuwdi | “ | “ | “ |
| 92. | S. Gbadamosi | “ | “ | “ |
| 93. | E. Ogundere | Craftsman HATISS 03 | Snr. Craftsman HATISS 04 | “ |
| 94. | B.A. Adeyanju | Asst. Craftsman HATISS 02 | Craftsman HATISS 03 | “ |
| 95. | O. Asein | Stores Asst. HATISS 02 | Storekeeper HATISS 03 | “ |
| 96. | M.E. Bassey | Motor Driver/Mech HATISS 03 | Snr Motor D/M II HATISS 04 | “ |
| 97. | E.O. Omitoyinbo | “ | “ | “ |
| 98. | A. Banke | Motor Driver HATISS 02 | Motor Driver/Mech HATISS 03 | “ |
| 99. | E. Mimba | “ | “ | “ |
| | | | | “ |
| | | | | “ |

## YEAR 2000 EXIT FROM THE SERVICE:

| S/No | NAME | DESIGNATION/HATISS | DATE OF EXIT | MODE OF EXIT |
|---|---|---|---|---|
| 1 | Mr. J. Babalola | Snr. Foreman 06 | 1/1/2000 | Voluntsrty Retirement |
| 2 | “ L.S. Odey | Ast.Chief Agric.Supt 12 | “ | Compulsory Retirement |

| | | | | |
|---|---|---|---|---|
| 3 | " K.A. Akanni | Res. Officer 08 | " | Resignation |
| 4 | " C. Omeje | Snr. Security Asst. 03 | " | Compulsory Retrirement |
| 5 | " A. Gbadamosi | Security Supt. 05 | 2/1/2000 | Compulsory Retirement |
| 6 | " R. Egbeniyi | Snr. Field Overseer 04 | 4/1/2000 | Deceased |
| 7 | " B. Adeyanju | Health Technician 05 | 4/1/2000 | Compulsory Retirement |
| 8 | " P.E. Egbe | Motor D/Mech II 03 | 10/1/2000 | - do - |
| 9 | " M. Nnubougu | Snr Field Overseer 04 | 10/1/2000 | - do - |
| 10 | " S.O. Oyeranmi | Asst.Chief Agric Supt 12 | 11/1/2000 | - do - |
| 11 | " J. Emaku | Snr. Lab Technician 05 | 25/2/2000 | - do - |
| 12 | " J.O. Fasina | " | " | - do - |
| 13 | " M. Odeniyi | Hd Messenger 03 | 6/3/2000 | - do - |
| 14 | " I. Antere | Head Health Att. 02 | 15/3/2000 | - do - |
| 15 | " N.W. Illiya | Agric. Supt.06 | 31/3/2000 | Voluntaary Retirement |
| 16 | Mrs T.N. Illiya | Health Attd. 01 | 1/4/2000 | Resignation |
| 17 | Mr. R. Imuze | Snr Agric. Field Overs.04 | 5/4/2000 | Compulsxorry Retirement |
| 18 | Miss M.I. Odufuwa | Research Officer I 08 | 1/4/2000 | Resignation |
| 19 | Mr. Mafimisebi | " | " | Resignation |
| 20 | " O.D. Kehinde | Snr Craftsman 04 | 30/4/2000 | Voluntary Retirement |
| 21 | " U. Umontia | Snr Agric. Field Overs. 04 | 25/5/2000 | Compulsory Retirement |
| 22 | " J. Oyedokun | Snr Security Asst. 03 | 27/5/2000 | Compulsory Retirement |
| 23 | Mr. J.O. Onasanya | Prin Admin Officer 11 | 31/5/2000 | Voluntary Retirement |
| 24 | " J. Akinruli | Asst Craftsman 02 | 19/6/2000 | Complulsory Retirement |
| 25 | " J. I. Ilori | Asst.Chief Agric Field. Overseer 05 | 8/6/2000 | Compulsory Rettirement |
| 26 | Mr. E. Uwah | Head Sec. Guard 02 | 6/5/2000 | Compulsory Retirement |
| 27 | " E. Enunwa | Technical Officer 06 | 22/6/2000 | Deceased |
| 28 | " J.O. Awotayo | Admin. Officer 08 | 3/5/2000 | Resignation |
| 29 | " R. Ajagbe | Agric. Field Overseer 03 | 8/7/2000 | Compulsory Retirement |
| 30 | " G. Salami | Snr Lab Technician 05 | 1/7/2000 | Compulsory Retirement |
| 31 | " D. Apejua | Hd Security Guard 02 | 16/7/2000 | Compulsolry Retirement |
| 32 | Mrs C.F. Aluu | Field Attendant 01 | 5/7/2000 | Resignation |
| 33 | Mr. L.A. Olukanni | Chief Agric Supt 13 | 1/9/2000 | Conpulsory Retirement |
| 34 | " S. A. Otubu | Laboratory Supt.07 | 2/10/2000 | Compulsorfy Retirement |
| 35 | " C.U. Ukwu | Snr Agric Field Overs. 04 | 10/10/2000 | Compulsory Retirement |
| 36 | " J.O. kalu | " | 10/10/2000 | Compulsory Retirement |
| 37 | " I. Idowu | " | 10/10/2000 | Compulsory Retirement |
| 38 | " A. S. Oyekale | Research Officer I 08 | 31/10/2000 | Resignation |
| 39 | " H.N.T. Adenekan | Snr Exec. Officer 08 | 3/11/2000 | Compulsory Retirement |
| 40 | " A. Iwere | Head Security Guard 03 | 31/11/2000 | Compulsory Retirement |
| 41 | " R. Awodele | Higher Exec. Officer 07 | 31/12/2000 | Voluntary Retirement |
| 42 | " O. Ihueze | Snr Messenger 02 | 18/11/2000 | Deceased |

| | | | | |
|---|---|---|---|---|
| 43 | " S.O. Olamigoke | Asst. Chief Agric Supt 12 | 1/2/2000 | Compulsory Retirement |
| 44 | " K. Alamu | Snr. Lab. Tech. 06 | 24/6/2000 | - do - |

**YEAR 2000 TRANSFER OF SERVICE**

| NAME | DESIGNATION | DATE OF EXIT |
|---|---|---|
| 1. Mrs C.I. Aisueni | Head of Administration HATISS 14 | 30/11/2000 |

**IN- SERVICE TRAINING FOR THE YEAR 2000**

| NAME OF TRAINEE | DESIGNATION & HATTIS | INSTITUTION | TYPE OF COURSE | DURATION |
|---|---|---|---|---|
| 1. Dr.C.R.Obatolu | Chief Research Officer. HATISS 13 | Federal Min. of Agric & Rural Development in collaboration with ARMTI. | Year 2001 Pre-Budget preparation Workshop. | July 3-4, 2000 |
| 2.Mr. K.T.M.Ojelade | Prin Res. Off. HATISS 11 | Sheraton Hotel | Regional Seminar on the Mgt. Of intellectual property for Res. Dev. (R & 0) and commercialization of Res. & Dev. Result. | Nov.30-Dec, 1, 2000 |
| 3. Dr. A.B. Fasina | Director. HATISS 15 | Main Auditorium of the Hill Station Hotel, Jos. | Training Workshop on the Mgt. & Administration of Pension for Directors, Deputy Directors, Chief Officer, Secretaries/Directors in the Fed & State Ministries, Parastatals, State & Local Govt. Pension Boards. | Nov 6-11 2000 |
| 4. Dr. O.L.Idowu | Assistant Director. HATISS 14 | " | " | " |
| 5. Mr. S.A. Akano | Senior Agric. Field Overseer HATISS 04 | University of Ibadan Conference Hall | National Workshop on industrial relations & Labour/Mgt. Cooperation: A PANACEA for Industrial peace & harmony. | Oct 25-27 2000 |
| 6.Mr. S.O. Odeleye | Prin. Agric Supt. I HATISS 11 | National Centre for Genetic Resource & Biotechnology (NAGGRAS) Moor Plantation Ibadan. | PGR Training courses. | Dec 11-15, 2000 |
| 7. Mr. J. O. Sote | Admin. Officer HATISS 07 | University of Ibadan Conference Centre. | National Workshop on industrial relations & Labour/Mgt. Cooperation: A PANACEA for Industrial peace & harmony. | Oct 25-27, 2000 |
| 8. Mr. J.O. Ogunbayo | Asst.Chief Exec. Officer HATISS 12. | University of Lagos. | National Workshop on trusteeship Pension Fund & Corporate finance | Oct. 17-18, 2000 |

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| | | | Management. | |
| 9. Mr. J.O. Babafemi | Prin Admin. Officer HATISS 12 | " | " | " |
| 10.Mr. J.O. Babafemi | Prin Admin. Officer HATISS 12 | Main Auditorium of the National Women Dev. Centre, Central Area District, Garki Abuja. | Training Prog. For Desk/Schedule Officers on grade 07-13 in the Federal Ministries Parastatals, State & Local Govt. Pension Boards. | Nov.13-24, 2000 |
| 11. Mr.J.O. Ogunbayo | Asst.Chief Exec. Officer HATISS 12. | " | " | Nov.13-24, 2000 |
| 12. Mr. J.O. Sote | Admin. Officer HATISS 07 | Ogun State University. | Masters in Public Admin. | 18 Months wef 2000 |
| 13. Mr.O.S. Adefaka | Prin. Accountant HATISS 11 | Federal Min. of Agric & Rural Development in collaboration with ARMTI. | Year 2001 Pre-budget preparation Workshop. | July 3-4, 2000 |
| 14. Mr. O.S. Adefaka | Prin. Accountant HATISS 11 | University of Lagos | National Workshop on trusteeship Pension Fund & Corporate finance Management. | Oct.17-18 2000 |
| 15. Mrs F. A. Abe | Senior Nursing Sister.HATISS 09 | Semshak Hotels Ltd, Jos. | National Workshops on Medical Health & Management of Typhoid fever, Environmental & Occupational Health. | Nov. 22-24, 2000 |
| 16. Mrs L.A. Busari | Senior Statistical Officer.HATISS 08 | I.S.T.C | Computer hardware Maintenance & Repair. | Oct. 16-20, 2000 |
| 17. Mrs F.O. Olawole | Senior Clerical Off. HATISS 05 | Obafemi Awolowo University, Ile-Ife. | Diploma in Public Administration | 1999/2000 |
| 18. Mr. K.O. Togun | Clerical Officer. HATISS 04 | " | " | " |
| 19. Mr. D.K. Kuforiji | Agric Supt. HATISS 06 | Niger State College of Agric. Mokwa. | Higher National Diploma (Agric.) | 1999/2000 |
| 20.Mr.S.O. Ogunwolu | Lab Technologist I. HATISS 08 | University of Ibadan. | Masters of Science (Food Tech) | " |
| 21.Mr. D.D.Tokun | Chief Lab Technologist HATISS 13 | | Equipment Maintenance/Fabrication. | Nov. 20- 1 Dec. 2000 |
| 22. Mrs A. Osuntokun | Asst. Lab. Technologist HATISS 12 | | " | Nov. 20- 1 Dec. 2000 |
| 23. Mr. A. Omotobora | Prin. Lab Technologist HATISS 11 | | " | Nov. 20- 1 Dec. 2000 |
| 24. Mr.John Egbadon | Senior Lab. Tech. HATISS 08 | I.S.T.C | Maintenance of communication Equipment. (CEMC) | Nov.6-10, 2000 |

## Executive Summary of Year 2000 Annual Report

Research activities in year 2000 were conducted under seven programmes. These include cocoa, kola, coffee, cashew and tea programmes. Others are Crop Processing and Utilization (CPU) and Socio Economics, Statistics and Techno-Economics) Programmes.

**COCOA**

Nine research tasks relevant to the improved production of cocoa were investigated in the Cocoa Programme. The priority areas were the effective control of pests and diseases and improved vegetative propagation of cocoa. The highlights of the findings are:

i. Two hundred and sixty-five (265) cocoa trees were selected as promising black pod escape materials.
ii. Efforts at improving budding as a method of vegetative propagation of cocoa was found promising.
iii. Preliminary investigations revealed that some plant extracts have potentials as botanicals in the control of black pod disease of cocoa.
iv. New collections of insect pests associated with newly established cocoa farms were made. Their pest status has been determined.
v. For the third successive year, investigations revealed that Folar 525 is effective in the control of weeds in young cocoa farms.

**KOLA**

The kola Programme research activities included strategies for the control of kola weevils, selection of high-yielding *Cola nitida* and *Cola acuminata*, and fertilizer recommendation for kola production.

The results indicated the following:

i. Kola weevils exhibit positive geotaxis. It is recommended that farmers should carry out regular sorting and removal of weevilled nuts during storage.
ii. Vegetative regeneration of old kola trees by coppicing is recommended for the rehabilitation of moribund kola plantations.
iii. It was established that kola seedlings respond positively to NPK fertilizer treatments.

**COFFEE**

The Coffee Programme's research focus was on cost-saving soil improvement strategies, disease and pest control, molecular characterization, improved nursery practices and shade requirement of coffee. Thirteen tasks were investigated upon by ten scientists.

The results showed the following:

i. Organic – mineral fertilizer applied at 2kg/5ton/ha gave the best plant vigour in *Coffea canephora*.
ii. The seasonal variation in the population of four defoliating insect pests of robusta coffee was equally established.
iii. 90g of CuSO4 dissolved in 9L of water was found to be effective for control of coffee leaf rust and coffee berry disease.
iv. Genetic variations in caffeine, phenol and protein were determined in selected *Coffea canephora*.
v. It was also established that 50% shade regime on the field enhanced berry yield of robusta coffee.

**CASHEW**

Research activities under Cashew Programme were as follow: Between 1999 and year 2000, Brazilian jumbo cashew nuts selected from identified farms were classified on weight basis and 24 hectares of the materials were established in CRIN Headquarters and four Sub-Stations.

i. Preliminary observation of the field performance of these materials revealed impressive vigour and precocity.

ii. In the year 2000, additional jumbo cashew nuts were also acquired through marcotting.

iii. Budding technique was also perfected in an attempt to use it for mass production of planting materials identified with desirable qualities.

iv. A method of increasing the longevity of cashew pollen was also determined to aid hybridization especially between trees that are located far apart.

v. Studies on the susceptibility of the newly acquired cashew germplasm to leaf spot disease revealed that cashew stands established with the small sized-nuts are most susceptible to the disease.

vi. Studies on the incidence of other fungal attack on cashew seedlings in the nursery led to the identification of four virulent fungal isolates.

vii. Attempt to use natural plant extracts for the control of the common inflorescence blight disease of cashew showed some promise. Preliminary laboratory results indicated that extracts from *P. guinensis* compared favourably with Benlate in suppressing the growth of the casuative organism of the disease.

viii. Studies were also conducted on the bio-ecology and control of the cashew leaf miner. The study revealed that the pest occured in every month of the year except March and April with peak populations in January, November and December. It was also discovered that tender cashew leaves were more susceptible to attack by the miner than the older leaves.

ix. Studies on the effect of the size of polythene bags and nursery period on the performance of cashew revealed that reduction in pot size or nursery period had no significant effect on the performance of the seedlings in the nursery and after transplanting.

x. Preliminary results obtained from the studies on the use of organic manures, phosphorus sources, as well as mycorrhiza for raising cashew seedlings did not show significant effect of the treatments on the performance of cashew seedlings.

**TEA**

Research activities under Tea Programme focussed on increasing the area of tea cultivation in Nigeria, which hitherto was restricted to the Mambilla area because of its favourable climatic conditions for tea cultivation. Thus, tea adaptatibility trials were extended to lowland areas including Ikorodu, Ikom, Akwete, Iyanomo, Ijebu-Ife, Ibadan and Mayo-Selbe.

i. Out of these, Ikom recorded the highest average yield of 8.1tons/ha, suggesting that commercial tea production may be sustained but not without essential cultural maintenance operations.

ii. Agronomic studies on the lowland tea introductions showed that clone 318 gave better potential of sprouting than clone 35 on red-subsoil, even though termite invasion, fungal attack and vagaries of weather contributed to about 90% mortality of seedlings after $70^{th}$ day of sprouting.

iii. Field establishment studies revealed that clones 19, 143 and 370 performed significantly better than clone 354 and the unknown under plantain shade with a survival rate of 70-93% compared to less than 39% obtained under no shade. Macronutrients such as K, Ca, Mg and P were identified as the major problem of tea on the Mambilla, irrespective of the clones.

iv. Trials on the application of organic fertilizers formulated from Cocoa Pod Husk (CPH), *Chromolaena odorata* (COB), Tea Fluff (TFF) Cowdung (CDG) and Poultry dropping (CDG) as a substitute for minerals commenced.

v. Further studies on the major diseases identified on tea clones on the Mambilla revealed that Leaf Spot, Leaf blight, Shoot dieback, Root-rot and Rot of tea cuttings were predominant on all farms assessed. The incidences and severity arising from natural infection varied markedly

among the tea clones cultivated. Clone 35 was identified as the most susceptible to diseases while clone 143, 318 and 14 were found to be resistant. Isolation from leaves from lowland tea yielded organisms such as *Bothryodiplodia theobromae*, *Aspergillus* spp and *Fusarium*, which were secondary pathogens.

**CROP PROCESSING AND UTILIZATION**

The mandate of the Crop Processing and Utilization Programme is to utilize the products and by-products emanating from CRIN mandate crops to develop various products. In line with this mandate, the programme achieved the following:

i. Substitution of cocoa pod husk for maize in the diets of laying quails.
ii. Fresh kola testa was utilized in raising African giant land snails (*Archatina archatina*) under kola plantation.
iii. Fresh cocoa bean mucilage was used in wine production and the cocoa wine so produced has physico-chemical and sensory characteristics which compared favourably with commercial wines.
iv. Kola Pod Husk (KPH) was used in liquid soap production.
v. Coco cola (Cocoa/Kola) beverage was produced.
vi. Use of kolanut in producing a recipe of kola soft drink was achieved.
vii. Cashew kernel meal was used to produce a protein – rich biscuit.

**STATISTICS, SOCIO-ECONOMICS AND TECHNO-ECONOMICS (SST)**

The SST Programme's research focus was on adoption, socio-economic evaluation, marketing, statistics and feasibility studies.

Highlights of achievements are:

i. Adoption of improved agronomic practices on cocoa farms.
ii. Preliminary investigation into the income, consumption and saving pattern of cocoa farmers in Southern Nigeria.
iii. Establishment of determinants of coffee marketing in Nigeria.
iv. Evaluation of productivity of smallholder outgrower Tea Farmers.

While the first 2 tasks were to be carried out in the following year, the third task was able to establish the factors that effect coffee marketing in the country and also established the relationship among them.

For efficient coffee marketing, it was suggested that farmers should reduce their level of price speculations, organise themselves into cooperatives and be taught modern and efficient packaging and storage practices. Study on tea farming identified constraints to tea production and made policy recommendations towards solving/overcoming the constraints. These included increase in areas earmarked for tea cultivation, private tea companies assistance to farmers in form of fertilizers and pesticides while government should also provide input subsidy and irrigation facilities. In the area of marketing statistics, cocoa and kola production figures were collated for the year and the farm gate prices for these two crops were effectively monitored during the year and reported on.

## **COCOA PROGRAMME (**Leader: Kolawole Badaru)

## Improvement of cocoa production, propagation and field management: Comprehensive assessment of all accessions for tolelrant to pod rot and insect infestation

### Screening for black pod 'escape' genotypes in the germplasm

(K. Badaru and P.O. Aikpokpodion)

The *Phytophthora* pod rot (Ppr) commonly referred to as "black pod" disease of cocoa remains the most important constraint to cocoa production in Nigeria. The search for resistance is still on to provide the most cost-effective control for the disease. The objective of this experiment was to select genotypes that show 'escape' characteristics by producing the bulk of their crop during the dry season when environmental factors are unfavourable to Ppr attack. Screening was carried out in the field genebank at the peak of the dry season (February – March) on a total of thirty-five (35) experimental plots at the CRIN Headquarters, Ibadan. Observations were made on the production intensity of each genotype relative to other neighbouring trees measured by the number of pods produced per tree. This observation is to be continued for the next three seasons after which budwoods will be collected from genotypes showing stability in this trait. Such selected genotypes will be established in a plot as "CRIN Ppr escape clones".

From this study, two hundred and sixty-five (265) genotypes were selected for their pod production. This ranged from 11-138 pods per tree with a mean pod production of 34.5 pods per tree. Preliminary results from this study showed that materials with outstanding escape characteristics are available in the germplasm and it would be possible on completion of assessment to select and release "Ppr escape clones" for planting in similar environment as the Headquarters. It is suggested that this work be extended to other cocoa growing ecological zones of the country in order to select materials showing this 'escape' characteristic.

### Development of rapid method of propagation of improved cultivars of cocoa through budding and *in-vitro* plantlet regeneration.

#### Effect of pre-budwood collection treatments on budding success in cocoa (*Theobroma cacao L.)*

(K. Badaru and P. O. Aikpokpodion)

Vegetative multiplication and field establishment with uniform clonal planting materials in *Theobroma cacao* is not often realizable due to low budding success. Conventional method of budding in cocoa gives varying levels of success usually less than 30% in the West African sub-region. This is due to low percentages of 'bud take' and sprouts of new growths. With renewed interest in clonal selection, tree crop breeders have found budding a very useful propagation and multiplication technique. This experiment was therefore carried out to determine the effects of some pre-budwood collection treatments of twigs on budding success in cocoa.

Four pre-budwood collection treatments of twig on 'bud take' and sprout was studied: (i) whole leaf clip (ii) half leaf clip (iii) apical bud clip and (iv) twig wounding at the point of budwood collection and (v) a control. Budwoods were collected 2, 4,6,8 and 10 days after treatment (DAT) giving a factorial experiment of 5 x 5 in a randomized complete block design. Clone Na 32 was used for this experiment. Results showed that the wounding treatment gave a significantly greater 'bud take' than all other treatments ($P<0.05$) for all the days under study. The 'bud take' at 8 – 10 DAT in the wounding treatment (76% - 88%) was significantly greater ($P< 0.05$) than in the control (40% - 56%). At four weeks after opening, the wounding treatment consistently gave a significantly higher

percentage budding success (46% - 72%) than the control (26% - 54%) for all the days studied. This study underscores the potential advantage of pre-treatment of twig before budwood collection for increased budding success in cocoa.

**Studies on the genetic basis and mechanisms of inheritance of resistance to pod rot.**

**Genetic studies on the basis and inheritance of resistance in cocoa to *Phytophthora* pod rot.**
(P. O. Aikpokpodion and K. Badaru)

The major constraint to cocoa production in Nigeria is the pod rot (black pod) disease caused by *Phytophthora megakarya*. Yield loss up to 30% - 40% is recorded on commercial plantations in the South West and up to 90% in the South-South areas of the country. The planting of resistant cultivars is the best option of control of the disease. However, an understanding of the genetic factors controlling resistance traits and inheritance pattern of such, forms the basis for an effective means of determining the genetic factor responsible for resistance and its mode of inheritance. A 5 x 5 diallel mating design is being used for this study. In the year under report, progenies from these crosses are being raised in the nursery in readiness for the early screening test.

**Development of rapid method of propagation of improved cultivars of cocoa through budding and *in-vitro* plantlets regeneration.**

**Effects of different combinations of growth regulators in modified Murashige & Skoog (MS) Mdium on the *in vitro* growth of cocoa staminode explant. (**P.O. Aikpokpodion and E.B. Esan)

Regeneration of explants from somatic tissues provide the best means of perpetuating and propagating *en masse* desired genotypes. In this experiment, the effects of different combinations of growth regulators – Naphthalene acetic acid (NAA), 2,4 –D and Benzylaminopurine (BAP) on stimulation of callus formation, embryogensis and organogenesis in flower staminodes of cocoa was studied. The different stock solutions were made from NAA (100mg/L), BAP (0.23g/L) and 2,4-D (50mh/L). Observations made up to 12 weeks in the growth chamber showed that the explants remained inert with no evidence of callus formation or embryogenesis. This suggests that more studies have to be carried out.

**Characterization and evaluation of CRIN cocoa germplasm and introduction using morphological and isozyme electrophoresis methods.**

**Genetic diversity in morphological characteristics among Ten F2 populations of cocoa**
(K. Badaru and P.O. Aikpokpodion)

The availability in the germplasm of genotypes of diverse genetic constitution is a necessary pre-requisite for the exploitation of heterosis and development of improved cultivars. Evaluation and characterization of these genetic resources provide information on the suitability of these materials for use in breeding programmes and direct use by farmers and industrialists. Twenty-two morphological characteristics of ten F populations (T12, T17, T60,T61, T63, T72, T82, T85, T87 and T92) maintained in the germplasm located at the West Block were assessed. These included flower, fruit and bean characteristics (Table 1). Results showed that variability occured among some of the characteristics observed.

Table 1:

| **Qualitative characteristics** | **Quantitative characteristics** |
|---|---|
| Leaves | Flower |
| 1. Flush colour | 1. Style length |
| | 2. Sepal length |
| 2. Ligule colour | 3. Ovary length |
| 3. Filament colour | Fruit |
| Fruit | 4. Ridge pair separation |
| 4. Pod shape | 5. Pod length |
| 5. Pod apex form | 6. Pod width |
| 6. Ridge colour | 7. Pod length/width ratio |
| 7. Pod basal constriction | Beans (Seed) |
| 8. Pod rugosity | 8. Bean dried weight |
| Beans (Seed) | 9. Number of beans per pod |
| 9. Cotyledon colour | 10. Bean width |
| | 11. Shell/Nib ratio |
| | 12. Peeled bean weight |

**Determination of IPM technique for the control of black pod disease and mirid infestation.**

**Screening of botanicals for the control of black pod disease. (**T.O. Adejumo**)**

The *Phytophthora* black pod disease of *Theobromae cacao* L caused by *Phytophthora megakarya* has been reported to be the most economically important fungal disease in West Africa Reports indicated that yield loss of between 30-35% annually has been attributed to this disease. Many chemicals have been screened for the control of this disease but owing to the residual effect of the plant protection chemicals, alternative control measures are being sought. The objective of the study was to investigate the antifungal effect of some botanicals in controlling black pod disease of cocoa.

In the preliminary laboratory experiment, aqueous extracts of *Allium sativum, Chromolaena odorata* and *Piper guineense* were tested against *Phytophthora megakarya,* the causal agent of cocoa black pod. It was observed that extracts of C. *odorata* and *P. guineense*. (10% w/v) completely inhibited the ***in vitro*** radial growth of *P. megakarya* and were comparable to Bordeaux mixture. New effective fungicide will evolve after isolating the antimicrobial substances and field performance.

**Weed control in young cocoa (***Theobromae cacao***) with Folar 525:**
(A.A.Adeyemi, A.O. Olaiya)

For the third successive year, investigation to evaluate Folar 525 SC, a formulated mixture of glyphosate (N - (Phosphonomethyl) glycine) and terbuthylazine (2-ter-butylamino-4-chloro-6-ethylamino-s-triazine) for weed control effectiveness and selectivity in young cocoa was carried out at Owena in 2000. Treatments investigated included herbicide (Folar 525) rates of 1.05, 2.10 and 3.15 kg a.i/ha. weeded check and control ( unweeded). The treatments were laid out in randomised complete block design with four replications. Plot size was 9m x 9m to give 9 stands of cocoa per plot. Three-metre-space in –between plots and six - metre space in-between the replicates were allowed off to facilitate movements for field operations and prevent herbicide drift. The herbicide treatments were applied with CP 20 pneumatic sprayer to deliver 3001/ha of spray solution as directed application to the weeds only. Weed control effectiveness of the herbicide treatments was determined at 42 days after herbicide application through visual ratings of 0-100 where 0 = no control and 100 = absolute control. Predominant weeds identified in the experimental area during the year under review consisted of *Chromolaena odorata* R.M. King and Robinson, *Aspilia sp. Ageratum conyzoides L., Fleuya aestuans L., Synderella nudiflora Gaetn, Panicum maximum, Jacq.*

Folar 525 was generally more effective than handslashing treatment (weeded) check) in the control of weeds under young cocoa. The two higher rates (2.10 and 3.15 kg a.i/ha) of the herbicide performed better than the lower rate of the herbicide (Table 1). There was no weed control attained under the weedy check. Generally the efficacy of Folar 525 increased with increase in the rate of the herbicide up till the rate of 2.10 kg a.i/ha beyond which the efficacy stabilized or formed a pleateau. Consequently weed dry weight was significantly highest under the herbicide rate of 1.05 kg a.i /ha than the two higher rates (2.10 and 3.15 kg a.i/ha). There was, however, no significant difference in the weed dry weight under the herbicide rate of 2.10 and 3.15 kg a.i/ha indicating that the weed control effectiveness of the two-herbicide rates are similar.

Table 2 shows the phytotoxicity ratings of the herbicide treatments and % survival of the young cocoa under the different weed control treatments at the third year of experimentation. There was no herbicide lethality on the seedlings and as such there was no mortality of young cocoa in any of the herbicide treatments indicating that the herbicide was not phytotoxic when applied as direct application. Similarly, the 87.50-93.75% survival of young cocoa under herbicide treated plots is an indication that Folar 525 SC is safe for weed control in young cocoa. Growth performance of cocoa in terms of height, stem diameter and number of leaves of cocoa is shown in Table 3, under the herbicide rates of 2.10 and 3.15 kg a.i/ha .

**Table 1: Weed control effectiveness in different herbicide treatments in young cocoa at Owena in 2000.**

| Treatment | Application Rate (Kg a.i/ha) | Weed control % * | Weed dry weight (t/ha) |
|---|---|---|---|

| | | | |
|---|---|---|---|
| Glyphosate + | | | |
| Terbuthylazine | 1.05 | 67.50 | 0.64 |
| | 2.10 | 92.50 | 0.26 |
| | 3.15 | 94.75 | 0.18 |
| Weeded Control | 0.00 | 56.25 | 0.80 |
| Unweeded Check LSD (P=0.05) | 0.00 | 0.00 | 3.30 |
| | - | - | 0.24 |

- Weed control ratings where 0 = no control and 100 = absolute control.

**Table 2: Phytoxicity ratings of herbicide treatments and % survival cocoa seedlings under different weed control treatments at Owena in 2000.**

| Treatment | Rate (Kg a.i/ha) | Phytotoxicity ratings | % Survival |
|---|---|---|---|
| Glyphosate + | | | |
| Terbuthylazine | 1.05 | 0.00 | 87.50 |
| | 2.10 | 0.00 | 93.75 |
| | 3.15 | 0.00 | 93.75 |
| Weeded Control | 0.00 | 0.00 | 75.00 |
| Unweeded Check LSD (P=0.05) | 0.00 | 0.00 | 25.00 |
| | - | - | - |

**Phytotoxicity ratings where 0 = no seedling mortality, and 100 = complete death of the seedlings.**

**Table 3: Growth response of young cocoa to the different herbicide treatments at Owena in 2000**

| Treatment | Rate (kg a.i/ha) | Growth Parameters |
|---|---|---|

| | | Height (cm) | Girth (cm) | No of leaves |
|---|---|---|---|---|
| Glyphosate + Terbuthylazine | 1.05 | 130.0 | 2.10 | 80.0 |
| | 2.10 | 190.0 | 2.90 | 138.0 |
| | 3.15 | 186.0 | 2.99 | 127.0 |
| Weeded check | 0.00 | 120.0 | 1.80 | 62.0 |
| Weedy control | 0.00 | 23.13 | 0.31 | 15.25 |
| LSD (P=0.05) | - | 14.26 | 0.35 | 11.11 |

**Identification of Insects Associated with Newly Established Cocoa Farm**
(O. F. Adewola)

The CFC plot, a newly established cocoa farm intercropped with plantain as a shade crop was used for this survey. Four plots were selected and twenty-four plant stands were randomly sampled in each plot at weekly interval. The plant stands were checked for:

i. Healthy trees with no visible damage
ii. Trees showing moderate sign of attack but no defoliation.
iii. Trees showing signs of severe attack with defoliation

The cocoa plants were also sampled and thoroughly searched with minimum disturbance for presence or absence of insects causing damage. Insect samples were collected and taken to the Laboratory. Dead samples were preserved in glass tube containing 70% alcohol. Adult insects were killed and mounted in insect boxes while the immature ones were reared to adult, identified and preserved in insect boxes in the museum.

The insects collected were identified with the aid of standard keys in the Institute's museum.

**Results:**

Most of the cocoa trees were healthy with no visible damage while some showed moderate sign of attack with little defoliation because of the regular spraying of pesticides which was carried out on the farm. A higher population of the larvae of the various polyphagous insects were found. This coincided with period of higher flushing of leaves which started with the onset of rains.

It was also observed that tender leaves were more susceptible to the pest attack than old leaves. A list of insect pests observed in the plot is presented in Table 1.

A mantid, *Spodromantis lineola*, an ant *Oecophylla longinoda* and an unidentified brown spider were found preying on some of the larvae collected.

**Table 1: Insect pests observed in the CFC Plot**

| Common Name | Scientific Name | Family | Pest status | Damage Done |
|---|---|---|---|---|
| 1. Leaf Caterpillars | *Anomis leona* | Noctuidae | Minor | Defoliate leaves |
| 2. Defoliators | *Earias biplaga* | Noctuidae | Minor to major | Eat terminal buds and young leaves |

| | | | | |
|---|---|---|---|---|
| 3. Leaf caterpillar | *Characoma stictigrapta* | Noctuidae | Minor | Eat leaves. |
| 4. Leaf worms | *Spodoptera littoralis* | Noctuidae | Minor | Feed on flush leaves |
| 5. Bag worm | *Kotochalia sp.* | Psychidae | Minor | Eat leaves. |
| 6. Variegated grasshopper | *Zonocerus variegatus* | Acrididae | Major | Eat leaves. |
| 7. Tailor ants | *Crematogaster gabonensis* | Formicidae | Minor | Tie leaves of plant to form nest |
| 8. Ants | *Oetheca mutabilis* | Formicidae | Minor | Tie leaves of plant to form nest |
| 9. Leaf beetle | *Unidentified* | Chrysomelidae | Minor | Eat leaves. |
| 10. Mole cricket | *Cryllotalpa africana* | Gryllidae | Minor | Severe (cut) roots |

**Integrated Pest Management (IPM) for the Brown Cocoa Mirid – *Sahlbergella singularis Hagl.* –**

**Further survey and identification of the natural enemies and alternate host plants (Okelana F.A.)**

A survey and identification of the natural enemies and alternate host plants of *S. singularis* was begun in June 2000.

So far, a reptilian vertebrate predator of the mirid was observed. The study will continue in 2001.

**KOLA PROGRAMME (**Leader: T.C.N Ndubuaku**)**

**Studies on the Distribution of Kola Weevils Balanogastris kolae (Desbr) *(Coleopterm curculionidae*) in Traditional Storage Baskets** (T. C. N. Ndubuaku)**.**

The distribution of kolanut weevils, *Balanogastris kolae* in traditional storage baskets was studied to identify the factors that affect their locomotary and resting habits and consider the possibility of exploiting any observed behaviour in the development of strategies for the control of the pest.

Vertical distribution was studied at the top, middle and bottom sections of the basket, while horizontal distribution was studied at the core and peripheral sections of the basket. For the study of vertical distribution of kola weevils in storage baskets, the experimental set-up consisted of 3 baskets – A, B, and C. of the same size. Baskets B and C had their bottoms removed and replaced with a false bottom consisting of a fish net of 3.5cm mesh. The baskets were lined with banana leaves but the bottom side of B and C were not lined to allow the weevils free movements from one basket compartment to another. Each basket was half-filled with 500 kola nuts. The study of horizontal distribution was carried out using 2 baskets and E Basket C is a, cylindrical traditional kola storage basket while basket E is one half the volume of basket C, cylindrically shaped and made of 1mm binding wire frame and fitted on the side and bottom with a 3.5cm mesh fish net.

The baskets were stacked on each other with basket A at the base, B at the middle and C on top. The bottom of C was fitted into the mouth of B to rest on the surface of the kolanuts in B while the bottoms of B fitted into the mouth of A to rest on the surface of the kolanuts in A.

Immediately before stacking the baskets 60 weevils were released on the surface nuts of each basket for a 24-hr exposure period. At the end of each exposure period the baskets were separated and the insects in each were collected and counted to determine their distribution. The treatment was replicated 4 times and the percentage of the total insects present in each basket was calculated.

Results (Table 1 and 2) showed that adult kola weevils exhibited positive geotaxis as percentage distribution at the bottom section of the basket was 74% and significantly higher than the distribution at the middle section (16.5%) and top section (9.5%). The horizontal distribution at the peripheral section of the basket was 70.1%. This was significantly higher than the distribution at the core section (29.9%).

It is recommended that during regular sorting and removal of weevils and weevilledd nuts from kolanuts in storage baskets, farmers should concentrate more at the bottom section of the basket where most of the adult weevils are located. Future investigations will determine how the positive geotaxis exhibited by kola weevils will be exploited in baiting and development of an IPM program for control of kola weevils in storage.

**Table 1. Vertical distribution of adult kola weevils, *Balanogastris kolae* in storage.**

| Section of basket | No. of Weevils in different sections of storage basket after exposure for 24 hours. | | |
|---|---|---|---|
| | Range | Mean | Percent of total in all sections |
| Top Section | 0-14 | 6.0a | 9.5 |
| Middle section | 2-26 | 10.4a | 16.5 |
| Bottom section | 34-111 | 46.87b | 74.0 |

- Means followed by the same letter are not significantly different at 5% level. of probability

**Table 2: Horizontal distribution of adult kola weevils, *Balanogastris kolae in* storage baskets.**

| Section of basket | No. of Weevils in different sections of storage basket after exposure for 24 hours. | | |
|---|---|---|---|
| | Range | Mean | Percent of total in all sections |
| Outer section | 32-51 | 39.9a | 70.1 |
| Inner section | 9-25 | 17.0b | 29.9 |

- Means followed by the same letter are not significantly different at 5% level. of probability

**Further selection and acquisition of high yielding and compatible *Cola nitida* and *Cola acuminata* materials from traditional groves.** (P. O. Adebola**)**

1. This work started in 1997 with the identification of traditional high yielding farms in Ogun, Osun and Ondo States. The compatibility status of some of the identified materials in these farms have been established. 50 progeny seedlings obtained from identified compatible *C. acuminata* selections have been used to establish 0.5 hectares plot at the Headquarters. These plants were well maintained during the period and some of the dead stands were gapped up. Additional nuts were also obtained from the selected trees during the year and 80 *C. acuminata* seedlings raised from them were maintained in the nursery and will be ready for transplanting in May/June 2001. Some of the seedlings will be used to expand the 0.5 ha plot at W8/6 at the Headquarters while the rest will be used to establish a new plot in Owena Substation. To this end, a suitable location for the plot had already been located at the substation.

At Oshogbo in Osun State, high-yielding *C. nitida* trees were selected and their compatibility status determined. Open pollinated pods were obtained from these materials during the year and have been used to raise some seedlings at the Headquarters. They will also be ready for transplanting next planting season.

2. Inventory of existing Kola experimental plots.

This activity started during the year at the Headquarters. All the existing kola experimental plots were visited for on-the spot assessment. The activity revealed that until recently, most of these plots have been abandoned for years and have been taken over by weeds and forest trees. The plots have now been cleared of weeds and were regularly maintained during the year. With the aid of available spot plans of the plots, individual trees in each plot were identified and dead/living counts of some of these plots were carried out. It is hoped that the activity will continue next year with proper tree-by-tree labeling of each plot if necessary materials are provided.

**Influence of harvesting methods and primary processing stages on nut infestation by the kola weevils** *Balanogastris* kolae and *Sorphrohirus* species (Ojelade, K.T.M and Sanusi, R.A)

This study was carried out to evaluate the mode of pod collection and kolanut processing methods on the quality of nuts obtainable. Since primary processing of kolanut is an important stage handling of kolanut at this stage of processing will improve the quality of kolanuts produced.

About 1kg samples of three categories of kolanuts, including unskinned, skinned and stored kolanut swere extracted from kola pods obtained from (i) Harvested pods (ii) Fallen pods and (iii) Mixed or unsorted pods. Extracted kolannuts were observed for presence of oviposition holes, feeding marks, exit holes and instar stages of the kola weevils in order to evaluate the level of damage of nuts. Arithmetic percentage was used to estimate the average level of weevil-damage in the given kolanut lots. T-test was carried out to determine if there is any significant difference between the average number of damaged nuts observed when extracted nuts were unskinned, skinned and stored. A one-way classification was used to determine the significance of processing on observed level of weevil damage.

29.5% of the nuts were observed as weevil-damaged nuts when unskinned while 33.7% and 42.1% level of damaged nut when the nuts were skinned and stored respectively for harvested pods. For fallen pods, the observed level of damaged nuts were 38.3%, 67.1% and 76.3% when the nuts were unskinned, skinned and stored respectively. For unsorted pods; 17.2%, 31.5% and 40.8% of the nuts at unskinned, skinned and stored respectively were observed as (levels of weevil) ) damage.

The correlation coefficients of unskinned and skinned nuts as well as skinned and stored nuts were 0.9862, 0.9098 respectively for nuts from harvested pods, 0.5685,0.9919 respectively for nuts from fallen pods; and 0.9969, 0.9759 respectively from unsorted pods (Table 2). The implication of this is that more than 50% of variations in the latter processing stage was due to variations in the form.

The T-test implied that the difference in the observed level of damage in the nuts, from the three sources of pod collected were due to the method of processing.

The result indicated that only the method of processing has a lot of influence of the ability of a farmer, trader or consumer to ascertain the level of weevil damage on nuts.

**Table 1: Damage Estimates onn Kolanuts during Processing (%)**

| | POD CATEGORY | | |
|---|---|---|---|
| Processing Stage | Harvested | Fallen | Unsorted |
| Unskinned | 29.3 ± 5.6 | 38.3 ± 4.05 | 17.2 ± 2.25 |
| Skinned | 33..70 ± 5.72 | 67.10 ± 4.33 | 31.50 ± 2.8 |
| Stored | 42.10 ± 5.32 | 76.30 ± 5.22 | 40.8 ± 3.1 |
| | | | |
| | | | |

*Values obtained are means from 250 nuts, replicated five times.

**Table 2: Correlation Coefficfient of Damage estimated on kolanuts at different Stages of Primary Processing**

| | POD CATEGORY | | |
|---|---|---|---|
| | Harvested Pods | Fallen Pods | Unsorted |
| | Skinned | Skinned | Skinned |
| Unskiinned | 0.9862 | 0.5685 | 0.9969 |
| Stored | 0.9098 | 0.9919 | 0.9759 |

**Further investigation on the basic effect of scarification techniques on uniform and prompt germination of Cola nitida nut (**Olaiya, A.O and Badaru, K)

The experiment was carried out in the laboratory and 40 each of red, white and pink nuts were divided into two equals were scarified and unscarified. Each nut was sown in cups filled with washed river sand. Data were collected on days to germination, percentage germination, height of seedlings, stem girth and number of leaves at fortnight intervals. The data were analysed using ANOVA and significant differences thus calculated using Duncan Multiple Range Test.
The first to germinate was white scarified nuts (WS8) at 20 days after sowing though the % age germination of white scarified nuts was not significantly different from that of pink scarified nuts Fig. 1a. The days to germination of all scarified nuts were significantly different from those of unscarified nuts irrespective of the colour. Fig. 1b.
Scarification thus improves germination percentage as well as days to germination. Scarified white nuts had 85 percent germination percentage which was the highest, while pink unscarified nuts had the lowest which was 3.5 percent.
There was no significant difference in the morphological parameters taken. Scarification of the nuts should be done at the time of sowing to prevent infection

**Determination of Level of Organic and Inorganic Fertilizers for kola production**
**(**C. R. Obatolu and R. R. Ipinmoroti)

Unlike other tree crops, kola has not been adequately researched into nutritionally. Some workers had reported positive response of kola to mineral fertilizer applications. Egbe (1980) reported that application of PK produced more kola pods than P or K or N alone or NP or NK and that N was observed to depress production of ramet trees. On the other hand, Ayodele (1983), reported that application of P. K. NK and PK resulted in higher average kola yields than the control while N, NP and NPK depressed yield.

Recent observations indicated that kola seedlings would respond to fertilizer treatments. This is because some moribund kola plots that were supplied with kola seedlings but without fertilizer application, did not perform as expected. In addition, the kola seedlings showed some nutrient deficiency symptoms. This need to carry out of this study.

The study objective was to assess the optimal level of organic and inorganic fertilizers for kola production, Organo-mineral fertilizers from kola pods husks (KPH) and Cocoa Pod Husk (CPH) were formulated and applied to kola seedlings in 5-litre sized pots containing 5kg soil at rates equivalent to 0,2 .5, 5 and 10 mt/ha. The rates would be compared with inorganic fertilizer treated pots.

- The experiment is on-going
- Visual observations indicated that the kola seedlings were responding well to the treatments.

**Determination of the development, spread and distribution of kola diseases in kola farms and store** (Agbeniyi, S. O., Adedeji A. R. and Otuonye, H. A.)

The study focused on the effects of wounding and incubation temperature on the infection of kolanut by storage fungi.
Sample of kolanuts were obtained from the Kola Processing Unit at CRIN Headquarters at skinning stage. Samples which comprised of 10 nuts were either subjected to artificial wounding by using 8mm cork borer resulting in visible surface wounds or were left unwounded. Following this initial treatments, kolanuts were placed in 11.0cm Petri-dishes containing wet Whatman filter paper. Samples

were then incubated at 10,.20 or 30°C. For each treatment there were three replications and the percentage of kolanuts that developed infections was determined after 10 days of incubation. The result obtained is in Table 1. Most infections occurred at wounding. When kolanuts were not wounded and incubated at 10°C, the infection percentage was 16.7%. Whereas 79.2% of kolanuts were infected when nutss were wounded and incubated at 30° C. thus, ambient storage temperature of 28 + 2° C at which kolanuts are usually stored will generally enhance disease incidence

**Recommendation**: Appropriate skinning procedure aimed at reducing wounding during primary processing is recommended.

**Table 1: Effect of artificial wounding and incubation temperature on the infection of kolanuts.**

| Treatments | Infection Percentage |
|---|---|
| Nuts unwounded held at 10°C | 16.7 |
| Nuts wounded held at 10° C | 33.3 |
| Nuts unwounded held at 20° C | 20.6 |
| Nuts wounded held at 20°C | 50.0 |
| Nuts unwounded held at 30°C | 29.0 |
| Nuts wounded held at 30°C | 79.2 |

**Influence of Harvesting Methods and Primary Processing Stages on Nuts Infestation by the Kola Weevils (*Balanogastris kolae* and *Sophrorhinus spp*)** (Ojelade, K.T.M and Sanusi, R.A)

Extracted kolanuts were observed for the presence of oviposition holes, feeding marks, exit holes and instar stages of the kola weevils to determine the level of weevil damage on nuts when nuts were unskinned, freshly skinned and stored for about four weeks. Arithmetic percentages, t-statisticsal test and f-statistical test were used for data analysis.

Percent of observeable damage of 17.2% 31.5% and 40.8% were lowest for unskinned, skinned and stored nuts from unsorted pods while that from fallen pods at 38.3%, 67.3%, respectively, were the highest.

The correlation coefficients of unskinned and skinned nuts as well as skinned and stored nuts were 0.9862 and 0.9098, respectively for nuts from harvested pods; 0.5685 and 0.9919 respectively for nuts from fallen pods; and 0.8869, 0.9759 respectively for nuts from unsorted pods. The t-test statistics indicated that mode of pod collection has no influence on the observable level of weevil damage to kolanuts while f-test indicated that processing stage has a lot of influence on observable level of damage. The results indicate that only the method of processing may have a significant influence on the ability of a farmer, trader or consumer to discern the level of weevil-damage on kolanuts. Therefore, the level of revenue loss can be judged to be as high as 76.3%, 67.1% and 38.3% if the kolanuts are stored, skinned and unskinned respectively.

**Evaluation of Moribund Kola Plantations for Rehabilitation**
(R. R. Ipinmoroti; M.A. Daniel and C. R. Obatolu)

Successive complaints by kola farmers of low yield has called for the evaluation of some moribund kola plantations for possible rehabillitation. It was observed that most of the kola plots in Nigeria were established some three to four decades ago, hence they have out-lived their useful economic life. In addition , the farmers have not been using fertilizers on the farms.

Visits were made to some moribund kola plots in June, 2000. Soil samples were collected from some demarcated areas of the farms at a depth of 0-30cm and up to 90cm in some instance for their physico-chemical analysis. Physical observation of the farm situations were made and background histories were also obtained. The soil samples were processed and analysed for their chemical and textural characteristics.

The soil physical properties, pH and other chemical analyses are presented in Table 1. The N and K contents were found to be too low optimal performance of kola while the Ca was observed to be too high which could have probably resulted K/Ca ratio inbalance, with expected low K absorption by the kola plants.

The kola farms had been established for more than four decades ago without fertilizer application. These might have contributed to the low yield observed by the farmers from their kola plantations.

Vegetative regeneration of old kola trees by coppicing, the use of improved kola seedlings and the application of N and K fertilizers (Table 2) were advised on the farms for their rehabilitation.

**Table 1: Physico-chemical Properties of the Soils of the Zones Investigated at Sotubu**

| AREAS/ZONES | SAMPLING DEPTH (cm) | Soil pH | % N | % C | P Mg/Kg soil | Exchangeable Cation (Cmol/kg soil) | | | % Sand | % Silt | % Clay | Texture class |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | K | Ca | Mg | | | | |
| GBOMO A | 0-15 | 5.60 | 0.07 | 0.077 | 4.61 | 0.09 | 1.32 | 0.66 | 76.2 | 13.0 | 10.8 | Sandy Loam |
| $B_1$ | 0-15 | 5.99 | 0.07 | 0.077 | 4.61 | 0.09 | 1.52 | 0.83 | 87.2 | 1.0 | 11.8 | Sandy Loam |
| $B_2$ | 15-30 | 6.27 | 0.05 | 0.38 | 4.15 | 0.12 | 1.94 | 0.63 | 81.2 | 2.0 | 16.8 | Sandy Loam |
| $B_3$ | 30-45 | 5.36 | 0.05 | 0.16 | 4.61 | 0.07 | 1.05 | 0.53 | 77.2 | 4.0 | 18.8 | Sandy Clay Loam |
| $B_4$ | 45-60 | 6.42 | 0.05 | 0.14 | 3.46 | 0.05 | 1.05 | 0.69 | 78.2 | 2.0 | 19.8 | Sandy Clay Loam |
| $B_5$ | 60-75 | 5.30 | 0.04 | 0.12 | 4.15 | 0.04 | 0.46 | 0.22 | 72.2 | 4.0 | 23.8 | Loam |
| $B_6$ | 75-90 | 5.44 | 0.05 | 0.17 | 2.13 | 0.04 | 0.46 | 0.28 | 78.2 | 2.0 | 19.8 | Sand Clay Loam |
| DOKULE Ci | 0-15 | 5.92 | 0.08 | 0.85 | 4.61 | 0.10 | 1.69 | 0.93 | 88.2 | 2.0 | 9.8 | Sand Loam |
| Cii | 0-15 | 6.18 | 0.05 | 0.35 | 4.61 | 0.05 | 0.85 | 0.69 | 83.2 | 2.0 | 14.8 | Sand Loam |
| DOKULE $D_1$ | 0-15 | 6.20 | 0.08 | 0.76 | 6.92 | 0.09 | 0.97 | 1.08 | 70 | 13.0 | 16.8 | Loam |
| $D_2$ | 15-30 | 5.76 | 0.06 | 0.44 | 3.23 | 0.07 | 0.96 | 0.57 | 75.2 | 2.0 | 22.6 | Sandy Clay Loam |
| $D_3$ | 30-45 | 5.68 | 0.06 | 0.28 | 2.31 | 0.07 | 1.18 | 0.66 | 55.2 | 1.0 | 43.8 | Clay Loam |
| $D_4$ | 45-60 | 6.01 | 0.06 | 0.61 | 2.31 | 0.05 | 1.58 | 0.69 | 53.2 | 1.0 | 45.8 | Clay Loam |
| $D_5$ | 60-75 | 6.17 | 0.06 | 0.38 | 2.31 | 0.06 | 1.55 | 0.82 | 49.2 | 1.0 | 49.8 | Clay Loam |

Table 2: **CRIN Fertilizer Recommendations For Kola**

| Year | Recommended dosage of fertilizers | Remarks |
|---|---|---|
| $1^{st}$ – $3^{rd}$ Year of Planting | 50gm single Superphosphate (SSP or<br>20gm Triple Superphosphate (TSP) | Apply fertilizers on the soil surface in a circle at least 25cm from the stem.<br>Apply half of the rate in July and the remaining half in September. |
| $4^{th}$ – $6^{th}$ Year of Planting | 459g Urea + 55g SSP or 22g TSP – 50g K per tree | Broadcast half the rate in April/May and remaining half in August/September. |
| * Matured Kola trees | 1.36 kg Urea + 3.41kg SSP or 1.36kg TSP<br>+1.36 kg $K_2SO_4$/tree + 1% Solubo + 0.05% $CuSO_4$<br>0.7% Zn SO4 Solutions. | Broadcasing N fertilizer in split dose of half in April/May and half in August.<br>Apply P, K and /or Solubor once in April/May. The micro-nutrients of B, Cu and Zn are applied as the deficiency occurs. |

- SSP or TSP to be omitted for the Sotubu soils under investigations.

**COFFEE PROGRAMME (**Leader: Dr. (Mrs) F.A. Okelana**)**

**Potassium up- take of *Coffea canephora* in Soils of different Ecological zones of Nigeria.**
**(**C. R. Obatolu, M. A. Daniel & T.F. Oyadiran)

The replacement of nutrient elements removed by crops makes it possible to assess the quantity of such element that would be needed for optimal growth.

A green house trial was carried out at the Institute's Headquarters using *Coffea canephora*, as test crop on soil samples collected from various coffee growing zones to determine their nutrient supply capacity especially potassium.

Samples were collected at Ibadan, Owena, Kabba, Ibeku, Uhonmora, Ochaja and Ikom. The result showed that the percentage K – uptake was higher in the leaves than in stems and roots with Kabba soils having 2.99% K, Uhonmora 2.84%, Ibadan 2.72%, Owena 2.58%, Ochaja 2.49% and Ikom 2.31% (Table 1).

The agronomic data taken showed that there was a general increase in plant growth, leaf number, leaf area and plant girth. (Fig. 1,2, 3 and 4).

**Effect of Organo-mineral Fertilizer on the Growth and Yield of *Coffea canephora* In S.W. Nigeria. (**C.R. Obatolu & M.A. Daniel**)**

The main objectives of this green house trials which was initiated in January 2000, at the Institute's Headquarters was to evaluate the best rate of organo-mineral fertilizer application in coffee nutrition.

The effectiveness of organo-mineral fertilizer as soil amendment for increasing coffee production at a cost-effective dosage was investigated. The lay-out was Completely Randomised Block Design (CRBD) with six (6) organic fertilizer types viz: Sole (100%) *Chromoleana odorat***a** (CH), *Pennisetum* (P) and Cowdung (CD); 50%: 50% of *Chromolana* + Cowdung (CH + CD), *Chromolaena* + *Pennisetum* (CH + P) and Cowdung + *Pennisetum* (CD + P).
Fortification levels were at 0, 1, 2 and 4kg at the rate of 0t/ha., SE/ha, 10t/ha gave the best performance in Plant Vigour. Figures 1, 2, 3 and 4.

**Abundance of caterpillars of four defoliating insect pests of robusta coffee** (F.A. Okelana)

Incidence of Caterpillars of *Epicampoptera* spp. *Cephonodes hylas, Leucoplema dohertyi* and *Lecythocera* sp.) was monitored at the shaded (S2/4) and open (S8/1) robusta coffee experimental plots at CRIN Headquarters, Ibadan. Fifty coffee shrubs were sampled randomly every week at each plot by counting the number of caterpillars on 10 shoots per stand at hand-height. The mean number of caterpillars per month was reckoned.

The ***Epicampoptera*** spp. occurred mostly during the months of June to December with peak population in August in both plots (Table 1). *C. hylas* appeared with the onset of rain in March and it attained a peak in April. As usual, the open plot S8/1 supported higher population of the Sphingid defoliator (*C. hylas*) than the shaded plot.S2/4 (Table 1).

Populations of *L. dohertyi* and *Lecythocera* spp. were mostly incidental with peak population of the former occurring in December at both plots. (Table 1).

**Table 1: Seasonal variation in the population of larvae of four defoliation insect pests of robusta coffee at CRIN Headquarters, Ibadan.**

| | **M O N T H S** | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | **(Mean monthly values/50 stands)** | | | | | | | | | | | |
| PLOTS | J | F | M | A | M | J | J | A | S | O | N | D |
| (A) *Epicapoptera spp*. S2/4 (Shaded) | 0 | 0 | 0 | 0 | 0 | 2.2 | 8.5 | 24. 8 | 11.0 | 2.5 | 2.3 | 2.0 |
| S8/1 (Open) | 0 | 1.3 | 0 | 0 | 0 | 5.4 | 21.3 | 23.8 | 13.4 | 2.0 | 3.0 | 1.2 |
| (B) *Cephonodes hylas* | | | | | | | | | | | | |
| S2/4 | 0 | 0 | 0 | 4.8 | 0 | 0.6 | 0 | 0 | 0 | 0 | 0 | 0.2 |
| S8/1 | 0 | 0 | 0.6 | 11.0 | 0.3 | 1.0 | 0.8 | 0.3 | 0.2 | 0 | 0.3 | 0 |
| (C) *Leucoplema dohertyi* | | | | | | | | | | | | |
| S2/4 | 0 | 0.5 | 0 | 0 | 0 | 0 | 0.8 | 0 | 0 | 0.5 | 5.0 | 6.6 |
| S8/1 | 0.5 | 0.8 | 0.6 | 0 | 0 | 0 | 0 | 0 | 0.4 | 1.0 | 2.0 | 3.8 |
| (D) *Lecythocera sp.* | | | | | | | | | | | | |
| S2/4 | 0 | 0.3 | 0.2 | 0 | 0 | 0.2 | 0.5 | 0 | 0 | 0 | 0.8 | 1.0 |
| S8/1 | 0 | 0.3 | 0 | 0 | 0 | 0.0 | 0 | 0 | 0 | 0 | 1.3 | 0 |

**Evaluation of Copper sulphate and rate of application for its efficacy against leaf rust and Coffee berry disease (**E.A. Fawole**)**

The trials which started in 1996 were carried out at four different locations in Kogi State – Gboloke, Olle, Ighun and Iyamoye on farmers' farms. Three different rates of copper sulphate application were tested for the control of leaf rust and coffee berry disease. These were 45gm/9lit water, 90gm/9lit water and 135gm/9lit water. The experiments were laid out in a randomised complete block design with four replicates per treatment. Spraying was done using CP15 Knapsack sprayers.

Results revealed that the three rates tested, adequately controlled both leaf rust and coffee berry disease, but of these, 90gm of copper sulphate dissolved in 9 litres of water was the most appropriate and cost-effective for the control of the two diseases. The fungicide was however, more effective against leaf rust than coffee berry disease.

**Biochemical Characterisation, Coffee Improvement And Propagation.**

**Variation in caffeine and phenolic contents of Selected** *Coffea canephora* **clones: (**S.S. Omolaja**).**

In the International market, there is a growing demand for low or caffeine-free coffee. Also the percentage phenol in coffee clones was suggested to be associated with the resistance level of coffee to attack by some diseases and insect pests. This work therefore investigated the percentage of phenol and caffeine content in twenty seven selected clones of *Coffea canephora* in CRIN. Gravimetric method was used for the phenol and caffeine analyses. The caffeine content among the clones ranged from 1.1 to 1.5% dmb (dry matter basis) (Table 1). The percent phenol ranged from 2.5 to 15.5. The co-efficient of variation for phenol is high thereby enhancing the possibility of rapid selection for favourable phenol percentage in *C. canephora*. The importance of this work lies in the fact that when farmers produce coffee that is acceptable to the international market, farmers'sale will increase and higher price will be offered for it.

**Polyacrylamide Gel Electrophoresis Of Protein In** *Coffea Canephora.*

The other aspect of biochemical (molecular) characterisation carried out on *Coffea canephora* was electrophoresis. Crop traits are direct result of product of gene and protein which is a primary product of gene. Genetic diversity in a crop germplasm is therefore understood better through the analysis of the primary product of gene (protein). Protein electrophoresis therefore offers an efficient means of identifying and quantifying genetic variation in crop germplasm. The objective of this work is to separate the selected *C. canephora* clones into distinct genetic entities using polyacrylamide gel electrophoresis of protein. The analysis was carried out in collaboration with Dr. O.O. Oyedapo, Biochemistry Department, Obafemi Awolowo University, Ile-Ife.

**Table 1: Percent caffeine and phenol in selected clones of** *Coffea canephora*

| Clones | %Phenol | %Caffeine |
|---|---|---|
| T1049 | 12.5 | 1.3 |
| T4 | 15.5 | 1.4 |
| E77 | 7.2 | 1.2 |
| E92 | - | 1.5 |
| E130 | 2.4 | 1.1 |
| C36 | - | 1.1 |
| C111 | 11.5 | 1.2 |
| G129 | 9.0 | 1.4 |
| C108 | 6.5 | - |
| C96 | 10.2 | - |
| A81 | 3.0 | - |
| E1 | 3.0 | - |
| T24 | 11.4 | - |
| M10 | 15.2 | - |
| T921 | 10.8 | - |
| T204 | 2.5 | - |
| C105 | 10.7 | 1.4 |
| T365 | 12.3 | 1.1 |
| T395 | - | 1.2 |
| M53 | 10.4 | - |
| C107 | 7.5 | - |
| M31 | 12.4 | - |
| M36 | 11.2 | - |
| T314 | - | 1.3 |
| G87 | - | 1.5 |
| T197 | - | 1.4 |

- Not determined

The protein band variation as observed among twenty three clones analysed is presented in Figure 1. Marked differences were recorded for number, combination and intensity of bands among the clones. Most of the bands were found to be fast in movement. (4.0-7.0cm), followed by intermediate bands (2.0-3.9cm) and slow moving bands (0.1-1.9cm) respectively (Table 2). The protein bands at 0.1 to 1.9cm are common to only six clones: T204-, C108, T395, E130, T365 and T4 while the band at 4.0 to 7.0cm are common to all the clones except clones T921 and C107. Some bands at 2.0, 5.0, 5.5 and 6.0 are unique to the clones in which they appeared. The highest number of bands (five) was found in clone T204 while the least number of band (one) occurred in clones A110, E77, T116, T921 and C107.

**Intra-And Interspecific Hybridization (**S. S. Omolaja**)**

The major objectives of this study were to obtain higher yielding hybrids that combine *C. arabica* quality with pest tolerance of *C. canephora*. Successful cross-pollination were obtained in four cross combinations: C36 x T1049, C111 x T93; C96 x T1049 and C90 x T93. The seedlings obtained are being evaluated in the nursery. Successful interspecific hybrid was also obtained in two crosses: arabica x C36 and Arabica x M31. The seedlings are also undergoing evaluation in the nursery.

**Clonal Propagation Of** *Coffea canephora*

In 1996, a procedure was developed in CRIN for mass propagating high yielding *Coffea canephora* clones to farmers by potted stem cuttings. In 1998, the method was improved upon by the production, at commercial level of open-rooted coffee stem cuttings. The problem, however was that when several thousands of cuttings were to be produced, stem cutting materials available on the fields were usually inadequate. Consequently a trial was conducted on raising stem cuttings using single node as against the use of multiple nodes. The results showed 98.0% success in stem cutting sprouting (Table 3).

**Table 2: Relative mobilities of Bands in twenty three** *Coffea canephor**a*** **clones.**

| Clones | Slow bands (0.1-1.9cm) | Intermediate Band (2.0-3.9cm) | Fast Bands (4.0-7.0cm) | Total No. of Bands | Unique Bands cm |
|---|---|---|---|---|---|
| A T204 | 1 | 1 | 3 | 5 | - |
| B C108 | 1 | 1 | 2 | 4 | - |
| C T395 | 1 | 1 | 2 | 4 | - |
| D T24 | - | 1 | 1 | 2 | - |
| E T165 | - | 1 | 3 | 4 | 5.0 |
| F E106 | - | 2 | 2 | 4 | - |
| G E130 | 1 | 1 | 1 | 3 | - |
| H T365 | 1 | 1 | 1 | 3 | - |
| I C105 | - | 1 | 2 | 3 | - |
| J T220 | - | 1 | 2 | 3 | - |
| K A110 | - | - | 1` | 1 | 5.6 |
| L T197 | - | - | 2 | 2 | - |
| M E77 | - | - | 1 | 1 | 5.5 |
| N T1049 | - | 2 | 2 | 3 | 2.0 |
| O A81 | - | 1 | 2 | 3 | - |
| P G129 | - | 1 | 2 | 3 | - |
| Q G87 | - | 1 | - | 3 | 6.0 |
| R T176 | - | - | - | 2 | - |
| S T116 | - | 1 | 2 | 1 | - |
| T T921 | - | 1 | 1 | 1 | - |
| U C107 | - | 1 | | 1 | - |
| V M36 | - | 1 | | 3 | - |
| W T4 | 1 | - | | 2 | - |

- Not determined

**Table 3: Sprouting success of single node stem cuttings of** *Coffea canephora*

| Clones | Number of Stem Cuttings set | Number of successful Sprout after Hardening (3 months) |
|---|---|---|
| C36 | 40 | 39 |
| C90 | 40 | 39 |
| C96 | 40 | 40 |
| T93 | 40 | 40 |
| T921 | 40 | 39 |
| T1049 | 40 | 38 |
| M53 | 40 | 38 |
| M31 | 40 | 38 |

**Evaluation Of Different Growing Media For Raising Coffee Seedlings**
(E. A. Adeyemi)

The performance of coffee seedling on three nursery beds made of top soil, sawdust, top soil/sawdust mixture in equal proportion was studied at the central nursery CRIN, Ibadan with the objective of finding alternative growing medium for top soil in order to reduce sole dependency on it for seedling production and reduce cost.

Top soil treatment gave the highest survival rate of seedlings, mixture of top soil and sole sawdust and sawdust media followed in descending order (Table 1). The mean plant heights (Table 2) were comparable in top soil and mixture treatments but superior to sawdust. The stem girth, number of leaf and leaf area followed the same pattern. Seedling dry matter in 50:50 top soil/sawdust gave the highest value followed by top soil while sawdust gave the least value (Table 3)

The performance recorded therefore suggests that top soil/sawdust medium will be suitable for the raising of coffee seedlings in the nursery.

**Table 1: Effects of growing media on seedling survival (%) at 3 and 6 months after transplanting (MAT) from pre-nursery to the main nursery.**

| Growing media | 3MAT | 6 MAT |
|---|---|---|
| 100% top soil | 85.22 | 74.11 |
| 100% sawdust | 63.00 | 63.00 |
| Mixture | 77.78 | 70.33 |

**Table 2: Effect of growing media on plant height (cm) at 3 and 6 MAT from the pre-nursery to the main nursery:**

| Growing media | 3MAT | 6 MAT |
|---|---|---|
| 100% top soil | 10.98 | 23.02 |
| 100% sawdust | 7.19 | 16.02 |
| Mixture | 9.54 | 20.40 |
| LSD | NS | 3.15 |

**Table 3: Effect of growing media and dry matter (g) at 6 MAT from the pre-nursery to the main nursery.**

| Growing media | 6 MAT |
|---|---|
| 100% top soil | 5.01 |
| 100% sawdust | 3.46 |
| Mixture | 5.74 |

**Effect of organic fertilizers combined with phosphorus on the growth of coffee seedlings**
(O. S. Ibiremo and C. R. Obatolu)

Coffee (*Coffea canephora* Pierre. Ex Froehner) responds well to application of both organic and inorganic fertilizers. The integrated use of organic and inorganic fertilizers is desireable to sustain coffee yield and maintain soil fertility. Therefore, the objective of this study was to evaluate the effect of organic fertilizers fortified with phosphorus from different sources on the growth of coffee seedlings. In this trial,, a green house experiment involving the use of two types of organic manures viz: cowdung (animal origin) and cocoa pod husk (plant origin) was conducted. The manures were applied at rate equivalent to O and 10 tons/ha and each of these was factorially combined with three sources of phosphorus applied at 0, 30 and 60kg $P_2$0 5/ha.The initial physico-chemical properties of the soil used are presented below in Table 1.

**Table 1 Initial physical and chemical characteristics of the soil used for the study**

| Soil depth (0-15cm) | Unit | Value |
|---|---|---|
| Sand | g/kg soil | 694.00 |
| Silt | " | 149.60 |
| Clay | " | 156.40 |
| Textural class | | |
| PH (H20) | | 6.65 |
| Organic carbon | " | 9.10 |
| Total Nitrogen | " | 8.16 |
| Available P | mg/kg soil | 8.76 |
| Exch. Cations | | |
| K | C mol/kg soil | 0.40 |
| Ca | " | 2.96 |
| Mg | " | 1.28 |

The results indicated that single super phosphate (SSP) when applied singly or in combination with organic manures significantly increased plant height and leaf area than when sokoto rock phosphate (SRP) was applied to coffee seedlings in all situations.
The experiment is on-going, while soil and plant analyses will be carried out in order to determine the plant nutrient uptake.

**Germination studies and seedlings performance of** Coffea canephora **(Pierre Ex. Froehner) seeds pre-treated through acid scarification. (**A.A. Oloyede and A.O. Famaye)

Investigation was carried out at CRIN Headquarters, Idi-Ayunre, Ibadan in year 2000 to explore the possibility of obtaining early germination in *Coffea canephora* seeds pre-treated with sulphuric acid at different concentrations of 40%, 60%, and 80%. There was also a treatment of complete removal of parchment and the control of no treatment with acid nor parchment removal.

Germination result is as shown in Figure 1. The result shows that no parchment treatment gave better performance of 60% germination from the sixth week than other treatments. By the tenth week it attained a percentage germination of 80%.

Morphological parameters like height, girth, number of leaves, leaf area and plant biomass consistently showed that no parchment and 60% acid treatments were better than other treatments (Tables 1, 2, 3 and 4).

**Table 1: Mean plant height (cm) months after sowing (MAS)**

| Treatments | 2 | 4 | 6 |
|---|---|---|---|
| Control | 0.0 | 7.5 | 13.0 |
| 40% acid conc | 3.5 | 9.6 | 15.2 |
| 60% " " | 4.7 | 11.5 | 19.0 |
| 80% " " | 4.4 | 10.3 | 15.0 |
| No parchment | 5.0 | 10.0 | 15.0 |
| LSD (0.05) | 0.69 | NS | NS |

**Table 2: Mean number of leaves, months after sowing (MAS)**

| Treatments | 2 | 4 | 6 |
|---|---|---|---|
| Control | 0 | 6.0 | 9.5 |
| 40% acid conc | 1.0 | 5.3 | 8.7 |
| 60% " " | 1.5 | 6.2 | 11.4 |
| 80% " " | 1.3 | 5.5 | 11.4 |
| No parchment | 1.5 | 7.0 | 12.0 |
| LSD (0.05) | 0.86 | NS | 2.04 |

**Table 3: Mean leaf area ($cm^2$) months after sowing. (MAS)**

| Treatments | 2 | 4 | 6 |
|---|---|---|---|
| Control | 0 | 30.3 | 106.02 |
| 40% acid conc | 6.74 | 38.1 | 178.26 |
| 60% " " | 11.86 | 54.54 | 287.52 |
| 80% " " | 9.71 | 46.62 | 188.34 |
| No parchment | 20.00 | 58.58 | 252.30 |
| LSD (0.05) | 10.31 | NS | NS |

**Table 4: Mean plant biomass 6 months after sowing. (MAS)**

| Treatments | Shoot (g) | Root (g) |
|---|---|---|
| Control | 2.5 | 0.55 |
| 40% acid conc | 4.7 | 1.00 |
| 60% " " | 6.3 | 1.70 |
| 80% " " | 5.0 | 1.85 |
| No parchment | 8.2 | 2.25 |
| LSD (0.05) | 2.52 | NS |

**Preliminary Evaluation Of Some Plant Extracts For The Control Of Termites In Coffee Plantations**
**(**E.U. Asogwa and F. A. Okelana**)**

The hazardous nature of synthetic termiticides has necessitated the development of non-toxic, safe and biodegradable alternatives. This therefore informed the basis for this research. Ten plant samples with pesticidal attributes were identified and collected for evaluation as natural termiticides. The plant samples are as follows: *Azadirachta indica* (leaf); *A. indica* (bark); *Ricinus communis* (leaf); *Cedrela odorata* (bark); *Khaya ivorensis* (bark); *Khaya senegalensis* (bark); *Chrysophylum albidum* (bark); *Ocimum basilicum* (leaves); *Parkia clappertoniana* (bark) and Zoro plant (leaves).

The plant materials (leaves and barks) were collected from the Forestry Research Institute of Nigeria, Ibadan. These samples were oven-dried at the Entomology Laboratory, after which they were pulverised into fine powders with a high-speed mill.

120g of each of the solid powder from the pulverised samples was extracted with a Soxhlet apparatus using absolute ethanol as solvent for eight hours. The resulting ethanol-plant extracts were concentrated by double distillation before storing them in specimen bottles placed in a refrigerator for subsequent use.

The extractions are yet to be completed for the actual bioassay tests and field trials.

**Screening Of New Insecticides For The Control Of Termites On Coffee (**E.U. Asogwa and F. A. Okelana)

Termites, *Nasutitermes sp*. and *Microtermes sp*. attack on coffee is common in Nigerian plantations. This has led to the abandonment of coffee plantations by some local farmers. The effectiveness of using the organochloride insecticides (Aldrin, DDT, Aldrex T, Gamalin 20 EC) as a seed treatment, on seedlings, mature plants and for tree protection is widely known. However, following the ban on the use of the organochlorines, there is the need to screen new classes of insecticides for the control of termites. Alternative termiticides- Chlorpyrifos (Pyrinex 48 EC) and Hexachlorocyclohexane (Endofalm 500 E.C.) were therefore selected for screening in termite control activities during part (Nov – Dec 2000) of the termite season (November 2000– March 2001).

The bioassay tests of the chemicals were carried out at the Entomology laboratory under ambient room temperature of 26 – 32$^{o}$C and R.H of between 80 –88%. The topical/residual contact and fumigant tests were carried out on ten termites (Soldiers) in each of the petri-dishes using aqueous solutions of the insecticides at the manufacturers' recommended dosage of 12.5ml/L for Endofalm and 40ml/L for Pyrinex For topical application, the treatments were applied topically to the termites in the respective petri-dishes. by pipetting, with a micro syringe, 5 micro litres of the insecticides per insect. On the other hand, 100 micro litre of the pesticides was used to drench the filter papers in the various petridishes for the residual contact action test. The same dosage was used for the fumigant action test. Distilled water served as control. Each treatment was replicated four times and mortality counts were taken 2 hours, 4 hours and 6 hours after application.

Preliminary results (Table 1) showed that 90-100% mortality was recorded between 4-6 hours after topical application and residual contact action tests. However, the chemicals did not have fumigant action against the termites when exposed to different concentrations of their fumes. The work is still in progress. A detailed data analysis will be carried out on the laboratory bioassay while the field trials will commence in January 2001.

**Table 1: Effect of form of application of two insecticides on mortality of termites in the laboratory.**

| | Topical Application Test. | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | R1 | | | R2 | | | R3 | | | R4 | | | |
| A | 2hrs | 4hrs | 6hrs | 2hrs | 4hrs | 6hrs | 2hrs | 4hrs | 6hrs | 2hrs | 4hrs | 6hrs | |
| Endofalm | 8 | 2 | 0 | 8 | 2 | 0 | 9 | 0 | 1 | 7 | 3 | 0 | 40 |
| Pyrinex | 8 | 2 | 0 | 9 | 1 | 0 | 8 | 2 | 0 | 8 | 2 | 0 | 40 |
| Control | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |

RESIDUAL CONTACT TEST

| B | R1 | | | R2 | | | R3 | | | R4 | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | 2hrs | 4hrs | 6hrs | 2hrs | 4hrs | 6hrs | 2hrs | 4hrs | 6hrs | 2hrs | 4hrs | 6hrs | |
| Endofalm | 0 | 9 | 1 | 0 | 8 | 2 | 0 | 9 | 1 | 0 | 9 | 1 | 40 |
| Pyrinex | 0 | 9 | 1 | 0 | 10 | 0 | 0 | 9 | 1 | 0 | 10 | 0 | 40 |
| Control | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 9 | 0 | 0 | 0 | 0 | 0 |

FUMIGANT ACTION TEST.

| C | R1 | | | R2 | | | R3 | | | R4 | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | 2hrs | 4hrs | 6hrs | 2hrs | 4hrs | 6hrs | 2hrs | 4hrs | 6hrs | 2hrs | 4hrs | 6hrs | |
| Endofalm | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 1 | 2 |
| Pyrinex | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Control | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |

**Effect of Shade regimes on Yield of Coffee** (A.O. Famaye and C. R. Obatolu)

This experiment was set up at CRIN Headquarters Idi-Ayunre and CRIN substations located at Uhonmora and Kusuku, Mambilla in 1995. Healthy and mature coffee trees were coppiced at 30cm above ground level. After rejuvenation, four vigorous shoots were left for each stand while others were removed. Four shade periods namely, O (permanent shade), 3,6 and 12 months were imposed at three intensities of shade 0,50 and 100 percents. Bamboo poles were used to construct the 2m. high shed. Fresh palm fronds were used to cover the top and sides of the sheds at Idi-Ayunre and Uhonmora to provide the required shade levels which were attained through the use of light meter. It was found that 18 and 36 large palm fronds both at top and sides reduce the light intensity in the open by 50% and 100% respectively. Elephant grass was used at Kusuku for the same purpose.

The experimental design used was randomised complete block in a factorial layout. There were twelve treatments replicated four times.

From the record of coffee berry yield obtained for three years Table 1 showed that 50 percent permanent shade regime gave significantly (P=0.05) higher berry yield than zero and 100 percent shades. It is therefore suggested that 50% shade that resulted in optimum yield be packaged to the coffee growers (farmers).

**Table 1: Average berry yield of coppiced coffee in kg/ha for three years after imposition of shade**

| Level of Shade | Time of removed | Idi-Ayunre (kg/ha) | | | Locations Uhonmora (Kg/ha) | | | Kusuku (Kg/ha) | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | 1996 | 1997 | 1998 | 1996 | 1997 | 1998 | 1996 | 1997 | 1998 |
| 0 | 0 | 66.0 | 264.2 | 314.0 | 65.0 | 201.5 | 310.3 | 46.5 | 194.0 | 235.5 |
| | 3 | 68.0 | 270.6 | 310.0 | 64.1 | 266.7 | 300.2 | 45.4 | 193.5 | 224.4 |
| | 6 | 60.0 | 265.6 | 312.4 | 66.0 | 263.2 | 305.0 | 43.3 | 189.4 | 213.9 |
| | 12 | 66.0 | 267.0 | 316.4 | 66.2 | 260.4 | 303.7 | 41.5 | 189.4 | 213.9 |
| | Mean | 65.0 | 266.9 | 313.2 | 65.3 | 263.0 | 304.8 | 44.2 | 191.8 | 218.6 |
| | LSD (P-0.05) | 2.39 | 3.79 | 3.71 | 1.34 | 3.79 | 5.77 | 3.06 | 3.16 | 6.55 |
| 50 | 0 | 70.0 | 274.2 | 319.5 | 65.5 | 269.2 | 300.1 | 47.0 | 200.4 | 220.1 |
| | 3 | 65.0 | 260.7 | 309.6 | 66.0 | 265.3 | 315.7 | 46.4 | 198.7 | 227.3 |
| | 6 | 66.3 | 268.3 | 313.8 | 64.0 | 260.0 | 310.4 | 43.0 | 194.3 | 220.0 |
| | 12 | 68.5 | 270.8 | 312.9 | 67.6 | 267.5 | 308.7 | 42.3 | 190.0 | 214.5 |
| | Mean | 67.5 | 268.5 | 314.0 | 66.5 | 265.5 | 308.7 | 44.7 | 195.9 | 224.2 |
| | LSD (P-0.05) | 3.07 | 7.90 | 5.67 | 2.74 | 5.51 | 8.92 | 3.26 | 6.94 | 12.33 |
| 100 | 0 | 10.5 | 140.6 | 120.3 | 9.5 | 134.5 | 114.5 | 8.3 | 110.2 | 100.4 |
| | 3 | 56.0 | 258.7 | 300.0 | 60.0 | 254.7 | 293.7 | 34.0 | 150.7 | 185.2 |
| | 6 | 53.5 | 250.8 | 295.6 | 56.5 | 253.2 | 298.9 | 33.4 | 140.5 | 180.5 |
| | 12 | 50.5 | 253.4 | 254.4 | 44.11 | 223.2 | 251.0 | 26.8 | 136.9 | 158.9 |
| | Mean | 42.5 | 225.9 | 123.16 | 32.25 | 81.51 | 125.4 | 17.03 | 25.10 | 54.47 |
| | LSD (P-0.05) | 14.40 | 78.46 | 48.47 | 14.35 | 32.55 | 48.43 | 9.64 | 26.23 | 33.03 |

**CASHEW PROGRAMME** (Leader: E. Akin Ayodele)

**Acquisition Of Additional Cashew Germplasm Identified With Desirable Characteristics. (**E. A. Ayodele)

A programme for the acquisition of Brazilian nuts with desirable characteristics such as large apple, large nut size, fruitfulness all year round, sweetness of apple juice, low astringency of juice, precocity and high yield was initiated in 1999 as a joint task by the Plant Breeding and the Soils and Plant Nutrition Groups. The nuts which were classified into four categories on weight basis of (i) Jumbo (> 16gm/nut) (ii) large (12 - < 16gm/nut), (iii) medium (8 - < 12gm/nut) and (iv) small (< 8gm/nut); were sourced from Kosoni –Ola Farms, Oro. Selections were established as germplasm orchards at the Headquarters and four of the Institute's Substations. The programme is to allow for future further studies on, and selections from these materials, which hitherto have not been among the Institute's acquisition, albeit are on demand by farmers and in the world market. The establishment started in 1999 and continued in 2000 with a total of 24 hectares established so far (Table 1).

Records of germination in the nursery as well as growth in the field were taken for the two years. The seedlings were transplanted to the field six weeks after sowing. Table 2 shows percent germination on nut size/weight basis over the six months period. The germination pattern has not shown any consistent trend with regards to per cent total germination after six weeks with deviation from mean of between 4 and 11% across the classes of nuts. Factors responsible for the observed trend have not been immediately ascertained. Length of nut storage prior to germination is however a possible suspect. This could not be confirmed as the nuts were supplied at source, from the store though they were said to be amongst the season's harvest. Further germination and studies are expected to give definitive trend on this for reproducible result and hence conclusive statement on percentage germination based on nut sizes in the Brazilian nuts. This observation confirms that one season's germination data are inadequate for a definitive statement on germination studies.

**Performance of Seedlings in the Field:** Observations and data collected in the field have shown impressive vigour of growth and precocity. As at December 2000, some of the seedlings transplanted into the field in June 1999 had reached heights of up to 3.5m while some stands have even started flowering. This observation is at variance with what obtains with the local varieties that would take 3-4 years to flower or to reach a height of 3.5m. Further observation, data collection and analysis shall provide definitive statement on the establishment in the next reporting period.

**Table 1: Brazilian Cashew of Oro-Sub Origin (Oro Selections) germplasm orchards at CRIN Headquarters and Substations.**

| Location | Hectarage | Year Planted | Remarks |
|---|---|---|---|
| Headquarters | 5.0 HA | 2000 | First planted in 1999, destroyed by fire and replanted in July, 2000 |
| Ochaja | 11.0HA | 1999-2000 | 7.0ha planted in 1999 and 4.0ha in 2000. 100% established. |
| Uhonmora | 4.0HA | 1999-2000 | 50% loss recorded in 1999. Hence gapped up in 2000 |
| Owena | 3.0HA | 2000 | Under observation |
| Mambilla | 1.0HA | 2000 | Under observation |
| TOTAL | 24.0ha | 1999-2000 | |

**Table 2: Germination (%) of Brazilian nuts (Oro Selection ) through Six weeks nursery period: Observation records for 1999 and 2000**

| Period After Sowing | 3 weeks | | 4 weeks | | 5 weeks | | 6 weeks | | |
|---|---|---|---|---|---|---|---|---|---|
| Class of Nut | 1999 | 2000 | 1999 | 2000 | 1999 | 2000 | 1999 | 2000 | Nursery |
| Small ( 8gm/nut) | 75 | 40 | 74 | 58 | 78 | 64 | 79 | 67 | 8 |
| Medium (8-12gm/nut) | 79 | 48 | 80 | 64 | 82 | 67 | 83 | 67 | 10 |
| Large (12-16gm/nut) | 58 | 15 | 65 | 49 | 73 | 58 | 74 | 60 | 10 |
| Jumbo ( 16g/nut) | 33 | 22 | 43 | 52 | 54 | 59 | 55 | 60 | 4 |

**Pollen longevity and *in vitro* germination studies in cashew (*Anacardium occidentale L.*) (**O. M. Aliyu**)**

This work was to determine the longevity of cashew pollen and to develop a suitable artifical medium for cashew pollen germination *in vitro*, in order to enhance hybridization among parental lines in distanct locations, to facilitate further studies on pollen storage, incompatibility and pollen physiological problem in the crop species.

*In vitro* germination and longevity of pollen of cashew *A. occidentale* were investigated. Cashew pollens from 5 selected trees were germinated *in-vitro* using 0%, 2.5%, 5.0%, 7.5%, 10.0%, 12.5%, 15.0%, 17.5% and 20.0% sucrose solutions. The culture was carried out on microscope slide placed on two layers of filter paper saturated with water in the petri-dish. Germination was recorded every four hours (Adebola, 1998). Basal medium from (i) above was added to each of the following stock solutions 0.0ppm, 50ppm, 100ppm, and 150ppm of H2 BO3, $H_2B0_3$, $KNO_3$ and. $CaCl_2.2H_20$ in different combinations. *In-vitro* germination of cashew pollens were carried out in each of the medium. Five inflorescences were collected from the selected trees and their bases were immediately dipped in water to enhance longevity of pollen. Both *in-vitro* germination and pollen stainability tests were carried out on pollens from these inflorescences for a period of 7 days.

Of the nine sucrose concentrations used, only 5.0% supported appreciable germination. Concentration above 15.0% were found deleterious to cashew pollen germination. Of the three inorganic mineral salts tested, $KNO_3$ and $H_2BO_3$ were more critical in pollen germination medium than $CaC1_2.2H_2O$. Highest germination percentage was obtained by addition of 50ppm of $KNO_3$, 50ppm of $H_3BO_3$ and 100ppm of $CaC1_2$. $2H_2O$. Pollens from inflorescence having its stalks dipped in water at room temperature retained about 50% viability 96 hours after harvesting, while only 1.61% of the pollens remained viable 168 hours after harvesting, with the same treatment.

Pollens placed in covered petri dish (control) at room temperature lost viability 24 hours after harvesting of the inflorescence. *In vitro* germination and viability of cashew pollens are positively correlated (r = 0.986).

**Acquisition of additional cashew germplasm identified with desirable characteristics through the method of marcotting. (**E.B. Esan, P.O. Adebola, O. M. Aliyu and E.A. Ayodele**)**

The objective of the study was to acquire additional cashew germplasm materials with proven and desirable qualities through marcotting technique. Acquisition mission for cashew genotype with proven desirable qualities were undertaken to Kosoni –Ola farm, Nigeria Limited, Oro Kwara State, where 24 cashew trees with the following attributes were selected and marcotted.

- Highly determined and early bearing genotypes
- Erect biotypes with upright and compact canopy that are high yielding, which are good for high density planting.

- genotypes with extra-large apple (>210g)
- large nut and large apple genotype
- small nut and large apple genotype
- large nut and small apple genotype and

some wild relatives of the crop with non-juicy and less-edible fruit (apple).

Eighty two (82) marcots were set on the selected trees, 50 successful marcots were later harvested and transferred to the nursery at CRIN Headquarters for proper establishment in polythene pots before transplanting to the field.

Both morphological and electrophoretic characterisation of the selected genotypes are presently under study.

**Development of Effective Vegetative Propagation Technique (budding) in Cashew**
(O. M. Aliyu)

To develop and perfect an effective vegetative propagation method (budding) in cashew towards easy acquisition of germplasm and large scale (mass) production (clonally) of planting materials from improved genotypes for cashew farmers in Nigeria.
In this investigation rootstocks of 2, 3, 4, and 5 months old were used. Budwoods from young twigs of about 1.5c.m thickness were collected and sterilized in absolute ethanol for 5 minutes before budding. Patch budding technique was used in this study. Budded seedlings were opened 14 days after budding and number of bud-take was recorded.

**Result recorded so far is shown in the Table below**

| Age of rootstocks (months) | Number budded | Number of take | No. sprouted |
|---|---|---|---|
| 2 | 50 | 22 (44%) | 6 (12%) |
| 3 | 50 | 18 (32%) | 6 (12%) |
| 4 | 50 | 19 (38%) | 7 (14%) |
| 5 | 50 | 8 (16%) | 2 (4%) |
| 6 | 50 | 5 (10%) | 0 (0.%) |

12% - 14% of the materials in 2-4 months old category sprouted while the sprouting sucess dropped to 0% in the 6 months old rootstocks. It will be difficult to conclude that 5 to 6 months old rootstocks are too old for budding. However, the high percentage of loss might be attributed to the shock the plants experienced as a result of transfer of the rootstocks to the budding section. Similarly, the low sprouting in 2-4 months rootstocks might be attributed to dormancy nature of cashew during rainy season when the budding took place. Wounding of budsticks showed no significant results when tested with 5-6 months old rootstocks. These observations are promising. Sterilization, defoliation and wounding of budsticks as pre-treatments before budding are to be incorporated into the next phase of the work.

**Improvment on Vegetative Propagation of Cashew** *(Anacardium occidentale, L.)*
(L. A. Hammed)

**Marcotting:**

The highly economic nuts of cashew serve as the popular propagules. This cuts short the turn-out of the nuts by the amount set aside annually for propagation. Cashew seedlings flower and fruit between the second and third year of propagation as against the cashew ramets that flower and fruit in less than one year. The experiments were therefore designed to produce marcots on a large scale for field establishment and distribution to cashew growers. The first stage of the work has been completed at Zone 1 cocoa/kola/cashew intercrop plot at the CRIN Headquarters. This involved the development of a more convenient method of producing cashew marcots. Ten serial solutions (10ppm to 100ppm at 10ppm intervals) of root growth biostimulant were tried with the top soil only as the growth medium. The marcots, set during the rainy season,

were harvested 61st day after setting and potted in the nursery for sprouting rate/observation. The results are as presented in Table 1.

The reduced sprouting rates for 80ppm, 90ppm and 100ppm might not be unconnected with the development of higher root biomass that might have subjected the marcot-sets to moisture stress prior to harvesting. This is indicative of possible early harvest of the marcot-set as the concentration of root growth hormones increases especially above 70ppm.

**Table 1: Effect of hormone concentrations on root biomass and sprouting percentage (in the nursery) of cashew marcots.**

| Concentration (ppm) | Root biomass 60 DAS (g) | Sprouting percentage In the nursery 11 DAP |
|---|---|---|
| 10 | 1.6 | 0 |
| 20 | 0 | 0 |
| 30 | 3.0 | 25 |
| 40 | 4.8 | 25 |
| 50 | 5.8 | 75 |
| 60 | 6.0 | 75 |
| 70 | 6.0 | 75 |
| 80 | 6.6 | 50 |
| 90 | 6.8 | 50 |
| 100 | 7.1 | 25 |

Note: DAS = Days after setting
DAP = Days after planting.

**Incidence of fungal attack on the seedlings of Cashew (*Anacardium occidentale L.)***
(Otuonye A. H. and Adejumo T.O.)

Previous reports indicated that seedling losses of 60-65% and 15-20% were obtained from cashew seedlings (due to damping-off disease caused by *Sclerotium rolfsii* and *Pythium ultimum*, respectively.
Assessment of fungal attack on cashew seedlings was carried out at the CRIN nursery. It was observed that 83% of the seedlings had leaf blight symptoms appearing as yellow, brown minute spots and scorched, grey leaves which eventually abscissed. Four fungi were isolated from the infected leaves. They are *Botryodiplodia theobromae, Fusarium sp., Helminthosporium sp*. and *Aspergillus sp*. Neither *Sclerotium sp*. nor *Pythium sp*., which are known to cause serious damping-off disease, was isolated from the leaves of the infected seedlings.

**Investigations on Nut and Apple Development in Cashew (*Anacardium occidentale L*.)**
(O. M. Aliyu and L. A. Hammed)

The study was to investigate and understand the growth and development of cashew (nut and apple) in order to formulate effective improvement strategies in the management and handling of the produce.

The experiment was conducted at the Cocoa Research Institute of Nigeria Headquarters S.S. Quarters cashew plantation. Growth and development of cashew nut and apple 3-9 weeks after pollination (WAP) were studied. On each of the ten selected cashew genotypes, twenty developing fruits at the very week of pollination were randomly selected. Quantitative data were collected on the following variables; nut length (cm), widths of the lower and upper ends of the nuts (cm), apple length (cm), circumferences of the lower and upper ends of the apple (cm) and percent dry matter (DM) content of the apple.

The results obtained (Table 1 and Figures 1 & 2) showed an initial similar growth pattern of the nut and apple 3-5 WAP, and later differential growth patterns 5-7 WAP, and finally 7-9 WAP. The growth and development of the nut is hence sigmoidal comprising four stages (embryo-cotyledonory, nut-filling, physiological maturity and drying) while that of apple is asigmoidal comprising also four stages of development

(receptacular, slow-growth, rapid-growth and ripening). The % DM content of the developing apple increases with weight (g) up to 5 WAP. Thereafter, as the weight of the developing apple increases, the % DM declines. Thus, the two variables are negatively correlated (r = - 0.92).

**Table 1: Variability (% C.V) in weekly growth and development of cashew nuts and apple among the selected cashew materials.**

| Week After Pollination (WAP) | Length | Nut | | | Apple | | | |
|---|---|---|---|---|---|---|---|---|
| | | WLE | WUE | Colour | Length | CLE | CUE | Colour |
| 3 | 13.17 | 8.97 | 10.46 | G/P | 9.99 | 11.25 | 13.73 | G |
| 4 | 9.39 | 9.10 | 9.17 | G/P | 15.89 | 7.35 | 10.07 | G |
| 5 | 5.32 | 6.52 | 6.59 | G/P | 15.45 | 7.80 | 10.06 | G |
| 6 | 5.17 | 6.19 | 5.46 | G | 12.55 | 7.46 | 6.52 | G |
| 7 | 6.50 | 7.68 | 6.30 | G:g 7:3 | 155.30 | 8.70 | 12.28 | G |
| 8 | 7.00 | 8.30 | 8.38 | G:g 3:7 | 21.15 | 27.48 | 26.98 | G:y 1:1 |
| 9 | 9.63 | 9.32 | 9.24 | g | 11.69 | 10.73 | 10.31 | Y |

**NOTE**:
WLE = Width of lower end
WUE = Width of upper end
CLE = Circumference of lower end
CUE = Circumference of upper end
G = Green
G/P = Green with pink patches
g = Grey
y = Yellow or red (degraded green pigment).

Fig. 1: Comparison of growth and development of cashew nut and apple.

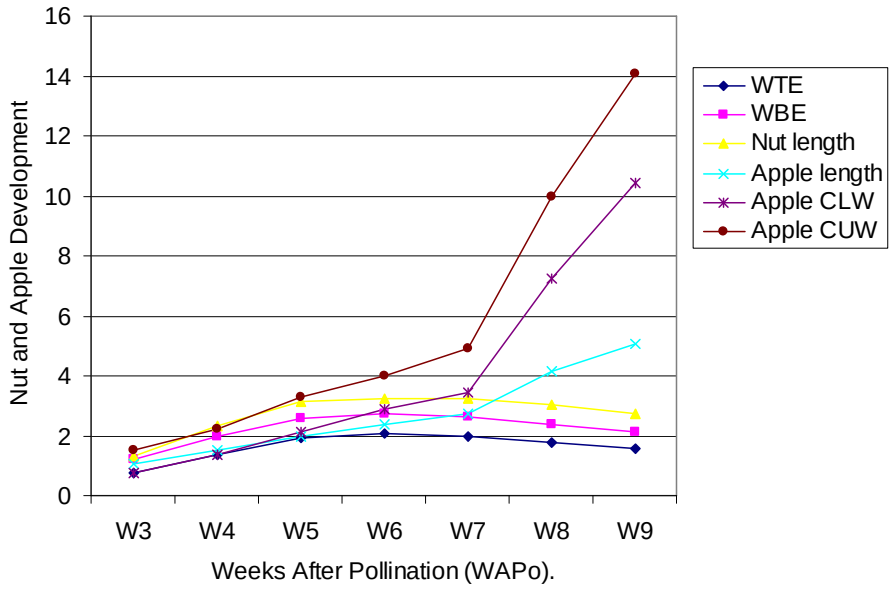
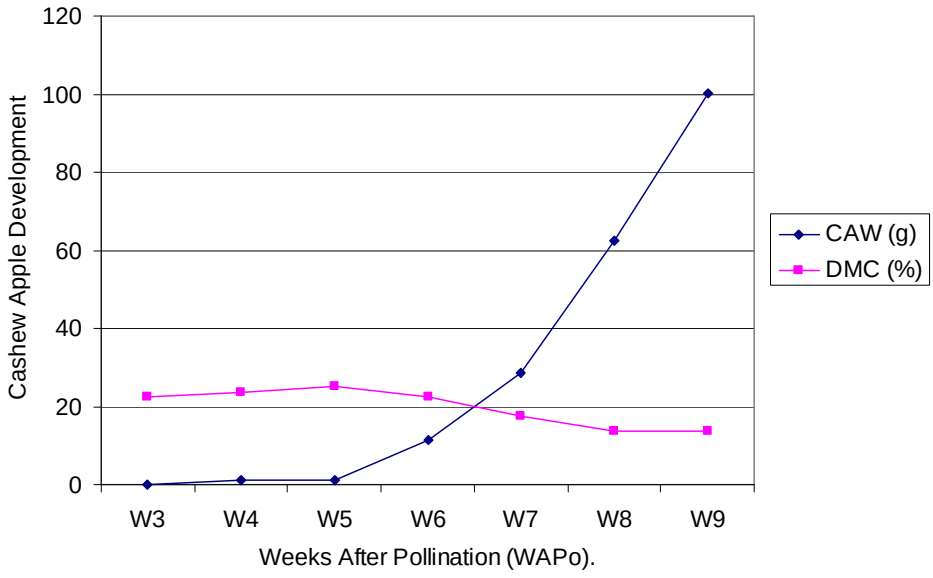



Fig. 2: Weight (g) (CAW) Vs Dry Matter Content (%) (DMC) of Cashew Apple.



**Viability Studies of Cashew nuts as Affected by Period of Harvesting (**L.A. Hammed and O.M. Aliyu**)**

Early harvesting of cashew nuts have been shown to improve ripening of the apple without any adverse effect on the quality of the apple but protection of the biological integrity of the nuts was neglected. This work was designed to investigate the effects of different periods of harvesting of the nut on the viability of the nuts. The first phase of the project was completed. The second phase is in progress.

**Effect of Polythene Bag size and Nursery Periods on the Performance of Cashew**
(A.A. Adeyemi)

Investigations to find out whether reduction in the size of polybags presently being used for the raising of cashew seedlings in the nursery and the age at which they are transplanted from the nursery (nursery period) to the field will or will not affect the performance of cashew in the field continued for the second year at CRIN Headquarters, Idi-Ayunre, Ibadan in the year 2000.

Cashew seedlings were raised in three different polybag sizes of 12.5cm x 30cm, 6.25cm x 30.0cm and 12.5cm x 15.00cm. The seedlings were transplanted to the field at five different ages (nursery periods) of 4,6,8,12 and 16 weeks after sowing (WAS) to make a total number of 15 treatments. The experiment was maintained in the year under review by regularly weeding the experimental area. Data on the growth parameters such as height, stem diameter, number of leaves, leaf length and leaf breath were periodically collected in the year.

Pot size had no significant effect on the performance of cashew except on number of leaves which was significantly higher in cashew seedlings raised in the polybag size of 6.25cm x 30.0cm than those raised in the larger polybag size of 12.5cm x 30cm indicating that reduction in the pot size has no adverse effect on the growth performance of cashew seedlings (Tables 1, 2 and 3). However, seedlings transplanted to the field at younger ages especially at 4 and 6 WAS had better height, larger stem diameter and more number of leaves than those transplanted at 12 and 16 WAS to the field. Conclusively, reduction in the size of planting pot and period of time the seedlings stay in the nursery (nursery period or seedling age) do not adversely affect the growth performance of cashew seedling after transplantation to the field, rather height, girth and canopy formation of cashew raised in smaller pots are either better or comparable to those raised in larger pots.

**Table 1: Effect of polybag size and nursery period on the height (cm) of Cashew seedlings after transplanting to the field at Idi-Aynure.**

| Polybag size | Nursery Period | | | | | | |
|---|---|---|---|---|---|---|---|
| | 4 WAS* | 6WAS | 8WAS | 12WAS | 16WAS | Mean | LSD (P=0.05) |
| 12.5x30.0cm | 38.5 | 34.6 | 28.0 | 28.3 | 25.7 | 31.02 | |
| 6.25x30.0cm | 42.0 | 41.6 | 33.0 | 34.0 | 34.0 | 36.92 | |
| 12.5x15.0cm | 35.0 | 33.0 | 38.0 | 29.0 | 27.7 | 32.54 | |
| Mean | 38.5 | 36.4 | 33.0 | 30.0 | 30.4 | 29.1 | |
| LSD (P=0.05) | | | | 5.93 | | | NS |

* WAS - Weeks after sowing

**Table 2: Girth (cm) of cashew seedlings under different polybag sizes and nursery periods after transplanting to the field in Idi-Ayunre in 2000.**

| Polybag size | Nursery Period | | | | | | |
|---|---|---|---|---|---|---|---|
| | 4 WAS* | 6WAS | 8WAS | 12WAS | 16WAS | Mean | LSD (P=0.05) |
| 12.5x30.0cm | 0.55 | 0.60 | 0.57 | 0.50 | 0.5 | 0.54 | |
| 6.25x30.0cm | 0.65 | 0.60 | 0.59 | 0.58 | 0.5 | 0.58 | |
| 12.5x15.0cm | 0.60 | 0.55 | 0.55 | 0.57 | 0.5 | 0.55 | |
| Mean | 0.60 | 0.58 | 0.57 | 0.55 | 0.5 | | |
| LSD (P=0.05) | | | | 0.06 | | | NS |

* WAS - Weeks after sowing

**Table 3: Influence of polybag size and nursery period on the number of leaves of cashew seedlings after transplanting to the field in Idi-Ayunre in 2000.**

| Polybag size | Nursery Period | | | | | | |
|---|---|---|---|---|---|---|---|
| | 4 WAS* | 6WAS | 8WAS | 12WAS | 16WAS | Mean | LSD (P=0.05) |
| 12.5x30.0cm | 11.00 | 11.5 | 10.5 | 10.5 | 10.0 | 10.7 | |
| 6.25x30.0cm | 16.5 | 15.0 | 13.0 | 12.0 | 11.5 | 13.6 | |
| 12.5x15.0cm | 14.7 | 15.0 | 12.0 | 11.5 | 9.2 | 12.48 | |
| Mean | 14.1 | 13.8 | 11.8 | 11.3 | 10.23 | | 2.06 |
| LSD (P=0.05) | | | | 2.99 | | | |

* WAS - Weeks after sowing

**Studies on the bioecology and control of the cashew leaf miner** *Acrocercops synagramma (Meyrick)* **(***Lepidoptera: Lithocolletidae***) (**F. A. Okelana and O. F. Adewola**)**

Occurrence of *A. synagramma* was monitored weekly on 20 randomly selected cashew trees located around the office complex of CRIN, Headquarters, Ibadan. The number of the miner's active (fresh) mines on the leaves of four branches at hand height per tree was reckoned.

Between July and September, 2000, 50 leaves were randomly collected weekly from the cashew plants and the number of old and freshly mined areas observed and counted. In another study, ten leaves were randomly collected at weekly intervals and the freshly mined portions were opened in order to locate the larvae. The number of larvae per mine and number of larvae per leaf were then recorded.

Twenty-cashew leaf miner were also collected and viewed under a high-powered Zeiss binocular microscope. The length and width of the larvae were measured under a X10 objective fitted with a graticle graduated in mm.

The results showed that the miner occurred in every month of the year except March and April with peak populations in January, November and December (Table 1). Furthermore, tender cashew leaves were observed to be more susceptible to attack by the miner than the old leaves (Table 2).

**Table 1: Abundance of the cashew leaf miner –** *A. synagramma* **on Cashew leaves at CRIN Headquarters.**

| Months | Mean No. of Mines/Week |
|---|---|
| January 2000 | 24 |
| February 2000 | 3 |
| March " | 0 |
| April " | 0 |
| May " | 0.5 |
| June " | 2.8 |
| July " | 13.3 |
| August " | 13.3 |
| September " | 5.5 |
| October " | 7.2 |
| November " | 24.0 |
| December " | 16.3 |

**Table 2: Incidence of the cashew leaf miner on cashew Leaves**

| No. of leaves collected | No. of leaves with mines | No. of leaves without mines | No. of old leaves with mines | No. of tender leaves with mines | No. of unmined old leaves | No. of unmined tender leaves |
|---|---|---|---|---|---|---|
| 50 | 26 | 24 | 11 | 15 | 12 | 12 |
| % age | 52 | 48 | 22 | 30 | 24 | 24 |

Values are means of 3 months

The number of mined areas per leaf ranged from 0-12 mines which covered 0-80% of the leaf surface thereby reducing the photosynthetic portion of the leaf. The number of larvae/mine ranged from 0-4 and 0-13 larvae per leaf. Larvae of *A. synagramma* are cream-coloured (milky white) and about 3.5 –8.0mm long and 0.51-1.0mm, wide.
52% of leaves sampled in July – September had mines. (Table 2).
The studies on the bioecology and control of the insect will continue in 2001.

**Evaluation of various Crop Protection Strategies for the Control of Pests, Diseases and Weeds.**

**Determination of efficacy of some plant extract formulations for the control of inflorescence blight Disease** (T. O. Adejumo***)***

Inflorescence blight disease is a major limiting factor in cashew nut production in Nigeria. It reduces the total cashew yield per hectare. For effective control, it requires 3 to 4 applications of fungicide/insecticide combination which farmers find difficult to afford due to its rising cost and its unavailability . This study was to investigate the suitability of plant extracts to control inflorescence blight disease of cashew.

For preliminary investigation, extracts of *Allium sativum, Chromolaena odorata* and *Piper guineense* at 10% W/V were assessed in the laboratory, while extracts of *Ocimum gratissimum*, combination of the plants in addition to the above were assessed on the field at 5%, 7.5% and 10.0% W/V. Test plot containing 51 mature cashew trees was used for this experiment. Ten inflorescence panicles randomly selected at different stages of development were tagged with labels at the SW3/1 plot at CRIN Headquarters in three replicates. The panicles were sprayed to run – off level with each extract and assessed for disease incidence at 1 – 2 weeks after each spray.

Preliminary laboratory results indicated that extracts from *P. guineense* significantly reduced radial growth of *Lasiodiplodia theobromae*, the causal agent of inflorescence blight and compared favourably with Benlate. Field results also indicated that *P. guineense* (5%), *A sativum* and *C. odorata* at 7.5% and *O. gratissimum* (10%) were highly effective in reducing the symptoms of inflorescence blight which include withering of the petals and dieback of small peduncles compared to treatment with Benlate and untreated control.

**Use of Organic materials as manure for raising Cashew Seedlings in depleted Soils**
(Ibiremo O.S. and Obatolu C.R.)

Seedlings of Cashew (*Anacardium occidentale L.*) were raised for 20 weeks in soil samples taken from two depths (0-20cm top soil and 20 – 40cm Sub-soil-simulated depleted soil (Table 1.) Ten Organic fertilizers were formulated from four organic wastes Viz*: Chromolaena Odorata* (CO) Cocoa pod husk (CPH).*Pennisetum purpureum* (PP) and Cowdung (CD). These were applied to Subsoil samples contained in polythene bags (5kg by weight) and compared with top soil and subsoil without organic fertilizers at rate equivalent to 5 tons/ha.

The results indicated that Cahsew seedlings performed well in all the treatments. There were no significant differences between cashew planted to topsoil unamended with organic manure ans those planted to subsoil with organic manure amendments in terms of leaf area, number of leaves and stem girth Table 2).

The changes observed in total N., Organic Carbon and PH as a result of the organic manure /application to the soils were not significant. They range between slight to moderate changes (Table 3).

In conclusion, Cashew Seeedlings can be successfully raised in depleted soils when amended with organic manures especially Cocoa pod husk and Cowdung instead of purchasing top soils.

**Table 1: Some selected physical and chemical properties of the soils used for the study**

| Soil Depths | Sand G/kgsoil | Silt G/kgsoil | Clay G/kgsoil | PH | Organic Mg/kg | Total/N Mg/kg | Avoid.P Mg/kg | Exch.Cations Cmcl Ca | Kg Mg | Soil K |
|---|---|---|---|---|---|---|---|---|---|---|
| 0-20cm (Topsoil) | 694.00 | 149.60 | 156.40 | 6.7 | 10.70 | 1.9 | 13 | 2.14 | 0.48 | 0.30 |
| 20-40cm Subsoil (Depleted) | 456.10 | 281.80 | 262.10 | 6.2 | 6.10 | 0.9 | 6.5 | 2.08 | 0.30 | 0.28 |

**Table 2: Growth Performance of Cashew Seedlings in Depleted Soils Ammended with organic Manure**

| **Treatment** | **Growth Parameters** | | |
|---|---|---|---|
| | **Leaf Area (cm2)** | **Stem girth(cm)** | **Number of leaves** |
| Cowdung (CD) | 22.36 | 2.20 | 3 |
| *Chromolaena Odorata* | 22.82 | 1.97 | 10 |
| Cocoa Pod husk (CPH) | 44.69 | 2.07 | 10 |
| *Pennisetum Purpureum* (PP) | 14.65 | 2.04 | 5 |
| CD + CPH | 30.57 | 2.07 | 9 |
| CD + PP | 22.22 | 1.72 | 5 |
| CD + 00 | 26.46 | 2.51 | 9 |
| CO + CPH | 26.71 | 2.04 | 3 |
| CO + PP | 56.31 | 2.19 | 9 |
| CPH +PP | 63.69 | 2.19 | 6 |
| Top Soil (0-20cm) only | 28.79 | 2.19 | 6 |
| Sub-soil (20-40cm) only | 22.02 | 2.07 | 9 |
| Mean | 31.78 | 2.11 | 8 |
| S.E | 1.38 | 0.05 | 2.8 |
| | NS | NS | NS |

NS – not significant.

**Table 3: Effect of organic manures on some soil chemical properties**

| | pH | | | % Organic | | | % N | | |
|---|---|---|---|---|---|---|---|---|---|
| Treatment | Initial | After | Remarks | Initial | After | Remarks | Initial | After | Remarks |
| Cowdung (CD) | 6.7 | 6.62 | Sc | 1.07 | 1.1 | Sc | 0.19 | 0.25 | Sc |
| *Chromolaena odorata* (CO) | 6.7 | 6.67 | Sc | 1.07 | 1.1 | Sc | 0.19 | 0.22 | Sc |
| Cocoa Pod husk (CPH) | 6.7 | 6.66 | Sc | 1.07 | 1.11 | Sc | 0.19 | 0.21 | Sc |
| *Pennisetum Purpureum* (PP) | 6.7 | 6.62 | Sc | 1.07 | 1.12 | Sc | 0.19 | 0.13 | Sc |
| CD + CPH | 6.7 | 6.67 | Sc | 1.07 | 1.09 | Sc | 0.19 | 0.23 | Sc |
| CD + PP | 6.7 | 6.71 | Sc | 1.07 | 1.08 | Sc | 0.19 | 0.26 | Sc |
| CD + CO | 6.7 | 6.72 | Sc | 1.07 | 1.19 | Sc | 0.19 | 0.28 | Sc |
| CO + CPH | 6.7 | 6.68 | Sc | 1.07 | 1.1 | Sc | 0.19 | 0.2 | Sc |
| CO + PP | 6.7 | 6.8 | Sc | 1.07 | 1.11 | Sc | 0.19 | 0.16 | Sc |
| CPH + PP | 6.7 | 6.82 | Sc | 1.07 | 1.1 | Sc | 0.19 | 0.11 | Sc |
| Topsoil only | 6.7 | 6.69 | Sc | 1.07 | 1.11 | Sc | 0.09 | 0.21 | Sc |
| Subsoil only | 6.6 | 6.65 | Sc | 0.61 | 1.02 | Mc | 0.09 | 0.1 | Sc |
| Mean | 6.69 | 6.71 | Sc | 1.03 | 1.16 | Sc | 0.18 | 0.2 | Sc |

Sc. – Slight change, Mc – Moderate change

**Effect of phosphorus sources, mycorrhizal Innoculation and Organic Manures on the Growth of Cashew Seedlings. (**O.S. Ibiremo and E. A. Ayodele)

Cashew responds well to judicious fertilizer application in Nigeria. Cashew has been reported to respond to phosphorus application. However, the use of rockphosphate as alternative source of P., cocoa pod husk (CPH) a major waste in cocoa farms and mycorrhizal inoculation for cashew nutrition have not been studied in Nigeria. The objective of this study was to evaluate the potential of cocoa pod husk (CPH), as manure combined with phosphorus from two sources (single super phosphate and Sokoto rockphosphate) on cashew nutrition adequately innoculated with mycorrhiza

In this task, both field and greenhouse studies were involved.

(1) Greenhouse study: Twelve (12) treatment combinations were formed from two levels of CPH three sources of phosphorus and two levels of mycorrhizal innoculation.
(2) Field study: It was a split – split – plot design with mycorrhizal innoculation as mainplot factor, organic manures at 3 levels as subplot factor and P – sources as sub-subplot factors.

The results in both experiments have not shown significant effect of the treatments on plant height, leaf area and stem girth.

The experiments continued into the next season (2001).

**Acquisition of Additional Cashew Genotypes with Desirable Qualities (***P.O. Adebola***)**

During the period, work was carried out mainly in the area of acqusition of additional cashew genotypes with desireable qualities. A previous survey of Kosoni-Ola Farms (Nig) Ltd (1999 Annual Report) showed that it contains several genotypes with specific desirable qualities. Forty-three trees with specific desirable characteristics were consequently selected and a total of 44 marcots were carried out on them. Twenty-three (52%) successfully rooted marcots were harvested during the period of report out of which 13 (29%) were nursed to maturity and have been transplanted to the field at the Headquarters. The field establishment of the materials was also monitored. Forty-eight additional marcots were also made in May 2000 on the selected trees

at Kosoni-Ola Farms. 20 (41%) successfully rooted marcots have also been harvested and are presently being nursed.

**Improvement of already Acquired Cashew Germplasm through Hybridisation**
(P.O. Adebola)

In an attempt to produce hybrids from the lot of selected cashew genotypes in our germplasm plot. Six cashew genotypes among the already acquired accessions at Ochaja sub-station were identified and selected for their specific desirable qualities which include high nut number, ninety-nine out size and (about 2,500/tree/year) small to medium size nuts (2.5-6g), yield stability and sweet apple juice. Other materials identified are the 1997 Oro Selections established also at Ochaja, CRIN Substation. The Oro Selections were specifically noted for their very large nuts (10-16g) but low nut number (Less than 1000 nuts/tree/year). Crosses between the two categories of cashew germplasm have been scheduled for the peak flowering period in January/February 2001.

**Susceptibility of the Newly Acquired Cashew Germplasm to Leaf spot Disease (**S. O. Agbeniyi**)**

Susceptibility of the newly acquired cashew germplasm established in 2000 to leaf spot disease was studied. Four cashew genotypes were selected in each of the four newly established germplasm at CRIN Headquarters. The objective was to determine the stability of their tolerance to fungal disease at juvenile stage over a period of time. The four germplasms were the jumbo size nut, large sized nut, medium sized nut and the small sized nut. The results obtained so far is shown in Table 1. Highest disease incidence was recorded in the small sized stands.

**Table 1: Susceptibility of Cashew Genotypes to Leaf spot Disease.**

| Cashew genotypes | X number of Leaf | X number of diseased leaf | Disease percentage |
|---|---|---|---|
| Jumbo size | 18.5 | 7.3 | 39.5 |
| Large size | 17.5 | 10.0 | 57.1 |
| Medium size | 15.5 | 9.0 | 58.8 |
| Small size | 8.5 | 7.0 | 84.3 |

**TEA RESEARCH PROGRAMME** (Leader: E. A. Fawole)
**Tea Improvement and Propagation**
**Preliminary Observation on Lowland Tea Adaptability Trial (**S.S. Omolaja, E. B. Esan and C. R**.** Obatolu**)**

Tea (*Camellia sinensis*) thrives on the high altitude region of Mambilla Plateau in Nigeria. This region is however limited in land area for tea culitvation because of other competing needs such as cattle grazing, industrial use and residential buildings. In view of the growing market demand for tea, it becomes imperative to increase area of tea cultivation in Nigeria. Consequently, tea adaptability trials were established in seven lowland locations of Nigeria: Ikorodu, Ibadan, Iyanomo, Akwete, Ikom, Ijebu-Ife and Mayo- Selbe. The four tea clones assessed in these locations were 35, 143, 236 and 318. The parameters that were measured are plant height, leaf number, plant vigour, plant width, leaf colour, harvest weight, weight per unit pluck and survival count after two years of planting. In this preliminary report, observation was restricted to three locations namely Ikorodu, Ikom and Akwete. A combined analysis of records for all the locations will be done later.

The general performance of the tea clones in each of the locations are as stated underneath.

**Ikorodu**:

Observation showed that the establishment ability of the tea clones in the location was good. The average performance was 93.3% (Table 1). The good performance was among other factors due to the fact that the plot was regularly weeded and watered. Clonal differences in plant vigor was apparent. Clone 143 had the highest plant vigor while clone 35 recorded least. Similar trend was repeated on yield. Clone 143 recorded the highest yield of 2.2 tons/ha while clone 35 recorded the least of 0.8 tons/ha.

**Ikom**:

Record showed that the percentage survival of the clones were 318: 24.8%; 35: 24.5%; 143: 27.2% and 236: 62.5%. The overall average performance of tea clones in terms of establishment ability was 34.7%. The order of superiority of the clones with respect to plant vigor were: 143 > 236 318 > 35. The weight per unit pluck for each clone were 0.6g for each of clones 318 and 143: 0.4g and 0.3g for clones 236 and 35 respectively. The average yield among clones were different: 19.4 tons/ha for 143 was the highest, 5.2 tons/ha for 236, 5.0 tons/ha for 318 and 2.5 tons/ha for 35. The leaf size was of the order: 35 > 143 > 318 > 235. Clone 35 had the broadest leaves. The leaf colour of the individual clones as revealed by Munsel plant tissue colour chart were as follows:

7.5 GY; 4/4 for 318
10 GY; 3/2 for 236
5 GY; 5/6 for 25 and
7 GY; 3/4 for 143.

**Akwete**:

The overall percentage survival of the tea clones at Akwete was 52.6% (Table 1). The plant vigor of the clones were superior to one another in the order of 143 > 318 > 35. The weight per unit pluck for the clones were 0.5g for each of clones, 318 and 143; and 0.4g for clone 35. The average yield for the individual clones were 1.7 tons/ha for 318; 1.6 tons/ha for 143 and the highest yield of 2.0 tons/ha for 35. The leaf colour of the clones were:

7.5 GY; 3/4 for 318
7.5 GY; 3/2 for 143
5 GY; 5/8 for 35

In the three locations, Ikom recorded the lowest tea survival percentage of 34.7% in contrast to its average yield, which was the highest (8.1 tons/ha). It is probable therefore that Ikom will sustain commerical tea production provided the tea in such location is given adequate cultural requirements. More detailed analysis will be required to make conclusive remark. It is worthy of note that tea pruning, an essential cultural practice in tea was not carried out in any of the locations. This needs to be corrected in order that subsequent record can be taken in an ideal condition and more accurate judgement can be drawn on the actual performance of the tea clones in those locations.

**Table 1: Field Assessment of tea (*Camellia sinensis*) Clones in three lowland Locations.**

| Parameter/Clones | | Locations | | |
|---|---|---|---|---|
| | | Ikorodu | Ikom | Akwete |
| | 35 | 100.0 | 24.5 | 42.1 |
| Survival | 143 | 100.0 | 27.2 | 64.6 |
| Percent | 236 | - | 62.5 | - |
| | 318 | 80.0 | 24.8 | 41.7 |
| | X | 93.3 | 34.8 | 49.47 |
| Plant | 35 | 2 | 2 | 2 |
| Vigour | 143 | 5 | 5 | 5 |
| | 236 | - | 4 | - |
| Yield | 35 | 0.8 | 2.6 | 2.0 |
| (tons/ha) | 143 | 2.2 | 19.5 | 1.6 |
| | 236 | - | 5.2 | - |
| | 318 | 1.0 | 5.0 | 1.7 |
| | X | 1.3 | 8.1 | 1.8 |

**Incidence of Leaf Blight of Lowland Tea (*Camellia sinensis*) at CRIN Headquarters**
(A. R. Adedeji)

An experiment was initiated in September 2000 to study the incidence and causal organism of leaf blight that caused heavy defoliation of lowland tea at CRIN Headquarters. This formed part of monitoring of diseases of lowland tea in Nigeria.

The tea stands at CRIN Headquarters were noticed to be shedding leaves. On closer examination, the leaves, the branches and stems of affected plants contained the mycelial strands of the fungi. The mycelial strands which were white or light brown were up to 2mm in thickness and proceeded from the stems to the leaves. The leaves later turned brown, dry- detached but still hanged losely on the twigs. Fifty-five percent of leaves on the affected twigs were infected, out of which 25% were already dried while 20% had the mycelial strands but still fresh.

Isolation from these leaves (fresh without visible mycelial strands, fresh with visible mycelial strand; dead dried leaves) yielded *Botryodiplodia theobromae*, *Aspergillus sp*. and *Fusarium sp*. However, none of these organisms gave the symptoms of mycelial strands ramifying the leaf blade which suggested that these organisms were secondary pathogens.

A comprehensive investigation is thereby necessary to ascertain the causal organism in order to develop adequate control method.

**Evaluation of Tea Cuttings raised on Red Sub-soils obtained from some Lowland areas of Nigeria (**A. A.Oloyede; S. S. Omolaja; and A. R. Adedeji)**.**

The investigation was conducted at the CRIN nursery to examine the possibility of raising tea cuttings on red – soils obtained from Araromi-Obu and Ijebu-Imusan in Ondo and Ogun States respectively.

The experiment is of a completely randomised design (CRD) involving the following treatments; Red sub-soil/ top soil (control); red sub-soil over 1:1 mixture of weathered sawdust and top soil and red sub-soil over pure weathered sawdust. The possibility of using local materials for covering the cuttings in place of conventional polythene sheet was also investigated.

The pH values and preliminary results of sprouting success of the cuttings under various treatments are given below:

| Location | Soil pH |
|---|---|
| Araromi – Obu | 5.3 |
| Ijebu –Imusan | 4.2 |

**Table 1: Percentage sprouting success of clones 35 and 318.**

| Treatment | Clones (% sprouting) | |
|---|---|---|
| | 35 | 318 |
| Top Soil/Red sub-soil (Ijebu Imusan) | 47 | 40 |
| Top soil: sawdust (1:) red sub-soil | 20 | 67 |
| Sawdust/red sub-soil | 20 | 47 |

**Table 2: Percentage sprouting success of clones 35 and 318.**

| Treatment | Clones (% sprouting) | |
|---|---|---|
| | 35 | 318 |
| Top Soil/Red sub-soil (Araromi - Obu) | 33 | 67 |
| Top soil: sawdust (1:1) red sub-soil | 67 | 80 |
| Sawdust/red sub-soil | 53 | 40 |

**Table 3: Fungi associated with cutting rot of Tea Clone 35.**

| Fungal | Treatments | | |
|---|---|---|---|
| | Top soil/Red sub-soil | Top soil: Sawdust (1:1)/Red Sub-soil | Sawdust/Red sub-soil |
| *Fusarium sp.* | + | + | + |
| *Aspergillus sp.* | - | + | + |

**Table 4: Fungi associated with cutting rot of Tea Clone 318.**

| Fungal | Treatments | | |
|---|---|---|---|
| | Top soil/Red sub-soil | Top soil: Sawdust (1:1)/Red Sub-soil | Sawdust/Red sub-soil |
| *Fusarium sp.* | + | - | + |
| *Aspergillus sp.* | - | - | + |

The above were taken at 35th day after setting the cuttings. The preliminary results showed that clone 318 had better potential of sprouting than 35 on red sub soil obtained from Araromi – Obu (Tables 1 & 2).

However, by the 70th day more than 90% of the cuttings were dead and suspected to be due jointly to fungal attack, termite invasion and rapid exposure to inclement weather conditions as a result of withering of plantain leaves cover used.

*Fusarium & Aspergillus* spp. were frequently isolated from the dead cuttings (Tables 3 & 4).

The investigation is continuing with the use of conventional polythene sheet as cover while further work on the pathogenicity test is in progress.

**Variation in Nutrient Contents of Various Tea Clones grown on the Mambilla Plateau** (C.R. Obatolu).

Thirty three (33) fourth leaf samples of tea (*Camellia sinensis* L.) were collected from the gene pool of the Mambilla Substation of the Institute in May 2000. The samples were carefully washed with distilled water, dried and ground with a hammer mill. Thereafter, they were digested and analysed on the atomic absorption Spectrophotometer for reading P, K, Ca, Mg, Cu, Zn, Mn, and Fe. The results of the analysis of seven of the clones as presented in Table I shows that the potassium contents of the various clones are quite close ranging from 0.88% to 1.43%. These values are certainly below the optimum level of 1.5 – 2.0% quoted in earlier works of Ogunmoyela and Obatolu (1984). Calcium levels ranged from 0.14 – 0.50% showing that only clone 228 is marginally optimum of all the seventeen clones. Whereas with Mg only clones 367 and 368 are below the 0.2% while all other clones ranged between 0.23% and 0.42% and 0.42%. As expected, all the clones are insufficiently supplied with phosphorus, an element which as a result of the soil reactions (pH of the Mambilla soils are acidity) are usually fixed and made unavailable to the plants. In respect of the micronutrients, almost all the clones are adequately supplied with Cu, Zn, Mn, and Fe. Values are in excess of the 0.2ppm critical level for tea (Ogunmoyela *et al*. 1994). Manganese values ranged from 30.0-68.0ppm but well above the 0.5ppm value set as the critical level.
Analysis of the remaining sixteen (16) clones are still outstanding and will be done soonest.
The results obtained so far have shown that macronutrient K, Ca, Mg, and phosphorus are the major nutrient problems of the tea on the Mambilla Plateau irrespective of the clones. The Micronutrient uptake and nutrient content of Tea on the Mambilla are quite adequate. It must be remembered that Cu, and Zn, are very valuable in tea nutrition particularly for the fermentation process and consequently in adequacy of these affect the quality of tea produced.

**Table 1: Nutrient Content of Different Tea Clones on the Mambilla**

| Clone | % K | % Ca | % Mg | % P | ppmZn | ppmMn | ppmFe | ppmFe |
|---|---|---|---|---|---|---|---|---|
| 19 | 1.20 | 0.34 | 0.31 | 0.25 | 18.0 | 30.0 | 29.8 | 148.0 |
| 61 | 0.88 | 0.38 | 0.37 | 0.25 | 15.0 | 38.0 | 400.0 | 133.0 |
| 68 | 1.43 | 0.28 | 0.27 | 0.31 | 20.0 | 55.0 | 225.0 | 133.0 |
| 74 | 1.21 | 0.24 | 0.23 | 0.25 | 28.0 | 43.0 | 328.0 | 175.0 |
| 143 | 1.34 | 0.30 | 0.28 | 0.28 | 18.0 | 45.0 | 400.0 | 115.0 |
| 228 | 1.04 | 0.50 | 0.42 | 0.28 | 13.0 | 48.0 | 425.0 | 140.0 |
| 235 | 0.97 | 0.29 | 0.27 | 0.25 | 35.0 | 30.0 | 305.0 | 180.0 |
| 318 | 1.36 | 0.36 | 0.30 | 0.25 | 18.0 | 48.0 | 213.0 | 120.0 |
| 353 | 1.19 | 0.25 | 0.23 | 0.26 | 15.0 | 55.0 | 450.0 | 113.0 |
| 354 | 1.25 | 0.42 | 0.30 | 0.30 | 18.0 | 58.0 | 218.0 | 160.0 |
| 363 | 1.42 | 0.42 | 0.25 | 0.33 | 20.0 | 57.0 | 425.0 | 155.0 |
| 367 | 1.03 | 0.39 | 0.30 | 0.25 | 15.0 | 33.0 | 293.0 | 153.0 |
| 368 | 1.08 | 0.16 | 0.04 | 0.25 | 25.0 | 50.0 | 215.0 | 163.0 |
| 369 | 0.91 | 0.14 | 0.04 | 0.25 | 25.0 | 50.0 | 215.0 | 163.0 |
| 370 | 0.94 | 0.24 | 0.27 | 0.25 | 20.0 | 55.0 | 278.0 | 143.0 |
| unknown | 1.19 | 0.36 | 0.23 | 0.26 | 10.0 | 30.0 | 388.0 | 133.0 |
| Mean | 1.01 | 0.25 | 0.27 | 0.25 | 18.0 | 68.0 | 305.0 | 120.0 |

**Evaluation of Different Rates and Kind of Organic Fertilizer on Highland and Lowland Tea Production**
(C. R. Obatolu and R. R. Ipinmoroti)

For consistent tea leaf harvest, there is need for adequate fertilizer application to soils under tea production. To achieve this, farmers have been using mineral fertilizers over the years, but for the past one and half decades, these fertilizers had become too expensive for the farmers and added to this, is the scarcity of the fertilizer in the open market. To solve these problems therefore, organic fertilizers were formulated from basal organic materials of Cocoa Pod Husk (CPH), *Chromolaena odorata* (COB), tea fluff (TFF), cowdung ( CDG)

and poultry droppings (PDG) and weighed out at the rates equivalent to 0, 5, 10, and 20 mt/ha. The experiment is on-going, the progress reports on the effect of these treatments on tea seedlings would be given as the data are taken.

**Further Identification of Major Diseases of Highland Tea (**E.A. Fawole**)**

A survey was conducted on tea bushes at Kusuku CRIN Substation, NBPC commercial plots and some selected farmers' farms in Kusuku, Masewa, Kakara, Nguoroje and Lekitaba on the Mambilla Plateau. The farms were assessed for the extent of damage caused by diseases. The major diseases identified were leaf spot, leaf blight, shoot dieback, root rot and rot of tea cuttings. Disease incidence and severity arising from the natural infection in all the farms visited varied markedly among the tea clones cultivated. Clone 35 was identified as the most susceptible to diseases while clones 143, 318 and 14 were resistant (Table 1). Work is in progress on the formulation of effective control strategies for the diseases.

**Table 1: Major Diseases Identified on Tea Bushes on the Mambilla Plateau.**

| Disease | Causal Organism | Farmers solution | Remarks |
|---|---|---|---|
| 1. Leaf spot | *Pestalotia theae* | None | C35 very susceptible |
| 2. Leaf blight | *Colletotrichum camelliae, Pestalotia theae, Cercospora spp.* | None | Widespread on the bushes on the Mambilla |
| 3. Shoot dieback | *Fusarium spp. Botryodiplodia theobromae, Rhizoctonia solani.* | Cultural control such as mulching and pruning | |
| 4. Root rot | *Formes lignosus* | | |
| 5. Rot of tea cuttings | *Fusarium solani, Fusarium oxysporum Phythium ultimum* | Avoidance of over watering | Widespread in the nursery. |

**Comparative Study of Five Tea clones under Plantain Shade in Ibadan South Western Nigeria**
***(***C. R. Obatolu and R. R. Ipinmoro***t)***

Five tea clones t- 19, 143, 370, 354 and the unknown were studied under plantain shade for their adaptation trial at Ibadan, CRIN Headquarters. Management practices of mulching, weeding, fertilizer application, irrigation and $A1_2$ ($SO_4$) soil treatments were carried out. Data on growth parameters were recorded and analysed statistically. Results indicated that clones 19, 143 and 370 performed significantly (P= 0.05) better than clones 354 and the 'unknown' under plantain shade. Also a higher survival rate of 70 – 93% was achieved, compared to less than 39% that was previously obtained for tea under no shade at Ibadan. Further studies on the rate of plucking table formation by the various tea clones is in progress under this experiment. Figures 1 – 3 indicate the trend of growth of the tea clones under plantain shade after 22 weeks of transplanting.

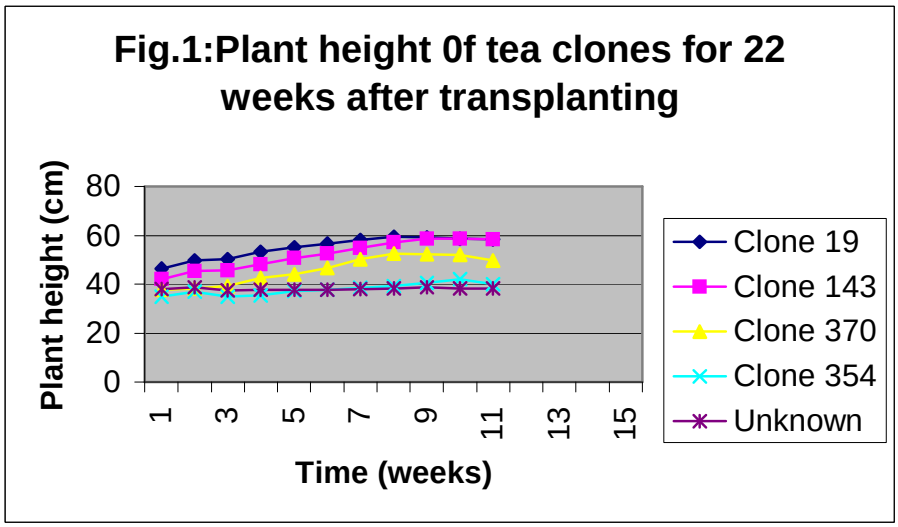


Fig.1:Plant height 0f tea clones for 22 weeks after transplanting
Plant height (cm)
80
60
40
20
0
1
3
5
7
9
11
13
15
Time (weeks)
Clone 19
Clone 143
Clone 370
Clone 354
Unknown

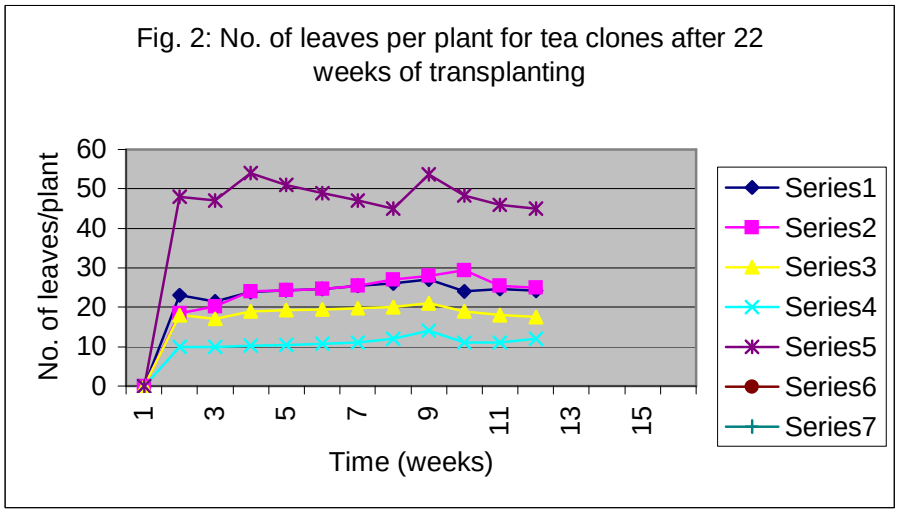


Fig. 2: No. of leaves per plant for tea clones after 22 weeks of transplanting
No. of leaves/plant
60
50
40
30
20
10
0
1
3
5
7
9
11
13
15
Time (weeks)
Series1
Series2
Series3
Series4
Series5
Series6
Series7

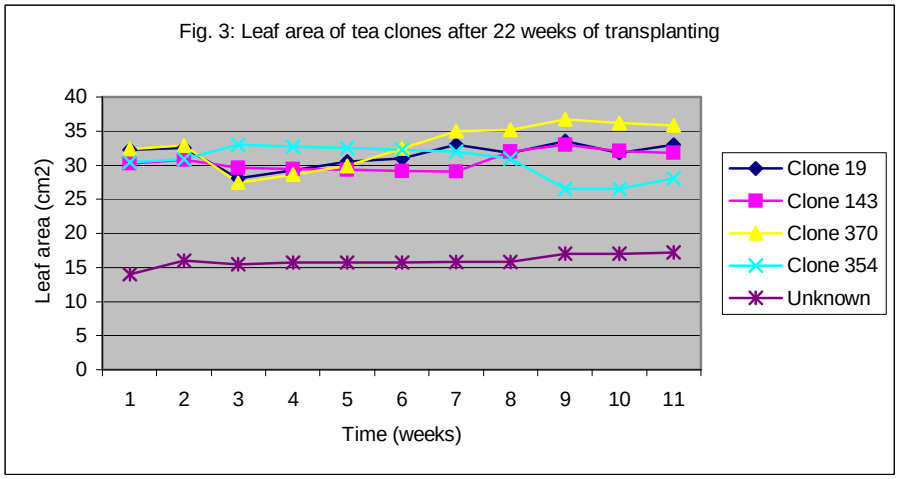


Fig. 3: Leaf area of tea clones after 22 weeks of transplanting
Leaf area (cm2)
40
35
30
25
20
15
10
5
0
1
2
3
4
5
6
7
8
9
10
11
Time (weeks)
Clone 19
Clone 143
Clone 370
Clone 354
Unknown

**Effect of Weed Incidence on Lowland Tea under Plantain Shade in Lowland area of Nigeria**
(A. O. Famaye).

Weed infestation is one of the commonest agronomic problems in crop production. Weed control is of importance to allow for easy harvesting of clean produce devoid of admixtures in addition to permitting satisfactory growth of the tea bushes. This experiment was set up in year 2000 to monitor the incidence of weeds on lowland tea undergoing adaptation to lowland area at CRIN Headquarters. The tea clones were planted under plantain shade of 3.1m apart.

The result obtained so far showed that the common weeds found in tea under plantain shade were *Tridax procumbens, Talinum triangulare Euphorbia hirta* and carpet grass. For the border row without plantain shade or any other shade, the common weeds found were *Chromolaena odorata, Pennisetum pupureum* and *Pannicum maximum*. The incidence of weeds were lower in tea under plantain than those on the bordered rows that were not shaded. This experiment is on-going. Data on weed biomass will be available later this year.

**STATISTICS, SOCIO-ECONOMIC & TECHNO-ECONOMIC PROGRAMME (**Leader: O O Oduwole)

**Adoption of Improved Agronomic Practices on Cocoa Farms in Nigeria (**O.O. Oduwole***)***

The Adoption Study was primarily designed:

(i) to assess farmers practices
(ii) to determine the constraints to adoption of improved practices and
(iii) to suggest recommendations for improvement in adoption.

300 farmers were to be sampled in six cocoa producing states through a two stage stratified sampling procedure. Relevant data will be collected through structured questionnaires, analysis of data will be done using multivariate regression analysis to determine factors affecting adoption.

**Progress:**

**Results/Achievement**: Questionnaires have been designed and some dispatched to the relevant States ADP for administration, field interview and data analysis in progress.

**A preliminary investigation into Coffee Marketing in Kogi State of Nigeria** (R. A. Sanusi).

The marketing of coffee has been known to be seriously hampered over the years mostly due to low prices being offered farmers. As a result, while there is hardly any new plantings, coffee plots established years back have been abandoned. Hence, there is the need to investigate the determinants of coffee marketing in Nigeria.

The questionnaires used in this study were administered in the coffee growing areas of Kogi State such as Kabba, Olle-Bunnu, Yamoye, etc. 55 out of 80 questionnaires were eventually selected for use in the analysis. Frequency counts, percentages, averages, and correlation analysis were used in analysing the data generated.

**Results and Discussion**

The average age of the farmers was 55 years. This implies that an average farmer still has some active years left in him that can be utilized in farm work. An appreciable number (90%) of the farmers were literate. The average number of years spent on schooling by an average farmer was 7 years. This implies that an average farmer attended a primary school. Hence if properly advised and encouraged, adoption of improved agronomic practices and formation of viable cooperatives could be enhanced. All (100%) of the farmers interviewed were married and were males.

Contrary to (theoretical) *a priori* expectation, all quantities of coffee marketed in 1998 and 2000 have a weak, negative, correlation with prices offered to the farmers. However, the relationship between the two variables in 1999 is positive, a situation which is consistent with *a priori*, expectation. The implication of this is that the price has an inverse relationship with the quantities marketed in 1998 and 2000 while there was a direct relationship between the variables in 1999 (Table 1). The factor that can be held responsible for this is price speculation.

In 1998 the average price of coffee per ton was ₦16,050.84 while the average for 1999 was ₦54,814.20. Furthermore, the average price/ton of coffee in 2000 was ₦56,141.64. The farmers fearing that the price may continue falling must have increased the rate of sale of their coffee as the price continued to fall in 1998. However, the seeming stability in prices, coupled with a buoyant weather for coffee production, according to the farmers, in 1999 could be said to be responsible for the traditional relationship between marketed quantities and prices. Despite a lower average price in 2000 over 1999 and 1998, the farmers could be said to have resumed their speculations, which made them sell more quantities as prices fell in 2000. The highest price quoted by any farmer in 2000 was ₦72,816.00 compared to ₦78,720.00 in 1999 and ₦98,400.00 in 1998 while the lowest prices in 1998 and 1999 were ₦29,250.00 and ₦29,520.00 respectively. The farmers fearing that the price may slide further down in 2000 must have increased the rate at which they disposed their coffee.

However, consistent with *a priori* expectation, there is a strong positive correlation between quantities of coffee marketed and quantities of coffee processed (i.e. milled/grinded) as well as the cost of processing.

That is, the quantity processed increased as quantity sold increased and with increases in processed quantity, the cost of processing also went up.

The sale of coffee at lower prices can not be said to be unexpected since only 34% of the farmers could be found practicing some sort of storage of excess quantities. Those that store were discovered not to be carrying out proper warehousing practices. Furthermore, only 22% do carry out some sort of packaging of coffee for sale while the rest do not package coffee for sale at all. Also, 54% said that market forces determine the price at which they sell their coffee while 42% said their selling price is determined by the total cost incurred.

60% of the farmers were of the opinion that the major problem facing the coffee industry is unstable prices, 36% were of the opinion that the government should evolve a financial scheme to help coffee farmers while 12% supported the creation of a (coffee) price stabilization board and 80% opined that the government should buy directly from farmers (just as was the case during the period of the defunct Cocoa Marketing Board).

**Conclusion**

There is need for the farmers to reduce their level of price speculations. Also the farmers need organise themselves into cooperatives so as to effect bulk marketing of their produce as well as use the opportunity of cooperation in obtaining funds. The farmers need to be taught modern and efficient packaging and storage practices. Albeit, research need be conducted into a simple, affordable (indigenously) available (improved) method(s) of warehousing (and/or storage) as well as packaging such that farmers will be able to hold their produce for some time without much loss.

**Table 1: Correlation Coefficient Matrices**

| | $X_{a1}$ | $X_{b1}$ | $X_{c1}$ | $X_{d1}$ |
|---|---|---|---|---|
| $X_{a1}$ | 1 | | | |
| $X_{b1}$ | -0.10486 | 1 | | |
| $X_{c1}$ | 0.683475 | -0.1808 | 1 | |
| $X_{d1}$ | 0.644784 | -0.14339 | 0.9835 | 1 |

| | $X_{a2}$ | $X_{b2}$ | $X_{c2}$ | $X_{d2}$ |
|---|---|---|---|---|
| $X_{a2}$ | 1 | | | |
| $X_{b2}$ | 0.007237 | 1 | | |
| $X_{c2}$ | 0.528712 | -0.00833 | 1 | |
| $X_{d2}$ | 0.511402 | -0.00096 | 0.984116 | 1 |

| | $X_{a3}$ | $X_{b3}$ | $X_{c3}$ | $X_{d3}$ |
|---|---|---|---|---|
| $X_{a3}$ | 1 | | | |
| $X_{b3}$ | -0.010634 | 1 | | |
| $X_{c3}$ | 0.799912 | -0.01385 | 1 | |
| $X_{d3}$ | 0.77964 | 0.085626 | 0.924925 | 1 |

where:

i. $X_{a1}$, $X_{a2}$ & $X_{a3}$ are quantities of coffee (in tons) sold in 1998, 1999 and 2000 respectively;
ii. $X_{b1}$, $X_{b2}$ & $X_{b3}$ are prices of coffee (per tons) offered to farmers in 1998, 1999 and 2000 respectively;
iii. $X_{c1}$, $X_{c2}$ & $X_{c3}$ are volumes of coffee (in tons) processed (i.e. milled) in 1998, 1999 and 2000 respectively;
iv. $X_{d1}$, $X_{d2}$ & $X_{d3}$ are cost of processing coffee in 1998, 1999 and 2000 respectively.

## SOCIO –ECONOMIC EVALUATION OF FARMS AND FARMERS PRODUCTIVITY

***Evaluation of the Productivity of small holder Outgrowers Tea Farmers (O. O. Oduwole)***

Over the years, tea cultivation on the Mambilla Plateau area of Taraba State has been carried out by small scale farmers. Tea companies with investment in large plantation have also used small scale farmers in form of outgrowers scheme to ensure steady supply of green tea leaves to their factories.
However the productivity of these small holder farmers have not been assessed with a view to look at areas for improvement. Similarly good practices can also be adopted for the proposed low land tea farmers.
This study was designed:

1. To examine the economic performance of tea farmers
2. To asertain the constraints to effectiveness
3. To suggest solution for improvement.

A random sample of 50 farmers were selected and structured questionnaires were administered to them. Villages from where farmers were sampled include Kusuku, Lekitaba, Ngoroje and Gembu areas. 30 questionnaires were found useful for analysis. Frequencies means, Anova and O.L.S regression were used in the analysis.

Plant population of planted Tea/ha varied widely between 300 – 14,000 Average plant population for clone 14/3 was 5,725 while clone 3/1/8 is 40,856.

Very few farmers were planting at high population density. Other crops like beans, groundnuts are also planted in the Tea farms in the past two years.

From the regression analysis of factors affecting income of Tea farmers, the result indicate that Tea income was positively and significantly correlated with farm size and herbicide cost. The t-Statistics was significant at 0.1 and 0.25 level for farm size and herbicide cost respectively. The estimated $R^2$ was .409 (Table 2).

From the regression analysis, distance to inputs source had negative correlation with tea income which indicate that as distance to input increases the income to Tea decreases. The planted area and type of clone were also negatively and significantly correlated to tea income at 0.20 level of significance. Their impact was not as high as the available farm size and herbicide cost.

**Constraints to Tea Production:**
The farm size significantly limits the area to be planted to Tea and the income accrueing to the farmer. Furthermore pests and diseases are major problems which significantly affect yield.

**Policy recommendation and other suggestions:**
To increase Tea productivity, more areas need to be given to farmers, while support by the Tea companies in form of fertilizers, pesticides and herbicides should be provided. Presently the inputs are procurred from the local market at high prices. Fertilizer prices ranged between ₦ 1,500 for NPK and ₦ 2,000 for Urea. This significantly affects the income accrueing to the farmers. There is the need for a fertilizer and other input subsidy for farmers in order to increase their income.
Irrigation facilities should also be extended to the farmers especially during the dry season. Price of harvested Tea is still low. Better price should be given to the Tea farmers to alleviate their poverty situation. Presently there is inadequate seedling supply to new farmers of the Tea Company. Farmers were being asked to have their own nursery and farmers were finding it difficult to establish their own nursery. There is the need for support in this area.

**Table 1: Farmers' statistics**

| Parameters | Mean values |
|---|---|
| Farm size | 2.42 ha |
| Farmers Age | 47.48 yrs. |
| Years in Production | 6.38 yrs |
| Total Newly Planted Area | 19.5 ha |
| Total Established Tea Area | 76.49 ha |
| Yield/ha 1997 | 1624.8 kg |
| Yield/ha 1998 | 1154.7 kg |
| Yield/ha 1999 | 25855.3 kg |
| Tea Price | |
| 1997 | ₦ 8.72 /kg |
| 1998 | ₦ 10.46 /kg |
| 1999 | ₦ 12.00 /kg |
| Tea Income/ha | |
| 1997 | ₦ 15,139.1 |
| 1998 | ₦ 14,722.00 |
| 1999 | ₦ 25,855.3 |

**Source: Field Survey.**

**Table 2: Regression Analysis of the determinant of Tea Income**

| Model Variable | Unstandardized Coefficients | | Standardized Coefficients | | |
|---|---|---|---|---|---|
| | B | Std Error | Beta | t | Sig |
| 1 (Constant) | -32421.65 | 27246,231 | | -1,190 | ,248 |
| Farm size | 4953,039 | 3160,235 | 1,009 | 1,567 | ,133* |
| Plant Area | -3300,662 | 3060,942 | -695 | -1,078 | ,294 |
| Type of Clone | -7994,836 | 8386,322 | -222 | -,953 | ,352 |
| Year of Planting | 741,693 | 896,185 | ,182 | ,828 | ,418 |
| Distance to Input | -553,990 | 797,159 | -160 | -,695 | ,498 |
| Cost of Fertilizer | -230 | ,554 | -089 | -,416 | ,682 |
| Cost of Herbicide | 12,294 | 5,527 | ,459 | 2,224 | ,038** |
| Harvesting | | | | | |
| Labour Weeding | -4.623E-02 | 2,665 | -,004 | -017 | ,986 |
| Cost | .581 | 1,471 | ,096 | ,395 | ,697 |
| Fertilizer Labour | -627 | 6,074 | -,028 | -103 | ,919 |

Summary: R .640 $R^2$ .409

a. Coefficient: (Constant), Fertilizer Labour, Plant Area, Year of planting, Cost of Fertilizer, Type of Clone, Harvesting Labour cost, Cost of Herbicide, Distance to Input, Labour Weed Cost, Farm Size.

b. Dependent Variable: Tea Income.

- sig at 0.1

** sig at 0.025

**Preliminary Investigation on the Income, Consumption and saving patterns of Cocoa farmers in Southern Nigeria. (**T. R. Shittu)

The project was set out to understand the areas of priority concerns to cocoa farming households in terms of their revenue allocation, between consumption and savings hence investments on farm inputs.

The objectives of this study therefore includes the examination of the use of revenue earned by cocoa farmers for farming inputs and other competing needs; and also optimization of use of investible funds on agro-chemicals and hired labour among cocoa farmers production activities.

The correlation analysis revealed a positive correlation between income earned and family household expenditure and family size while it was negatively correlated to invested funds on farm production activities. This preliminary finding corroborated the arguments of persistent need for funds by cocoa farmers during production season due to improper fund management/capacity and practices.
However, the work is still on-going.

**Table 1: Correlation Matrix Table.**

| | X48 | X62 | X78 | X102 |
|---|---|---|---|---|
| X48 | 1 | | | |
| X62 | 0.8421 | 1 | | |
| X78 | 0.7413 | 0.3842 | 1 | |
| X102 | 0.3346 | -0.2813 | 0.1437 | 1 |

**Market Prices and Situations**

**Cocoa**

| Month | JAN | FEB | MAR | APRIL | MAY | JUNE | JULY | AUG | SEPT | OCT | NOV | DEC | TOTAL |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| No.of Output | 39749 | 18436 | 14887 | 24434 | 32474 | 34474 | 14589 | 5579 | 26631 | | | | |
| % of Total | 0.188 | 0.087 | 0.07 | 0.115 | 0.153 | 0.163 | 0.069 | 0.026 | 0.12 | | | | |

The above figures were obtained from the Fermentary Section of the Plantation Management.
**Source: Fermentatry Section.**

**Market Statistics on Cocoa Prices for Year 2000**

| Cocoa | JAN | FEB | MAR | APRIL | MAY | JUNE | JULY | AUG | SEPT | OCT | NOV | DEC |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Price (₦) | 70000 | 68000 | 68000 | 65000 | 62000 | 60000 | NA | NA | 62000 | NA | NA | NA |

The price situation compared with that of 1999 is low due to the country's economic situation and depreciation in the world market prices.

The following results were obtained from EDF Man Challenge, Ibadan. Cocoa was sold for N75,000 which was the highest price for 1999. The prices above were obtained for the year 2000.

Cocoa production is now reduced, that is there is low production due to the following reasons:

i) There is depression in World Market Price.

ii) There is a reduction in the quality and quantity due to heavy downpour and hoarding of Cocoa bean.

**Production Statistics on Kolanuts.**

| Month | JAN | FEB | MARCH | APR | MAY | JUNE | JULY | AUG | SEPT | OCT | NOV | DEC | TOTAL |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| No.of Output | 5587 | 6978 | 11107 | 4223 | NA | NA | NA | 117 | | | | | 27895 |
| % of Total | 0.2 | 0.25 | 0.39 | 0.15 | | | | | | | | | |

**Source: Kola Laboratory**

**Market Price on Kolanuts**

| | JAN | FEB | MARCH | APRIL | MAY | JUNE | JULY | AUG |
|---|---|---|---|---|---|---|---|---|
| | ₦ | ₦ | ₦ | ₦ | ₦ | ₦ | ₦ | ₦ |
| Dry Skinned Kola | 2200 | 2000 | 2600 | 2700 | 2600 | | | |
| Fairly Dried Kola | 1100-1200 | 1400-1500 | 1500-1600 | 1600-1700 | 1700-1800 | | | |
| Unskinned Kola | 600-700 | 800-850 | 800-850 | 850-900 | 800-850 | 850- | | |

The price situation as compared with 1999 price was low due to the following reasons:

(i) *New Crops*: Due to the availability of fresh crops thereby increasing the number of kolanut for sale, the prices fell.

(ii) *Buyer*: The number of buyers had reduced considerably thus, the sellers had to buy among themselves hence price reduction.

***Constraints****:*

Vehicle was not readily made available.

**COCOA: Field Work Statistics by Programmes (January –December 2000)**

| Cocoa Programme Field | J | F | M | A | M | J | J | A | S | O | N | D |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Harvested Pods: HA | 14.9 | 17.8 | 14.1 | 18.5 | 15 | 15.3 | 22.7 | 16.1 | 17.8 | 12.5 | 20 | 16 |
| Total Pods | 9332 | 6354 | 4746 | 7645 | 11746 | 12272 | 7196 | 2325 | 8797 | 17267 | 18342 | 18088 |
| Pods as % G.Total | 23.5 | 39.4 | 33.1 | 34 | 38.2 | 39.1 | 49.1 | 41.7 | 33 | 33.6 | 38.4 | 32 |
| Black Pods | 494 | 706 | 622 | 541 | 477 | 600 | 756 | 496 | 4589 | 6744 | 4607 | 1374 |
| B.Pods % G. Total | 1.2 | 4.4 | 4.3 | 2.4 | 1.6 | 1.9 | 5.2 | 8.9 | 17.2 | 13.1 | 9.6 | 2.5 |
| Exptd trees per harvest | 15496 | 18512 | 14664 | 19240 | 15600 | 15912 | 23608 | 16744 | 18512 | 13000 | 20800 | 16640 |
| Pods per exptd. Trees | 0.6 | 0.32 | 0.32 | 0.4 | 0.75 | 0.77 | 0.3 | 0.14 | 0.48 | 1.33 | 0.88 | 1.09 |
| Present No. of trees* | | | | | | | | | | | | |
| Pods/tree** | | | | | | | | | | | | |
| LABOUR | | | | | | | | | | | | |
| Staff | 6 | 6 | 6 | 6 | 6 | 6 | 6 | 6 | 6 | 6 | 6 | 6 |
| Casuals | 25 | 26 | 27 | 27 | 28 | 28 | 28 | 27 | 27 | 27 | 27 | 27 |
| Total labour | 31 | 32 | 33 | 33 | 34 | 34 | 34 | 33 | 33 | 33 | 33 | 33 |
| Pods/Staff | 1555 | 1059 | 191 | 1274 | 1958 | 2045 | 1199 | 388 | 1466 | 2878 | 3057 | 3015 |
| Pods/casual | 373 | 244 | 176 | 283 | 420 | 438 | 257 | 86 | 326 | 640 | 679 | 670 |
| Pods/labour | 301 | 199 | 144 | 232 | 345 | 361 | 212 | 70 | 267 | 523 | 556 | 548 |
| HA weeded | 15.6 | 14.6 | 6.7 | 18.6 | 25.8 | 25.5 | 23.8 | 19.1 | 14.5 | 19.1 | 10.9 | 7.3 |
| HA weeded/casual | 0.62 | 0.56 | 0.25 | 0.69 | 0.92 | 0.91 | 0.85 | 0.71 | 0.54 | 0.71 | 0.4 | 0.27 |
| Expted trees weeded/sone | 2704 | 2531 | 1161 | 3224 | 4472 | 4420 | 3935 | 3311 | 2513 | 3311 | 1889 | 1265 |
| Expted trees weeded/sone | 649 | 584 | 258 | 716 | 958 | 947 | 843 | 736 | 559 | 736 | 420 | 281 |
| No exp trees/labour | 523 | 475 | 211 | 586 | 789 | 780 | 694 | 602 | 457 | 602 | 344 | 230 |
| Pods/HA | 626 | 357 | 337 | 413 | 783 | 802 | 317 | 144 | 494 | 1381 | 917 | 1131 |
| Range of Pods/HA:144-1381 | (approx. 763 pods/HA) | | | | | | | | | | | |
| Total pods: 124110 | | | | | | | | | | | | |
| Total B/pods: 22006 | | | | | | | | | | | | |

| **Tea Programme Field:** | J | F | M | A | M | J | J | A | S | O | N | D |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Harvested Pods: HA | 20.5 | 13 | 4.4 | 8.6 | 10.6 | 14.1 | 20.4 | 6.2 | 13.9 | 28.5 | 27.6 | 26.7 |
| Total Pods | 23441 | 6532 | 4370 | 5307 | 6827 | 6977 | 3022 | 861 | 6712 | 17048 | 16303 | 24027 |
| Pods as % G.Total | 59 | 40.5 | 30.5 | 23.6 | 22.2 | 22.3 | 20.6 | 15.4 | 25.2 | 33.2 | 34.1 | 43.2 |
| Black Pods | 1474 | 629 | 782 | 456 | 320 | 500 | 343 | 85 | 1103 | 4296 | 2182 | 2100 |
| B.Pods % G. Total | 3.7 | 3.9 | 5.5 | 2 | 1 | 1.6 | 2.3 | 1.5 | 4.1 | 8.4 | 4.6 | 3.8 |
| Exptd trees per harvest | 21320 | 13520 | 4576 | 8944 | 11024 | 14664 | 21216 | 6448 | 14456 | 29640 | 28704 | 27768 |
| Pods per exptd. Trees | 1.1 | 0.48 | 0.95 | 0.59 | 0.62 | 0.48 | 0.14 | 0.13 | 0.46 | 0.58 | 0.57 | |
| Present No. of trees* | | | | | | | | | | | | |
| Pods/tree** | | | | | | | | | | | | |
| LABOUR | | | | | | | | | | | | |
| Staff | 6 | 6 | 6 | 6 | 6 | 6 | 6 | 6 | 6 | 6 | 6 | 6 |
| Casuals | 25 | 25 | 25 | 25 | 25 | 25 | 25 | 25 | 25 | 25 | 25 | 25 |
| Total labour | 31 | 31 | 31 | 31 | 31 | 31 | 31 | 31 | 31 | 31 | 31 | 31 |
| Pods/Staff | 1089 | 728 | 885 | 1138 | 1166 | 504 | 931 | 144 | 1119 | 2841 | 2717 | 4005 |
| Pods/casual | 261 | 175 | 212 | 273 | 280 | 121 | 223 | 34 | 268 | 682 | 652 | 961 |
| Pods/labour | 211 | 141 | 171 | 220 | 226 | 97 | 180 | 28 | 217 | 550 | 526 | 775 |
| HA weeded | 10.3 | 8.6 | 9.4 | 3.6 | 6 | 21.9 | 8.3 | 13.8 | 12.8 | 19.5 | 10.6 | 8.5 |
| HA weeded/casual | 0.41 | 0.34 | 0.38 | 0.14 | 0.24 | 0.88 | 0.33 | 0.55 | 0.51 | 0.78 | 0.42 | 0.34 |
| Expted trees weeded/sone | 1785 | 1491 | 1629 | 624 | 1040 | 3796 | 227 | 2392 | 2219 | 3380 | 1837 | 1473 |
| Expted trees weeded/sone | 428 | 358 | 391 | 150 | 250 | 911 | 54 | 574 | 532 | 811 | 441 | 354 |
| No exp trees/labour | 346 | 289 | 315 | 121 | 201 | 735 | 44 | 463 | 429 | 654 | 356 | 285 |
| Pods/HA | 1143 | 502 | 993 | 617 | 664 | 495 | 148 | 139 | 483 | 598 | 591 | 900 |
| Range of Pods/HA:144-1381 | 139-1143 (approx.641 pods/HA) | | | | | | | | | | | |
| Total pods: 124110 | 121427 | | | | | | | | | | | |
| Total B/pods: 22006 | 14270 | | | | | | | | | | | |

| **Cashew Programme Fields:** | J | F | M | A | M | J | J | A | S | O | N | D |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Harvested Pods: HA | 28.1 | 28.7 | 19.6 | 27.4 | 32.1 | 36.1 | 26.6 | 13.3 | 33.4 | 43.5 | 32.6 | 21.8 |
| Total Pods | 4064 | 1944 | 3459 | 6576 | 5969 | 7448 | 3084 | 1287 | 8216 | 13172 | 9381 | 8392 |
| Pods as % G.Total | 10 | 12.1 | 24.1 | 29.3 | 19.4 | 23.7 | 21 | 23.1 | 30.9 | 25.6 | 19.6 | 15.1 |
| Black Pods | 186 | 176 | 385 | 282 | 161 | 382 | 395 | 617 | 4259 | 6579 | 1754 | 790 |
| B.Pods % G. Total | 0.5 | 1.1 | 2.7 | 1.3 | 0.5 | 1.2 | 2.7 | 11.1 | 16 | 12.8 | 3.7 | 1.4 |
| Exptd trees per harvest | 29224 | 29848 | 20384 | 28496 | 33384 | 37544 | 27664 | 13832 | 34736 | 45240 | 33904 | 22672 |
| Pods per exptd. Trees | 0.14 | 0.07 | 0.17 | 0.23 | 0.18 | 0.2 | 0.11 | 0.09 | 0.24 | 0.29 | 0.28 | 0.37 |
| Present No. of trees* | | | | | | | | | | | | |
| Pods/tree** | | | | | | | | | | | | |
| LABOUR | | | | | | | | | | | | |
| Staff | 5 | 5 | 5 | 5 | 5 | 5 | 5 | 5 | 5 | 5 | 5 | 5 |
| Casuals | 25 | 26 | 26 | 26 | 26 | 25 | 25 | 25 | 25 | 25 | 25 | 23 |
| Total labour | 30 | 31 | 31 | 31 | 31 | 30 | 30 | 30 | 30 | 30 | 30 | 28 |
| Pods/Staff | 813 | 389 | 692 | 1315 | 1194 | 1490 | 617 | 257 | 1643 | 2634 | 1876 | 1678 |
| Pods/casual | 163 | 75 | 133 | 253 | 230 | 298 | 123 | 51 | 329 | 527 | 375 | 365 |
| Pods/labour | 135 | 63 | 112 | 212 | 193 | 248 | 103 | 43 | 274 | 439 | 313 | 300 |
| HA weeded | 259 | 20.6 | 13.2 | 21.3 | 22.6 | 24.9 | 26.2 | 16.9 | 29.9 | 10.4 | 22.1 | 27.3 |
| HA weeded/casual | 1.84 | 0.79 | 0.51 | 0.82 | 0.87 | 1 | 1 | 0.68 | 1.2 | 0.42 | 0.88 | 1.2 |
| Expted trees weeded/sone | 5387 | 4285 | 2746 | 4430 | 4701 | 5179 | 5450 | 3515 | 6219 | 2163 | 4597 | 5678 |
| Expted trees weeded/sone | 1077 | 824 | 528 | 852 | 904 | 1036 | 1090 | 703 | 1244 | 433 | 919 | 1234 |
| No exp trees/labour | 898 | 691 | 334 | 714 | 758 | 863 | 908 | 586 | 1037 | 361 | 766 | 1014 |
| Pods/HA | 145 | 68 | 176 | 240 | 186 | 206 | 116 | 97 | 246 | 303 | 288 | 385 |
| Range of Pods/HA:144-1381 | 68-385 (approx. 227) | | | | | | | | | | | |
| Total pods: 124110 | 72992 | | | | | | | | | | | |
| Total B/pods: 22006 | 15966 | | | | | | | | | | | |

| **Coffee Programme Fields:** | J | F | M | A | M | J | J | A | S | O | N | D |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Harvested Pods: HA | 12.7 | 10.9 | 14.8 | 9.9 | 12.6 | 11.5 | 13 | 14.5 | 9.3 | 15.6 | 20.9 | 10.5 |
| Total Pods | 2876 | 1297 | 1760 | 2952 | 6222 | 4675 | 1359 | 1106 | 2906 | 3938 | 3766 | 5164 |
| Pods as % G.Total | 7.2 | 8 | 12.3 | 13.1 | 20.2 | 14.9 | 9.3 | 19.8 | 10.9 | 7.7 | 7.9 | 9.3 |
| Black Pods | 131 | 104 | 161 | 161 | 242 | 261 | 130 | 226 | 1235 | 1335 | 810 | 554 |
| B.Pods % G. Total | 0.3 | 0.6 | 1.1 | 0.7 | 0.8 | 0.8 | 0.9 | 4.1 | 4.6 | 2.6 | 1.7 | 1.0 |
| Exptd trees per harvest | 13208 | 11336 | 15392 | 10296 | 13104 | 11960 | 13520 | 15080 | 9672 | 16224 | 21736 | 10920 |
| Pods per exptd. Trees | 0.22 | 0.11 | 0.11 | 0.29 | 0.47 | 0.39 | 0.1 | 0.07 | 0.30 | 0.24 | 0.17 | 0.47 |
| Present No. of trees* | | | | | | | | | | | | |
| Pods/tree** | | | | | | | | | | | | |
| LABOUR | | | | | | | | | | | | |
| Staff | 6 | 6 | 6 | 6 | 6 | 6 | 6 | 5 | 5 | 4 | 4 | 4 |
| Casuals | 24 | 33 | 33 | 29 | 29 | 29 | 29 | 29 | 29 | 28 | 26 | 26 |
| Total labour | 30 | 39 | 39 | 35 | 35 | 34 | 35 | 34 | 34 | 32 | 30 | 30 |
| Pods/Staff | 479 | 216 | 293 | 492 | 1037 | 935 | 227 | 221 | 581 | 985 | 942 | 1291 |
| Pods/casual | 120 | 39 | 53 | 102 | 215 | 161 | 47 | 38 | 100 | 141 | 145 | 199 |
| Pods/labour | 96 | 33 | 45 | 84 | 178 | 138 | 39 | 33 | 85 | 123 | 126 | 172 |
| HA weeded | 19.5 | 36.1 | 29.3 | 19.3 | 14.8 | 29.3 | 28.7 | 24.8 | 26.7 | 27.8 | 23.7 | 9.0 |
| HA weeded/casual | 0.8 | 1.1 | 0.89 | 0.67 | 0.51 | 1.01 | 0.99 | 0.86 | 0.92 | 0.99 | 0.91 | 0.35 |
| Expted trees weeded/sone | 3380 | 6257 | 5079 | 3345 | 2565 | 6094 | 4975 | 5158 | 5554 | 7228 | 6162 | 2340 |
| Expted trees weeded/sone | 845 | 1138 | 923 | 692 | 531 | 1051 | 1029 | 889 | 958 | 1033 | 948 | 360 |
| No exp trees/labour | 676 | 963 | 781 | 573 | 440 | 896 | 853 | 759 | 817 | 903 | 822 | 312 |
| Pods/HA | 266 | 119 | 119 | 298 | 494 | 407 | 105 | 76 | 312 | 252 | 180 | 492 |
| Range of Pods/HA:144-1381 | 76-494 (approx. 285 pods/ha) | | | | | | | | | | | |
| Total pods: 124110 | 38021 | | | | | | | | | | | |
| Total B/pods: 22006 | 5350 | | | | | | | | | | | |

A. **KOLA (Nuts Harvest)**

| | J | F | M | A | M | J | J | A | S | O | N | D |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Harvested Nuts: HA | 4.4 | 9.1 | 14.1 | 5.6 | NO HARVEST | | NO HARVEST | | 6.4 | NO HARVEST | NO HARVEST | 7.1 |
| Total Nuts | 5587 | 6978 | 11107 | 4223 | NO HARVESTS | | NO HARVEST | | 2128 | | | 750 |
| Nuts as % G.Total | 100 | 100 | 100 | 100 | | | | | 100 | | | 100 |
| Weevils Nuts | 2560 | 2348 | 3432 | 2181 | | | | | 1030 | | | 250 |
| Weevils as % G. Total | 45.8 | 33.6 | 30.9 | 51.6 | | | | | 48.4 | | | 33.3 |
| Exptd trees/ harvest:HA | 722 | 1492 | 2312 | 918 | | | | | 1050 | | | 1164 |
| Nuts exptd. Trees | 7.7 | 4.7 | 4.8 | 4.6 | | | | | 2.03 | | | 0.64 |
| Present No. of trees* | | | | | | | | | | | | |
| Nuts/tree** | | | | | | | | | | | | |
| LABOUR | | | | | | | | | | | | |
| Staff | 6 | 6 | 6 | 6 | 6 | 6 | 6 | 6 | 6 | 6 | 6 | 6 |
| Casuals | 25 | 25 | 25 | 25 | 25 | 25 | 25 | 25 | 25 | 25 | 25 | 25 |
| Total labour | 31 | 31 | 31 | 31 | 31 | 31 | 31 | 31 | 31 | 31 | 31 | 31 |
| Nuts/Staff | 931 | 1163 | 1851 | 704 | N/A | N/A | N/A | N/A | 355 | N/A | N/A | 125 |
| Nuts/Casual | 223 | 279 | 444 | 169 | N/A | N/A | N/A | N/A | 85 | N/A | N/A | 30 |
| Nuts/Labour | 180 | 225 | 358 | 136 | N/A | N/A | N/A | N/A | 69 | N/A | N/A | 24 |
| HA weeded | 8.3 | 6.5 | 8.1 | 3.6 | 9.2 | 8.5 | 8.5 | 7.5 | 7.6 | 10 | 8.1 | 7.9 |
| HA weeded/casual | 0.33 | 0.26 | 0.32 | 0.14 | 0.37 | 0.34 | 0.34 | 0.3 | 0.3 | 0.4 | 0.32 | 0.32 |
| Expt. trees weeded/staff | 227 | 178 | 221 | 98 | 251 | 232 | 232 | 208 | 208 | 273 | 221 | 216 |
| Expt. trees weeded/casual | 54 | 43 | 53 | 24 | 60 | 56 | 56 | 50 | 50 | 66 | 53 | 52 |
| Expt. trees/labour | 44 | 34 | 43 | 19 | 49 | 45 | 45 | 40 | 40 | 53 | 43 | 42 |
| Nuts/HA | 1270 | 767 | 788 | 754 | N/A | N/A | N/A | N/A | 333 | N/A | N/A | 106 |
| Range of Nuts/HA 106-1270, that is, approximately 688 nuts/HA. | | | | | | | | | | | | |
| Range of weevils 33.3-51.6% (approx. 42.5%) | | | | | | | | | | | | |

**REMARKS**:
1. Kola nitida of 164/HA spacing is adopted in this computation.
2. Expected cocoa trees if plots were of effective hectarage (1040/HA)
3. * If current or present numbers of trees per plot were known the yield potential of each tree would have been estimated.
4. ** Same as 3 above.
5. Year 2001 report will contain estimations of potentially yield/performance of plots.

**Correlation analysis**

**KOLA**

| KOLA | KOLHA | KOLNUTS | KOLWEEVIL | KOLNUT/CAKOLHA/CAS | |
|---|---|---|---|---|---|
| KOLHA | 1 | | | | |
| KOLTNUT: | 0.887415 | 1 | | | |
| KOLWEEV | 0.840843 | 0.970442 | 1 | | |
| KOLNUT/C | 0.887531 | 1 | 0.970398 | 1 | |
| KOLHA/CA | -0.37528 | -0.35014 | -0.47232 | -0.35056 | 1 |

**COFFE**

| COFFE | COFHA | COFTPD | COFBPD | COFPD/CACOFHA/CA | |
|---|---|---|---|---|---|
| COFHA | 1 | | | | |
| COFTPD | -0.02988 | 1 | | | |
| COFBPD | 0.207214 | 0.278151 | 1 | | |
| COFPD/CA | 0.005944 | 0.989662 | 0.289865 | 1 | |
| COFHA/CA | 0.241746 | -0.60544 | 0.103264 | -0.63429 | 1 |

**CASHEW**

| CASHEW | CASHA | CASTPD | CASBPD | CASPD/CACASHA/CA | |
|---|---|---|---|---|---|
| CASHA | 1 | | | | |
| CASTPD | 0.742514 | 1 | | | |
| CASBPD | 0.618914 | 0.746474 | 1 | | |
| CASPD/CA | 0.71536 | 0.99772 | 0.736754 | 1 | |
| CASHA/CA | -0.02753 | -0.11942 | -0.27891 | -0.09519 | 1 |

**COCOA:**

| COCOA | COCHA | COCTPD | COCBPD | COCPD/CACOCHA/CA | |
|---|---|---|---|---|---|
| COCHA | 1 | | | | |
| COCTPD | -0.13388 | 1 | | | |
| COCBPD | -0.1159 | 0.584913 | 1 | | |
| COCPD/CA | -0.14327 | 0.998345 | 0.589673 | 1 | |
| COCHA/CA | 0.069606 | -0.15616 | -0.17221 | -0.18176 | 1 |

**TEA**

| *TEA* | *TEAHA* | *TEATPD* | *TEABPD* | *TEAPD/CATEAHA/CA* | |
|---|---|---|---|---|---|
| TEAHA | 1 | | | | |
| TEATPD | 0.777184 | 1 | | | |
| TEABPD | 0.82653 | 0.703476 | 1 | | |
| TEAPD/CA | 0.794688 | 0.768865 | 0.767867 | 1 | |
| TEAHA/CA | 0.23291 | 0.075037 | 0.385327 | -0.02489 | 1 |

**Interpretation of the correlation coefficients**

Kola Programme

KOLHA: KOLHA/CA= > (i) Low inverse Correlation; i.e. as the HA weeded per casual increases the number of nuts harvested from the HA decreases.

(ii) The coefficient of determination (Regression equation) can only account for 14.1% of kola yield in relation to the weeded HA/casual. Thus, other factors account for 85.9%.

(iii) What are the other factors? (i) Less trees per HA (not effective hectarage)

(ii) Age of trees

(iii) Are all trees bearing fruits or nuts?

(iv) Are the soil, climate (weather); and others not responsible?

Similarly low inverse correlations were shown in (i) Total kola nuts (KOLANUTS) and HA weeded per casual (KOLHA/CAS)

(ii) (KOLWeevil) and KOLHA/CAS and

(iii) Kola nuts/CAS and KOLHA/CAS

However, the test for significance:

The t of –1.2803, -1.1821, -1.6945 and –1.1823 respectively with V = 10 d.f. are Not significant"

**Coffee Programme**: Generally, the strength of relationship between variables correlated are weak. For example, total pods harvested show weak inverse correlation of –0.02988. This means an increase in hectares has not given a corresponding increase in pods harvested (not effective hectarage). The regression equation can only account for 0.1% of yield in relation to hectarage. Other factors accounted for 99.9%.

**Cashew Programme**: Farms or plots under this programme are performing fairly well. Areas of concern or attention are hectare weeded in relation to pods harvested from them (CASHA/CAS & CASHA) which has very low inverse correlation.

**Cocoa Programme**: 1. Decrease in total pods in relation to increase in hectares where pods were harvested.

2. High incidence of black pods in relation to hectares/plots where pod were harvested: chemical application will likely reduce the figure.

**Tea Programme** 1. Of all the variables considered, tea programme performed very well – (positive correlation).

2. Only hectares weeded per casual and pods per casual have low inverse correlation of –0.02489.

**CROP PROCESSING AND UTILIZATION PROGRAMME** (Leader: O Olubamiwa)

**Substituting Cocoa Husk for Maize in Diets of Laying Quails: (**O. Olubamiwa**)**

This study on the laying quail was sequel to a previous one in which 3.5-14.0% cocoa husk meal (CHM) and dietary energy levels of 2500-2800kcal/kg, were effectively utilized by the growing quail.

Three replicates each of 20, 16-week-old laying Japanese quails were randomly allocated to each of four dietary treatments. These included the control diet (0% CHM) and diets incorporating 7,14 and 21%CHM at the expense of maize. The energy levels were 2750, 2650, 2550 and 2450 kcal/kg respectively for the control and test diets. All diets were iso-protein. The trial lasted 10 weeks.

The results of the critical aspect of this experiment were clearly at variance with expectations. Though feed intake and egg weight were not influenced by dietary treatments, all CHM inclusions depressed ($P<0.05$) egg production, egg mass and feed efficiency.

It was concluded that further research is needed on the subject to furnish fundamental information on the utilization of fibrous crop by-products like cocoa husk meal in diets of laying quails.

**Table 1: Composition of Diets (%)**

| Ingredients | 1 | 2 | 3 | 4 |
|---|---|---|---|---|
| Cocoa husk meal | 0.00 | 7.00 | 14.00 | 21.00 |
| Maize | 40.00 | 33.00 | 26.00 | 19.00 |
| Full- fat soya | 24.0 | 23.85 | 23.95 | 24.75 |
| Fish meal | 5.00 | 5.30 | 5.50 | 5.50 |
| Maize Bran | 17.50 | 17.50 | 17.55 | 17.70 |
| Cassava Leaf Meal | 3.45 | 3.30 | 2.95 | 2.00 |
| Common Ingredients* | 10.05 | 10.05 | 10.05 | 10.05 |
| Total | 100.00 | 100.00 | 100.00 | 100.00 |
| Determined analyses (%) | | | | |
| Crude protein | 18.03 | 18.20 | 18.03 | 18.00 |
| Crude fat | 4.01 | 4.26 | 5.23 | 5.69 |
| Crude fibre | 3.76 | 5.46 | 8.37 | 10.43 |
| Calculated analysis | | | | |
| ME (Kcal/Kg) | 2750 | 2650 | 2550 | 2450 |

Contained: Oyster shell (7.55); bone meal (2.0); layers premix* (0.25); Salt (NaCl) (0.25).
*Agricare premix; Pfzer Nigeria PLC, Ikeja.

**Table 2: Productive Performance of Laying Quails on Cocoa Husk Diets**

| Parameter | D<br>1 | I<br>2 | E<br>3 | T<br>4 | S<br>SD |
|---|---|---|---|---|---|
| Feed intake (FI) (g/bird/day) | 23.8[a] | 23.5[a] | 23.0[a] | 23.8[a] | 1.6 |
| Egg production (EP) (%) | 52.9[a] | 38.0[b] | 29.4[bc] | 22.0[c] | 6.5 |
| Egg weight (EW) (g) | 10.4[a] | 10.3[a] | 10.5[a] | 10.6[a] | 0.6 |
| Egg mass (EM) (g/bird/day) | 3.9[a] | 3.9[a] | 3.1[b] | 3.2[b] | 1.6 |
| Feed efficiency (FE) (FI/EM) | 4.4[a] | 6.0[b] | 7.4[c] | 7.5[c] | 1.2 |
| Mortality (%) | 3.3 | 0.0 | 1.7 | 0.0 | Na |

abc Means in the same row with different superscripts differ significantly (P< = 0.5).
Na = Not applicable.

**Effect of Bulk Sweetener (Glucose) and Vegetable Fats (Hardened Palm Oil and Shea Nut Butter) on the Thermoresistant Property of Chocolate Production for the Tropics.**
*(T.O. Akinwale (Mrs)*

In order to tackle the thermoresistance problem of chocolate for the tropics, the use of bulk sweetener (glucose) and some vegetable fats were studied. Glucose was incorporated into the recipe to replace 25 and 50% sucrose while hardened palm oil (HPO) and shea nut butter were incorporated at varying levels between 10-50% and 5-20%, respectively.

The modified method for chocolate making routinely used by the Institute was employed. Proximate analysis of the samples were determined using AOAC (1980) methods. Melting characteristics and calorific values were determined using Gallenkamp melting apparatus and Ballistic Bomb calorimeter, respectively. Samples were evaluated for colour, taste, smoothness and over-all acceptability using Hedonic scale with 9 representing “like extremely” and 1 “dislike extremely”. Conventional milk chocolate was used as control sample.

The melting points of the chocolate remarkably increased with the inclusion **of** glucose syrup and the vegetable fats, ranging between 30-41$^{o}$ C as against 32$^{o}$ C obtained for the conventional chocolates (Tables 1 and 2).

The inclusion of glucose was observed to significantly reduce the caloric value of the chocolate from 505.75 cal/100g to 354cal/100g of sample.

The results obtained for sensory evaluation indicated no significant difference in all probability levels for the product prepared from glucose syrup, sheanut butter and 10% hardened palm oil.

It can be concluded that the replacement of cocoa butter by 5-20% sheanut butter, 10% hardened palm oil and up to 50% glucose syrup can produce chocolates which are thermoresistant and acceptable to consumers.

**Table 1: Selected Physico-chemical Characteristics of Chocolate Products made from Different Levels of Glucose Syrup (GS)**

| Chocolate product | % Moisture | % Dry Matter | % Ash | % Fat | Calorie/ 100g of sample | Melting point $^{o}$C |
|---|---|---|---|---|---|---|
| 25% glucose syrup and 75% sucrose | 2.5 [b] | 97.50 [b] | 2.50 [b] | 20.50 [c] | 354.27 [c] | 40.00 [b] |
| 50% glucose syrup and 50% sucrose | 2.65 [a] | 97.35 [b] | 2.48 [b] | 22.20 [b] | 404.60 | 41.00 [a] |
| Conventional chocolate (100% sucrose) | 1.45 [c] | 98.55 [a] | 3.17 [a] | 30.00 [a] | 505.15 | 32.00 [c] |

a, b,c, Means of values in each with different letter are significantly different at 5% probability (P > 0.05).

**Table 2: Physico-chemical Characteristics of Chocolate Products made from Different levels of Hardened Palm Oil (HPO) and Cocoa Butter (CB).**

| Chocolate product | % Moisture | % Ash | % Fat | Calorie/ 100g of sample | Melting point $^{o}$C |
|---|---|---|---|---|---|
| 10 HPO: 90CB | 3.04 | 1.90 | 20.55 | 404.60 | 39.00 |
| 20 HPO: 80CB | 2.90 | 2.70 | 21.72 | 354.00 | 41.00 |
| 50 HPO: 50CB | 1.60 | 2.85 | 35.00 | 303.45 | 42.00 |
| Chocolate recipe from 100% Cocoa Butter (Control | 1.150 | 3.17 | 30.00 | 505.75 | 32.00 |

a, b,c, Means of values in this column with different letter are significantly different at 5% probability (P > 0.05).

**Extraction of Pulp from Fresh Cocoa Beans for Wine Production: Physico-Chemical and Sensory Evaluation of the Wine (**T.O. Akinwale (Mrs.)

Different percentages of mucilage were manually removed by washing the pulp with 0.5-2.OL of water per kilogram of cocoa. The extracts from all the washings were pooled together, homogenised, pasteurised and prepared for fermentation. Fermentation was allowed to take place at ambient temperature (28-30$^{o}$C).

Physical examination, alcohol content, ash, % extract, soluble solids and specific gravity (at 20$^{o}$C), pH and total acids were determined according to AOAC (1980) methods.

Sensory evaluation was carried out using Hedonic scale with 9 representing “like extremely” and 1 “dislike extremely”.

Normal trend during fermentation was observed (Table 1). The physico-chemical and sensory characteristics of the cocoa wine compared favourably with commercial wines (Table 2).

The removal of mucilage affected the quality of the cured beans resulting in high incidence of germination with higher mucilage removal (Table 3).

However, an acceptable wine can be produced from cocoa mucilage washings.

**Table 1: Primary Fermentation Profile for Cocoa Mucilage Wine**

| Period of fermentation (Days) | Specific gravity at 20°C | Titrable acididy (%v/v/ tartaric acid) | Total soluble solid % at 20°C | pH |
|---|---|---|---|---|
| 0 | 1.080 | 0.110 | 20.00 | 3.80 |
| 2 | 1.069 | 0.250 | 10.00 | 3.20 |
| 4 | 1.048 | 0.345 | 15.50 | 3.08 |
| 6 | 1.019 | 0.5.85 | 8.50 | 3.10 |
| 8 | 1.019 | 0.585 | 8.50 | 3.25 |
| 10 | 1.004 | 0.685 | 7.25 | 3.30 |
| 12 | 0.993 | 0.715 | 5.25 | 3.15 |
| 14 | 0.990 | 0.945 | 5.50 | 3.35 |

**Table 2: Physico-chemical Attributes of Cocoa Wine Compared with some Commercial Fruit Wines.**

| Wine | PH | Specific Gravity at 20°C | % Extraction | % Total solid at 20 °C | % Total acid w/v (tartaric % acid) | % Fixed Acid (w/v) | Volatile acids as (w/v % acetic) | % Alcohol (v/v) |
|---|---|---|---|---|---|---|---|---|
| Cocoa | $3.70^{a}$ | $0.990^{d}$ | $1.930^{c}$ | $5.00^{d}$ | $0.890^{b}$ | $0.810^{b}$ | $0.080^{a}$ | $10.00^{a}$ |
| Apricot | $3.10^{d}$ | $1.040^{a}$ | $11.000^{a}$ | $9.00^{a}$ | $1.073^{a}$ | $1.043^{a}$ | $0.031^{b}$ | $7.00^{b}$ |
| Capel | $3.60^{b}$ | $1.000^{c}$ | $3.280^{b}$ | $6.00^{c}$ | $0.680^{b}$ | $0.620^{c}$ | $0.050^{a}$ | $10.00^{a}$ |
| Peach | $3.45^{c}$ | $1.034^{ab}$ | $11.400^{a}$ | $7.06^{b}$ | $0.800^{b}$ | $0.770^{b}$ | $0.036^{b}$ | $7.10^{b}$ |

a,b,c,d – Means of values in columns with different letters are significantly different at $P \leq 0.05$

**Table 3: Summary of the cut test for the washed fermented beans**

| Sample | No.of beans/ 100g | Moisture content | Mouldy | Insect infested | germinated | purple | brown | pH |
|---|---|---|---|---|---|---|---|---|
| W | $89.00^{a}$ | $5.40^{d}$ | $0.00^{a}$ | $2.00^{c}$ | $9.00^{c}$ | $28.00^{b}$ | $64.00^{b}$ | $5.65^{c}$ |
| X | $89.00^{b}$ | $5.90^{c}$ | $0.00^{a}$ | $14.00^{a}$ | $20.00^{b}$ | $15.00^{c}$ | $51.00^{c}$ | $6.35^{b}$ |
| Y | $82.00^{c}$ | $6.00^{b}$ | $0.00^{a}$ | $13.00^{b}$ | $30.00^{a}$ | $30.00^{a}$ | $38.00^{d}$ | $6.50^{a}$ |
| Z | $92.00^{c}$ | $7.00^{a}$ | $0.00^{a}$ | $0.00^{d}$ | $4.00^{d}$ | $4.00^{d}$ | $90.00^{a}$ | $5.20^{d}$ |

a,b,c,d, - Means of values with different letters in the same columns are significantly different at 5% probability level ($P < 0.05$).

W - Cocoa beans washed with 2.5 litres of water/5kg of fresh beans
X - Cocoa beans washed with 5 litres of water/5kg of fresh beans
Y - Cocoa beans washed with 10 litres of water/5kg of fresh beans
Z - Normal cocoa beans (No washing).

**Utilization of Kola in the Preparation of Kola Drinks (**C.O. Jayeola (Mrs**)**

The fresh nuts (seeds) of kola, (*Cola nitida)* were used in the preparation of kola soft drink. Moisture, ash, protein, carbohydrate, fat and caffeine contents of the seeds were determined. The developed kola soft drink was compared with some popular types vide the analyses of pH, total solids, specific gravity, caffeine and sensory evaluation.

The results indicated that the fresh nut contained 55.00% moisture, 2.40% ash, 8.90% protein, 88.10% carbohydrate, 0.92% fat and 1.50% caffeine. The formulated kola soft drink had a pH of 5.40, total solids of 10% and specific gravity of 1.040. These values are not significantly different from the values obtained for the commercial soft drinks. The result from sensory evaluation indicated that the formulated soft drink was well accepted (P< =0.05) thus making the utilization of kolanut for soft drink production possible in the producing areas. This development will add value to kola production by increasing the income of both primary producers and industrial users of the nuts.

**Table 1: Sensory Evaluation Result of Kola Soft Drink and Commercially Sold Soft Drinks.**

| Sample No. | Taste | Colour | Brilliance/ Clearity | Gas Evolution | Overall Acceptability |
|---|---|---|---|---|---|
| 214 | 8.10 | 8.30 | 8.40 | 8.30 | 8.70 |
| 308 | 8.60 | 8.30 | 8.50 | 8.40 | 8.80 |
| 522 | 8.40 | 8.40 | 8.70 | 8.70 | 8.80 |
| 640 | 8.80 | 8.10 | 8.60 | 8.70 | 9.00 |
| Means | 8.47 | 8.27 | 8.55 | 8.52 | 8.82 |
| (P) | N.S | N.S | N.S | N.S | 8.S |
| (V(%) | 21.52 | 24.93 | 27.07 | 22.10 | 21.94 |
| SE | 0.265 | 0.297 | 0.284 | 0.223 | 0.280 |

| | | |
|---|---|---|
| Where 214 | - | Formulated kola drink |
| 308 | - | Afri -Cola |
| 522 | - | Pepsi -Cola |
| 640 | - | Coca-Cola |
| N.S | - | Not Significant**.** |

**Utilization of Kolanut and Cocoa in Beverage Production**
(T.O. Akinwale (Mrs) and C.O. Jayeola (Mrs)

Kolanut (*Cola nitida*) powder and cocoa (*Theobroma cacao*) powder were used in the production of kola-cocoa (Cola coco) beverage in ratios 10.0:0.0, 7.5:2.5, 5.0:5.0, 2.5:75, and 0.0:10.0, respectively. Sugar, powdered milk and corn starch were added to the blends. The varying beverages were subjected to pH, protein, fat, ash, and caffeine contents analyses. The result indicated that there is increase in protein content of the beverage as the cocoa powder inclusion increased. The result of the sensory evaluation also revealed that all the products were acceptable as a beverage to the tasters.

Study is on-going so as to determine the shelf-life of the varying beverage products.

**Table 1: Proximate Analysis of Kola-Cocoa (Cola coco) Beverages**

| Parameter | 10.0:0.0 | 7.5:2.5 | 5.0:5.0 | 2.5:7.5 | 0.0:10.0 |
|---|---|---|---|---|---|
| Protein | 7.44 | 7.88 | 9.63 | 10.06 | 10.94 |
| Fat | 0.98 | 1.01 | 1.14 | 1.24 | 1.26 |
| Ash | 2.63 | 2.60 | 2.66 | 2.34 | 2.50 |
| Caffeine | 1.70 | 1.02 | 0.84 | 0.56 | 0.23 |
| pH | 6.60 | 6.30 | 6.20 | 6.20 | 6.30 |

**Table 2: Sensory Evaluation of Kola-Cocoa (Cola coco) Beverages**

| Sample No. | Taste | Colour | Flavour | Dispersability | Overall acceptability |
|---|---|---|---|---|---|
| 10.0:0.0 | 6.40 | 7.40 | 6.50 | 6.20 | 6.20 |
| 7.5:2.5 | 6.50 | 7.20 | 6.50 | 6.40 | 6.60 |
| 5.0:5.0 | 6.90 | 7.20 | 6.60 | 6.60 | 6.60 |
| 2.5:7.5 | 6.50 | 7.40 | 6.80 | 6.40 | 6.50 |
| 0.0:10.0 | 6.60 | 7.40 | 6.80 | 6.30 | 6.60 |
| Means | 6.58 | 7.24 | 6.64 | 6.38 | 6.50 |
| P | N.S | N.S | N.S | N.S | N.S |
| (V(%) | 22.61 | 20.12 | 23.40 | 23.62 | 22.45 |
| SE | 0.21 | 0.23 | 0.24 | 0.28 | 0.23 |

Where N.S. - Not Significant
SE - Standard Error.

**Performance of African Giant Land Snails (Archatina archatina) Fed Fresh Kola Testa Under Kola Plantation (**R.A. Hamzat)

**Experimental Design:** Seventy-five grower, African giant snails were raised using a Tyre – Technology newly developed at Cocoa Research Institute of Nigeria (CRIN). There were five treatments and each of the treatments was replicated three times with five (5) snails allocated to each of the replicates. The treatments were:
A - 100% (Fresh Water Leaf (FWL)
B - 80% FWL + 20% Fresh Kola Testa (FKT)
C - 50% FWL + 50% (FKT)
D - 20% FWL + 80% (FKT)
E - 100% (FKT)

**Proximate Contents of FKT and FWL**

The proximate composition of kola testa and waterleaf is shown in Table 1. Fresh kola testa and waterleaf had similar dry matter (DM) and ether extract (EE) contents. Kola testa had lower crude protein (CP), higher crude fibre (CF) and **higher nitrogen**-free-extractives (NFE) contents, than waterleaf.

**Performance of Experimental Snails**

The result of the performance parameters indicated that significant ($P<0.05$) treatment effects were observed in weight, shell length and shell Mouth Radius (SMR) (Table 2). The best results were obtained on the snails fed rations B and D while the snails fed rations A,C and E had poorer results. Mortality was lower in treatment B than in A with no mortality recorded in treatments C, D and E.

| Constituents | Kola Testa | Waterleaf |
|---|---|---|
| Dry matter (DM) | 11.99 | 9.68 |
| Crude protein (CP) | 13.22 | 21.09 |
| Crude Fibre (CF) | 14.36 | 10.34 |
| Ether extract (EE) | 1.37 | 1.47 |
| Nitrogen free extractives (NFE) | 59.00 | 32.54 |
| Total Ash | 12.17 | 34.56 |

**Table 2: Performance of African Land Snails (Archatina archatina) Fed Different Levels of Fresh Kola Testa.**

| Parameters | A | B | C | D | E |
|---|---|---|---|---|---|
| Live-weight (g) (W) | 128 [a] | 139 [b] | 128 [a] | 146 [b] | 130 [a] |
| Shell Length (SL) | 95.7[a] | 100.9 [a] | 95.9 [a] | 90.5 [b] | 90.2 [b] |
| Shell Mouth Radius (SMR) | 29.1[b] | 30.7 [a] | 29.6 [a] | 28.4 [b] | 38.2 [a] |
| Mortality (M) | 20.0 | 12.5 | 0.0 | 0.0 | 0.0 |

[a b] - Means within the same row with different superscripts are significantly different ($P < 0.05$).

**Studies on the Utilization of Kola Pod Husk in Liquid Soap Production:**
(L.E. Yahaya, R.A. Hamzat and S.O. Aroyeun)

Kola pod husk (KPH), the pericarp portion of the fruit, *Cola nitida*, was ashed and the ash was subjected to hot water and mineral acid extraction. Extracts from KPH ash (KPA) were analysed for mineral elements, viz: Ca, Na and K. The results revealed that KPA contains a relatively high percentage of potassium as indicated in its value of 37.4% in the extract. This value compares well with 41.0% for cocoa pod ash (CPA) which has been used successfully to develop a highly demanded liquid detergent at CRIN. As such it could serve as a potential ingredient in soap production.

Liquid soap was prepared from the potash extract of KPH. The quality of the soap obtained compared favourably with that of cocoa pod husk. This was evident in the high lather performance, low free fatty acid (0.005%), low free alkali and unsaponified neutral fat. There is therefore an indication that KPH, a seemingly agricultural waste can be utilized to replace commercial caustic soda in soap production.

**Fortification and Enrichment of Carbohydrate Rich Product with Cashew Kernel**:( S. O. Aroyeun)

Cashew Kernel Meal (CKM) was used as a protein rich source in the preparation of biscuit. The biscuits were produced from blends of soft wheat flour(SWF) and Cashew Kernel Meals (CKM). The different ratios of SWF to CKM used were (B) 90:10, (C)85:15, (D) 75:25 and (E) 50:50 respectively. The sample containing |SWF/CKM (i.e A) served as the control. The different biscuits produced were nutritionally analysed.

The results indicated a higher percentage values of protein, fat and ash for all the biscuits than the control sample A. Sensory evaluation results obtained indicated that all the biscuits so produced had high sensory ratings for all the selected attributes evaluated apart from sample E (SWF/CKM:50/50) which scored the lowest. There were no significant differences ($P < 0.05$) among all the biscuits samples analysed in attributes of taste, colour, texture, flavour and overall acceptability except E. The biscuit sample containing 90/10 SWF:CKM was considered to be close to Digestive biscuit in taste, texture and flavour. The implication of this is that although cashew is expensive it could not be compared to high cost of animal protein, hence the utilization of such plant protein which could provide essential nutrients to the body should be encouraged.

**Synthesis and Characterisation of CNSL – Modified resin Coating (**L.E. Yahaya**)**

Cashew nut shell liquid (CNSL) was expressed from the nuts of the Plant, *Anacardium occidentale* L. The liquid was subjected to physico-chemical characterisation. Results showed that CNSL has moderate acidic content (as evident in its low pH value), high level of unsaturation (Iodine value), low moisture content, high solid content, and non-drying.

Resin coating was synthesized from this liquid and the product was evaluated as binder for use as surface coating in vehicles. Results obtained revealed that the resin film exhibit short period of drying time, has excellent resistance to acid and salt solutions. However, it has poor resistance to alkali on application to

wood substrate. Thus, CNSL-based resin could be employed as binder in surface coating where resistance to alkali is not a major requirement.

**Progress Report Of Research Project On The Utilization Of Cashew Nut Shell Liquid In Surface Coatings And Polymer Processing** (Yahaya L.E **)**

The objective of the research project was to source for an alternative raw material for the production of the conventional surface coating of vehicles, which are petroleum-based. Besides, cashew nut shell liquid (CNSL) had not been put into any economic use for years.

For this study, CNSL was modified with other reagents by thermal polymerization to form resin, which can serve in the capacity mentioned above. Test performance of the finished product was determined by monitoring its drying time as well as subjecting the coated vehicle to different service media such as water, salt, alkali and acid solutions. Results showed that the film of the coating resin has excellent resistance to acid solution (10% $H_2SO_4$), unaffected by water and salt solution, however it has poor resistance to alkali (10% Na0H) – solution. This was, therefore, an indication that CNSL – modified resin could be employed as a binder in surface coating where resistance to alkali is not a major requirement e.g. some paints, printing ink and varnish industries. This will go a long way in reducing the cost of procuring the raw materials that are rather petroleum-based.

**Progress Report In The Utilization Of Kola Testa In Snail Nutrition Under Kola Plantation** (Hamzat, R.A.)

This study was carried out at the snailery unit of Cocoa Research Institute of Nigeria. The study spanned 84 days. Fifteen sets of old tyres of equal size that were previously washed and disinfected, were arranged in a particular pattern as explained below so as to create an intensive housing requirement for the snails. The first tyre from the bottom in each set was filled totally with sandy loamy soil. Kola leaves were used to cover the soil in order, to provide a natural habitat situation for the experimental snails. The tyres arranged on top of the soil filled tyre were perforated at the edges to encourage drainage of rainwater from the tyre. Seventy-five (75) grower, African giant land snails were purchased from a local farmer within Ibadan metropolis. Each set of tyres was covered at the upper most part by rubber netting made for this purpose. The snails were fed ad-infinitum. The soils in the pens were changed once, every month for the three (30 months' duration to avoid a build up of micro organisms that can be harmful to the snails.

Proximate analysis was done on the feed materials to determine their nutritive value (AOAC 1990). On a weekly basis, the weights of the snails were taken on an electric scale while the shell length and shell mouth radius were taken using a verneer calliper.

To measure these parameters, the snails were allowed to crawl in fresh water in order to remove the sandy-loamy soil on the snails body surface. The records of mortality were kept. Data obtained were subjected to ANOVA test (Steel and Torrie 1990).

The organoleptic assessment as well as the histological studies of the snails fed with the above treatments is in progress and the results will be available soon.

**FARMING SYSTEMS RESEARCH AND EXTENSION PROGRAMME**
(Leader: Dr. A. A. Adeyemi)

(i) **Determination of optimum spacing and plant population for kola and citrus in cocoa/kola/citrus intercrop** (A. A. Adeyemi)

The objective of this study was to find out the appropriate spacing and plant population densities under which kola and citrus can be suitably intercropped with cocoa to evolve cocoa/kola/citrus intercrop with high productivity.

The experiment commenced in 1995 at Ajassor; and the treatments included:

Cocoa at ($3m^2$) + kola/citrus at 24x24m each = 17 trees per ha each of kola and citrus.
Cocoa ($3\ m^2$) + citrus at 24x12m each = 34 trees per ha each of kola and citrus .
Cocoa ($3\ m^2$) + kola/citrus at 21x10.5m = 54 trees per ha each of kola and citrus.
Cocoa ($3\ m^2$) + citrus at 12mx12m = 69 trees/ha each of kola and citrus.
Sole Cocoa ($3\ m^2$) – 3mx3m = 1,111 cocoa trees
Sole Cola ($7.6\ m^2$) – 7.6.m x 7.6m = 173 plants per ha.
Sole Citrus ($7.6\ m^2$) – 7.6.m x 7.6m. = 173 plants per ha.

In 2000 (the year under review), the experimental site for the study (1.5ha of land) was maintained through periodic weedings and shade management through regular desuckering of plantain suckers where they were too many and using them for supplying of areas where plantain stands were missing in the site. Gapping up of some missing stands of component crops were also effected in the site during the year under review. Harvesting of cocoa pods was done in some plots.

Growth and development of intercropped cocoa, kola and citrus tended to increase with increase in spacings and decrease in plant population densities. Consequently, girth and canopy scores of cocoa, kola and citrus in cocoa/kola/citrus were better at larger spacing and lower plant population densities of kola and citrus than at smaller spacings and higher plant population densities, although the differences were not significant (Tables 1, 2 and 3). Similarly, the growth performance of polycultured cocoa, kola and citrus was comparable to that of their corresponding pure stands indicating that there were no deleterious effects of intercropping on the component crops at this stage of intercropping. This is probably due to the non-closure of leaf canopies of the three component crops as a result of which the growth of each of the component crops was not hindered by the competitive ability for analysis during the time of writing this report and these would be reflected in the subsequent report.

The experiment was replicated on a 1.5ha land at the Institute's Headquarters, Idi-Ayunre in the year under review, using randomised complete block design (RCBD) to lay out the treatments on the field. Only cocoa was able to be planted in the year while the remaining component-crops including kola and citrus would be planted in year 2001.

**Table 1: Growth response of cocoa to the different spacings and plants population densities of kola and citrus in cocoa/kola/citrus intercrop at Ajassor in 2000.**

| Treatment | [1]Height (cm) | Stem diameter((cm) | [2]Canopy scores |
|---|---|---|---|
| Cocoa ($3\ m^2$) + kola/citrus at 24x24m | * | 8.43 | 8.5 |
| Cocoa ($3\ m^2$) + kola/citrus at 24x12m | * | 7.43 | 8.2 |
| Cocoa ($3\ m^2$) + kola/citrus at 21x10.5m | * | 7.67 | 7.5 |
| Cocoa ($3\ m^2$) + kola/citrus at 12x12m | * | 7.80 | 7.5 |
| Cocoa ($3\ m^2$) + kola/citrus at 9x9m | * | 7.35 | 6.8 |
| Sole cocoa at 3mx3m | NS | 7.60 | 8.2 |
| LSD (P = 0.05) | | NS | NS |

[1]. Height above 300cm
[2]. Canopy scores (0-10) where 0 = poor canopy formation and 10 = full canopy formation.

**Table 2: Growth performance of kola as influenced by the different spacings and plant population densities of kola and citrus in cocoa/kola/citrus intercrop at Ajassor in 2000.**

| Treatment | Stem Diameter (cm) | Canopy scores |
|---|---|---|
| Cocoa (3 $m^2$) + kola/citrus at 24 x 24m | 4.10 | 7.50 |
| Cocoa (3 $m^2$) + kola/citrus at 24 x 12m | 3.73 | 6.50 |
| Cocoa (3 $m^2$) + kola/citrus at 21 x 10.5m | 3.71 | 6.60 |
| Cocoa (3 $m^2$) + kola/citrus at 12 x 12m | 3.04 | 6.10 |
| Cocoa (3 $m^2$) + kola/citrus at 9 x 9m | 3.02 | 6.00 |
| Sole kola at 7.6m x 7.6m | 3.80 | 7.35 |
| LSD (P = 0.05) | NS | NS |

**Table 3: Effects of spacings and plant population densities on the growth performance of citrus in cocoa/kola/citrus intercrop at Ajassor in 2000.**

| Growth Parameters of Kola | | |
|---|---|---|
| Treatment | Stem Diameter (cm) | Canopy scores |
| Cocoa ($3^{m2}$) + kola/citrus at 24 x 24m | 4.60 | 7.50 |
| Cocoa ($3^{m2}$) + kola/citrus at 24 x 12m | 4.23 | 7.00 |
| Cocoa ($3^{m2}$) + kola/citrus at 21 x 10.5m | 4.21 | 7.00 |
| Cocoa ($3^{m2}$) + kola/citrus at 12 x 12m | 3.54 | 7.50 |
| Cocoa ($3^{m2}$) + kola/citrus at 9 x 9m | 3.52 | 6.00 |
| Sole kola at 7.6m x 7.6m | 3.2 | 7.00 |
| LSD (P = 0.05) | NS | NS |

(ii)

## Determination of Suitable Intercropping System in Coffee (A. A. Adeyemi)

This study commenced in 1998 at Uhonmora and the objective was to evaluate various arable crop combinations that can be compatibly grown in association with coffee without any adverse effects of intercropping on the component crops especially coffee which is the main or precious crop within the mixtures.

Treatments investigated included:

(i) Coffee/yam/maize/cowpea;
(ii) Coffee/cassava/maize/melon;
(iii) Coffee/cassava/maize;
(iv) Coffee/cocoyam/pepper/okra
(v) Sole coffee (pure stands of coffee).

The experiment was repeated in 2000 and the plot size was 9m x 9m consisting of 9 coffee stands per plot while most of the arable crops were spaced at 1m apart except pepper that was planted at 1.0 x 0.5m. Maize was however planted at 2 plants per stand in the two different mixtures in which it existed during the investigation.

Results during the year under review showed that intercropping coffee with arable crops had no deleterious effects on the intercropped coffee. Growth performance of intercropped coffee in terms of plant height, stem diameter and number of leaves was either comparable with or better than that of sole coffee (Table 1). Yield of intercropped cassava ranged from 16.04 to 20.17tons per ha in coffee/cassava/maize/melon and coffee/cassava/maize mixture (Table 2).

**Table 1: Growth performance of coffee under different intercropping systems in coffee intercropped with different arable crops at Uhonmora in 2000.**

| Treatment | Height (cm) | Stem diameter (cm) | No. of leaves |
|---|---|---|---|
| Coffee/yam/maize/cowpea | 63.56 | 1.25 | 56.47 |
| Coffee/cassava/maize/melon | 55.67 | 0.88 | 25.97 |
| Coffee/cassava/maize | 56.44 | 0.99 | 33.50 |
| Coffee/cocoyam/pepper/okra | 57.55 | 0.99 | 37.00 |
| Sole coffee | 57.52 | 0.92 | 42.14 |
| LSD P = (6.05) | | | |

Table 2: Yield of Intercropped cassava under coffee intercropped with arable crops at Uhonmora in 2000.

| Cropping Systems | Yield (tons/ha) of cassava |
|---|---|
| Coffee/cassava/maize/melon | 16.04 |
| Coffee/cassava/maize | 20.17 |

**Clonal Effect of Tea on Maize Yield in Tea/Maize Intercrop (**C.R. Obatolu and M. Daniel)

Tea (*Cammelia sinensis L.*) is usually planted at a spacing of 0.6 x 1.0m and this gives enough space before canopy closure in two years. Although skeletal harvesting is done when tipping off and creating plucking table for tea, the economic returns of land used for tea cultivation can be increased if intercropped.

Maize (*Zea mays L.)* was intecropped with tea planted at 0.6 x 1.0m. There were two clones used in this trial - clones 318 and 35, and the following were the treatments:-

(i) Tea clone 318 intercropped with maize at 21,913 plants per ha (T1)
(ii) Tea clone 35 intercropped with maize at 21,913 plants per ha (T2)
(iii) Sole maize (T3)

Results obtained are presented in Table 1 below:

**Table 1: Maize Yield Under Different Tea Clones**

| Treatment | No. of Cob | Weight of cob + grains (kg) | Weight of grains (kg) |
|---|---|---|---|
| Tea clone 318 + maize | 905 | 81.45 | 67.54 |
| Tea clone 35 + maize | 825 | 74.30 | 60.78 |
| Sole maize | 905 | 82.44 | 67.62 |

Results showed that maize yield was not adversely affected by intercropping it with tea at the first year of intercropping**.**

**LIBRARY, INFORMATION AND DOCUMENTATION (**Leader: O. O. Fagbami**)**

The Library at the Headquarters houses most of the Institute's classified and informative materials on the mandate crops. The principal function of the Library is to meet information demand from researchers and groups viz. crop stakeholders, tertiary institutions of higher learning on mandate crops of the Institute, by purchasing books, periodicals and other publications. The interest of these stakeholders has been boosted with the establishment of mini-libraries at Uhonmora, Ochaja, and Owena Substations of the Institute. The standard of the Library has been maintained financially by the Management and support from collaborating organizations on exchange of research and extension papers.

Selective Dissemination of Information (SDI) has improved with profiles on priority research themes being distributed to research programmes in the Institute. A very extensive collection of materials on the Institute, mandate crops published in other organisations is done to boost information provision on all these research crops. A total of 15 published articles of research staff were submitted in the year 2000. 28 international and local journals with 10 books relevant to the mandate crops were received in the same year. 1,376 users visited the Library, while 1,878 books, 1,932 journal titles and 348 newspapers titles were consulted. Functioning Photostat machine for commercial purpose was provided for use. Constraint of the Library mainly is its computerization which is yet to be fully realised. Inability to subscribe for most foreign periodicals due to inadequate capital has not made the Library buoyant in research materials. Suggestion is for the Institute’s full integration into technological advancement of information transfer and exchange with other organizations for her research programmes into economic crops of the country.

**INTERNAL AUDIT (** Head : A.S.B. Akanni**)**

The Internal Audit carried out Audit of all financial records at the Headquarters and the Six Substations during Year 2000. We observed that all the financial records, store records and pension records were properly kept during the year of report.

**CRIN ENGINEERING GROUP (**Leader :G. E. Ubani**)**

The year witnessed several activities in the eight (8) functional sections of the group, namely:

1. Mechanical Section.
2. Electrical/Telecommunications Section
3. Carpentry Section
4. Civil (Building/Roads) Section
5. Painting/Sign-writing Section
6. Water Works and Plumbing Section
7. Drawing Office
8. Transport Office.

We are pleased to present the achievements of each section below:

1. **Mechanical Section**
    1. Reactivation of the machine shop's lathe machine which had been out of use for a decade or so. This enabled the group to fabricate bushings and other small spare parts for the Water Works' pumps and tractors.
    2. Refurbishing/reactivation of three (3) saloon cars, one (1) Police Patrol Station Wagon Car, one (1) MAN Diesel Water Tanker and one (1) Mercedes Benz 911 Lorry.
    3. Maintenance and servicing of all the Institute's fleet of vehicles.
    4. The Institute's staff transit vehicles were kept functional despite their age.
    5. Design and fabrication of slasher blades for the tractors.
    6. Recovery of accidented Sonata FG 01 G03 from Lagos whose engine was used to rehabilitate Sonata FG 04 G03.
2. **Electrical/Telecommunication Section**
    1. Achieved steady supply of electricity at the Institute through regular maintenance and rapid response to fault reports.
    2. Supply of power from the national grid improved due to collaboration with NEPA. Contributed personnel, vehicle and sometimes tools and materials to assist NEPA fault clearing efforts.
    3. The out-dated analogue NEPA meter which had consistently caused CRIN to be over-billed especially on "Demand Charge", was replaced.
    4. Regular Maintenance of CRIN High Tension (HT) and Low Tension (LT) power lines.
    5. Regular maintenance of the Institute's 250KVA, 27KVA, 12.5KVA and 2.5KVA generators.
    6. Maintenance of the HT and LT equipment, Viz. Transformers, RMUs, Control Panels, Oil cooled Circuit Breakers (OCBs) and Tripping Unit.
    7. Maintenance of the T16 Panasonic PABX. The "dead" extension to the Engineering Group was reactivated.
    8. Supervision of the supply and installation of a new voyager 1600ss-microwave radio link equipment for one NITEL telephone line to the Institute.
    9. Reactivation of the Airconditioners in the conference/committee rooms.
    10. Routine electrical engineering services support to all segments of the Institute.
3. **Carpentry Section**
    1. Renovation works at Quarters DD1, PRO3 and other residential and office buildings.
    2. Design and construction of chairs, tables and drawers for FMC/CRIN Project, mechanical section, Finance and Supply Group, Audit Section and the Administration Group.
    3. Construction of formwork for civil engineering jobs.
    4. Roofing of the 700gallon under-ground water reservoir at the laboratories/administrative block.
    5. Sundry repair of doors/replacements of lock sets.
    6. Construction of wooden snailery pens for the CPU.
4. **Civil (Buildings/Roads)Section**
    1. Renovation of residential buildings i.e PRO 3, DDI and DI..
    2. Renovation of telephone equipment room.
    3. Building of a 700gallons underground water reservoir at the laboratories/administrative complex.
    4. Rehabilitation of the Barakata Bridge.
    5. Construction of water storage platform for CFC/IPGRI Project.

6. Construction of concrete snailery pens.
7. Modest maintenance of the Institute's network of roads.
8. Supervision of the construction of a block wall water booster station at the junior staff quarters, (JSQ).

5 **Printing/Sign-writing Section**

1. Repainting of residential/official buildings such as the Qrts D1, PRO 3 and telephone equipment room.
2. Painting of burglary proofs for the Finance and Supply Group, Pension's office, Soils & Chemistry laboratories and the Telephone room, etc.
3. Repainting of glasses at the Herbarium and CPU Unit room.
4. Painting of CPU snailery's wooden and concrete pens.
5. Every painting job within the Institute.

**6. Water Works and Plumbing**

1. Supervision of the plumbing reticulation (complete pipe work renovation) at the junior staff quarter.
2. Supervision of the construction and plumbing installation of the JSQ's booster station.
3. Renovation works at the Qrts. PRO 3 and DD1.
4. Plumbing installation at the New Laboratories/Admin. Complex underground reservoir.
5. General plumbing works at CRIN residential and official buildings.
6. Reconnection of water pipe line to horticultural garden.
7. Supply of raw water from the water works to the estate.

**7. Drawing Office**

1. Preparation of all engineering drawing for project planning and execution. i.e. Basement for plan for water tanks, telephone mast and underground water tank's building modifications, machine-shop fabrication drawings.
2. Writing of scientific tables, figures and posters for seminars, conferences and exhibitions.
3. Tracing of scientific graphs, histograms, charts, etc.
4. Writing of flow charts for the production processes of CRIN mandate crops i.e Cocoa, Kola, Cashew, Coffee and Tea.

**8. Transport Office**

1. Driving of vehicles attached to the Institute's Executives.
2. Driving of vehicles attached to Programs and Groups.
3. Vehicular movement of personnel and materials to approved locations with vehicles from the pool.
4. Staff transportation to and from Ibadan city.
5. Procurement and supply of potable water for use by the Institute and members of the Institute's community.

**Constraints:**

In posting the foregoing achievements, there were several constraints experienced. However, the most daunting and recurrent ones were shortage of skilled manpower and delayed supply of materials/funds.

Suggestions to Eliminate/Alleviate Constraints

The recruitment of skilled personnel to support each of the sections within the Group was recommended and is receiving attention.

The stocking of commonly used spare parts on a re-order level system would go a long way to improve the "response factor" to fault clearing.

We in the Engineering Group are determined to contribute our best to supporting the Institute to achieve her overall goal in the coming year.

**FIELD ESTABLISHMENT AND DEVELOPMENT** (Leader: A. Borokinni)

**Field Activity Report (January – December, 2000):** Borne out of the prudent, effective, potential and the dynamism of the able team of the Internal Management Committee (IMC), the Field Establishment and Development (FED) came into being on the 1st October, 1999. The section is saddled with the responsibility of initial establishment and Management of new plantations, and with other developmental duties.

**Project Team Members:** The section (FED) is under the umbrella of the Farming System, Research and Extension (FSR&E), and Dr. A.A. Adeyemi stands as the Coordinator of the project.

Team Leader -
Mr. A. Borokinni - (PAS I
Team Members -
(I) Mr. T. Adewumi (PAS II
(ii) Mr. A.A, Ahmed-Akinola (HAS)
Auxiliary Staff Members -
(i) Monkio, J. (Storeman)
(ii) Ogunsola, G.B. (Mrs) (Typist)
(iii) Olabiyi, B.M. (Mrs) (Messenger)

**Field Activities**: Land surveying and demarcation of 60.4HA of newly proposed Field Establishment continued and was concluded in February, 2000. Early in the year, there was a little delay in the felling of the merchantable trees (Timbers) to give way for the establishment of proposed 60.4HA. This therefore prompted the team member to go round the plots to identify the plots with little or no luggable trees where something could be done before the planting season ran out.

The team members therefore submitted a proposal to establish 7.2HA of Cocoa and 2.2HA of Cashew (Reference PM/307/Vol.I/379) of 2 May, 2000. The IMC, during the year (March) involved the team members in the general cutlassing of the proposed 60.4HA in readiness for the felling of the timbers. The number of mandays used for the exercise was 1,280 totaling N128,000.00. Due to circumstances beyond the control of the Institute the aproval for the tree felling could not start as earlier scheduled. Also in the same vein, only 5.0HA out of 7.2HA proposed for Cocoa establishments were implemented. Logistics, time and bureaucratic procedures were greatly responsible for this.

However, field activities on 5.hA of Cocoa plots which is situated at Onipe second gate road, started on 23, May by carrying out underbrushing with the engagement of only 3 (three ) Casual workers and gradually increased to 7 (Seven) in June.

Supply of cocoa seedlings for planting into the plot was somehow delayed due to official protocol. However, planting of cocoa seedlings into the plot started in July and was concluded by first week of August, 2000.

5,555 cocoa seedlings have been planted into the plot. Cultural maintenance operations of the plot continued. As at the end of September, 2000, a total of 669 mandays at the cost of N69,900.00 had been used for the development of the cocoa plot.

During the year the total mandays engaged on the farm was 2,082 with the total amount of N109,200.00 (see the Table). A total number of 4,500 plantain suckers were planted as shade crop which cost a total of N45,000.00 at N10.00 per sucker.

Tree Felling Operations: Felling of merchantable and loggable trees within the Institute's newly proposed plots was contracted out by the Institute to various contractors including the contractors engaged by the Ministry of Agriculture and Forestry. The Tree felling exercise commenced in September. A total revenue of N154, 528.90 was realised from the operations as at the time of compiling this report.

After the felling of the merchantable trees by the contractors, the Institute commenced felling exercise on the remaining unloggable trees to pave the way for the planting operation. This exercise stretched through the month of December.

Construction of water reservoir for watering, fire tracing and watering of the newly planted cocoa seedlings virtually constituted the major activities during the last two months (Nov/Dec.) of the year.

**Constraints**: Easy movement of farm tools as at when necessary to the plot was a major constraint the section experienced during the year under review. Equally, there was insufficient number of casual workers engaged for all the field activities. This therefore dragged the field activities for too long.

Details of the mandays used on monthly basis and the cost implication are stated below:

| Months | Mandays/ working days | Rate of Mandays | Cost ₦ |
|---|---|---|---|
| May | 36 | 100 | 3,600.00 |
| June | 120 | 100 | 12,000.00 |
| July | 130 | 100 | 13,000.00 |
| August | 176 | 100 | 17.600.00 |
| September | 237 | 100 | 23,700.00 |
| October | 132 | 100 | 13,200.00 |
| November | 151 | 100 | 15,100.00 |
| December | 110 | 100 | 11,000.00 |
| Total | 1,092 | 100 | ₦109,200.00 |

**Internally Generated Revenue**

| Serial No | Items | January | February | March | April | May | June | Total |
|---|---|---|---|---|---|---|---|---|
| 1 | Cocoa Beans | 55,000 | 350 | 140,000 | - | 62,000 | - | 257,350 |
| 2 | Cocoa Pods | 725 | 50 | - | - | - | - | 775 |
| 3 | Cocoa Seedlings | - | - | - | - | 5,110 | 46,330 | 51,440 |
| 4 | Coffee | - | - | - | 100 | - | 100 | 100 |
| 5 | Cashew | - | 12,500 | 7,500 | 1,500 | 7,575 | 7,315/1,150 | 37,540 |
| 6 | Kola | - | - | - | - | 1,495 | 10,146 | 11,641 |
| 7 | Plantain/Banana | 11,175/360 | 8,400/400 | 9,375/40 | 1,575/260 | 2,100 | 4,525 | 37,150/1060 |
| 8 | Palm-fruit | 980 | 1,260 | 630 | 5,380 | 5,020 | 1,860 | 15,130 |
| 9 | Other Farm Sales | 400 | 600 | 600 | 600/400 | 800 | - | 3,400 |
| 10 | Bus Tickets | 5,840 | - | - | 18,340 | 7,960 | 16,450 | 48,590 |
| 11 | Rest House | 2,100 | - | 2.050 | 4,550 | 6,000 | 1,200 | 15,900 |
| 12 | Health Centre | 650 | 700 | 1,325 | 2,075 | 1,150 | 2,425 | 8,325 |
| 13 | Rent | 8,000 | 5,175 | 6,775 | 10,750 | 6,000 | 6,950 | 43,650 |
| 14 | Chicken/Qual | - | 7,500/300 | 500 | - | - | - | 8,000/300 |
| 15 | Library | - | 1,050 | - | - | 900 | - | 1,950 |
| 16 | Sundries | 28,640 | 3,425 | 330 | 11,550 | 15,950 | 10,513 | 70,408 |
| 17 | Workshop | 280 | 255 | 75 | 80 | - | - | 690 |
| TOTAL | | 114,150 | 41,965 | 169,200 | 57,160 | 122,060 | 108,864 | 613,399 |

| Serial No | Items | July | August | September | October | Nov | Dec | Total |
|---|---|---|---|---|---|---|---|---|
| 1 | Cocoa beans | - | - | - | - | 128,000 | 60,000.00 | 188,000.00 |
| 2 | Cocoa seedlings | 2,275 | - | - | 6,200.00 | - | - | 8,475.00 |
| 3 | Cocoa Pod | - | - | - | 30,000.00 | 7,840 | 5,800.00 | 43.00 |
| 4 | Kola seedlings | - | - | - | - | 130 | 4,387.50 | 4,517.50 |
| 5 | Cashew nut | - | - | - | 500.00 | - | - | 500.00 |
| 6 | Cashew seedlings | - | - | - | - | - | 500.00 | - |
| 7 | Plantain | 2,850 | 4,650 | 5,850 | 13,070.00 | 31,350 | 11,775.00 | 69,545.00 |
| 8 | Banana | - | - | 40 | 220.00 | 1,315 | 1,100.00 | 2,675.00 |
| 9 | Timber | - | - | - | 93,932.50 | - | 28,166.00 | 122,098.50 |
| 10 | Firewood | - | - | - | 840.00 | 120 | - | 960.00 |
| 11 | P/fruits | 3,180 | 1,100 | - | - | - | - | 4,280.00 |
| 12 | Maize | - | - | - | - | 2,730 | - | 2,730.00 |
| 13 | Other Farm Produce | 35,440 | 26,830 | 760 | 720.00 | 150 | 1,075.00 | 64,975.00 |
| 14 | Bus Ticket | 20,830 | 16,490 | 8,305 | 17,100.00 | 18,000 | 10,470.00 | 91,195.00 |
| 15 | Sundries | 3,200 | 1,310 | 1,290 | - | - | - | 5,800.00 |
| 16 | Chocolate | - | 2,485 | 4,030 | 3,395.00 | 5,400 | 750.00 | 16,060.00 |
| 17 | Access to road | - | - | - | 2,100.00 | - | - | 2,100.00 |
| 18 | Soap | | 1,900 | 950 | 2,800.00 | 800 | 550.00 | 7,080.00 |
| 19 | Reg. Forms | - | - | - | 3,250.00 | 2,000 | 500.00 | 5,750.00 |
| 20 | Juice | 250 | 350 | 1,600 | - | - | - | 2,200.00 |
| 21 | Diaries | - | - | - | 1,300.00 | 120 | 100.00 | 1,520.00 |
| 22 | Wine | 350 | 2,400 | 1,900 | 1,800.00 | 6,000 | 1,900.00 | 14,350.00 |
| 23 | Cream | 2,290 | 80 | 360 | 280.00 | 40 | 160.00 | 3,210.00 |
| 24 | Greeting Cards | - | - | - | - | - | 880.00 | 20.00 |
| 25 | Stickers | - | - | - | - | - | 20.00 | |
| Total | | 70,665 | 57,595 | 25,085 | 177,587.50 | 203,995 | 128,133.50 | 663,061.00 |

**Cocoa Yield Records for the Week/Month Ending:January to December**

| NO. | MONTHS | TOTAL NO. OF PODS HARVESTED | FIELD B/PODS | /PODS | NO. OF PODS ISSUED | NO. OF PODS OBTAINED | NO. OF B/PODS AT BREAKING | NO. OF FERMENTED PODS | WET WEIGHT (Kg) | Weight after fermen-tation | Dry weight (kg) | Discarded Beans |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | JANUARY | **39749** | **2268** | **351** | **6155** | **30975** | **3166** | **30074** | **2963.2** | **2704.4** | **1269.2** | |
| 2 | FEBRUARY | **18436** | **2021** | **349** | **3350** | **12716** | **2185** | **12552** | **1240.2** | **1072.4** | **529.0** | |
| 3 | MARCH | **14887** | **2001** | **156** | **3403** | **9327** | **2493** | **8835** | **871.6** | **763.2** | **372.8** | |
| 4 | APRIL | **24434** | **1347** | **258** | **30** | **22799** | **2904** | **21242** | **2111.6** | **1929.8** | **834.5** | |
| 5 | MAY | **32474** | **1257** | **373** | **-** | **30844** | **7974** | **24086** | **2328.0** | **2057.6** | **956.7** | |
| 6 | JUNE | **34659** | **1867** | **558** | **80** | **32154** | **6795** | **27226** | **2347.2** | **2101.0** | **859.7** | |
| 7 | JULY | **14661** | **1624** | **334** | **60** | **12643** | **3093** | **11174** | **1066.7** | **854.0** | **362.1** | |
| 8 | AUGUST | **5579** | **1424** | **143** | **10** | **4002** | **1423** | **4003** | **352.6** | **319.0** | **142.0** | |
| 9 | SEPTEMBER | **26631** | **11186** | **603** | **-** | **14842** | **3405** | **22623** | **2238.0** | **1977.2** | **789.9** | |
| 10 | OCTOBER | **51425** | **18954** | **1206** | **3000** | **28265** | **7216** | **40003** | **3840.0** | **3397.2** | **1412.8** | |
| 11 | NOVEMBER | **47792** | **9353** | **1269** | **3175** | **33995** | **7084** | **36264** | **3597.8** | **3219.0** | **1448.9** | |
| 12 | DECEMBER | **55671** | **4818** | **702** | **2510** | **47641** | **9172** | **43287** | **4272.0** | **3853.2** | **1773.6** | |
| **TOTAL** | | **366398** | **58120** | **6302** | **12773** | **280203** | **56910** | **281369** | **27228.9** | **24248.3** | **10750.7** | |

**OWENA SUBSTATION** (Officer-in-Charge: T.B. Akintoye)

**Physical Development***:* The station went through so many physical developmental changes during the year. The maintenance of the old structures was not neglected. Some of the physical developments were in form of construction, repairs and installations They include:

1. Expansion of the nursery from the 50,000 capacity to about 250,000 capacity.
2. Fencing project of the estate 1st phase (Maingate – River Owena about 1,200ft).
3. Grading of the Estate intra-roads.
4. Repair of the culvert over the stream linking the office/residential Quarters.
5. Changing of NEPA line completely from Idanre to Ondo line
6. Restoration of water to the Estate.
7. Construction of public taps for staff and other residents on the Estate.
8. Establishment of a mini library and a mini laboratory.
9. Partitioning of the open laboratory space into four different offices.
10. Installation of security light (halogen) at strategic places on the Estate.
11. Reflooring of the already damaged office block frontage.
12. Replacements of 4 electric poles that were damaged in the swamps.
13. Partitioning of the account section.
14. Resurfacing of cocoa drying slabs.
15. Construction of a mini filling stations.
16. Construction of a cocoa pod monument.
17. Installation of intercom in the offices of the Officer-in-charge/Admin. Officers
18. Establishment of staff club house and rest house annex.
19. Beautification of the estate by planting flower hedges.
20. General repair of residential quarters and the Rest House.
21. General repair of the vehicles.
22. Purchase of ceiling fans for some offices.

**Water Project:** The water project still needs a lot to be done, but in phases.
**Vehicles**: The grounded vehicles viz: the Bedford lorry and Volkswagen bus are yet to be repaired. Efforts were geared towards repairing the lorry in March, 2000 but there was a theft of the gear box, a case that is still pending in court. The other functional vehicles, the Peugeot 404 Pickup, the Mitsubishi and the MF 240 Tractor continued to enjoy some repairs and replacement of faulty parts. The Mitsubishi Pickup is due for over-hauling of the engine as it has started smoking while the 404 Pickup would need its chassis repaired and the roofing/housing changed to metal (better than the tarpaulin) .
**Radiophone**: The station's radiophone has not been functioning. Efforts to get it repaired through the contracting engineer proved abortive. The station will be grateful if the radiophone can be replaced with the modern type as it is old and obsolete.
**Revenue**: An annual revenue of Two hundred and eighty-seven thousand five hundred and three Naira, eleven kobo (N287,503.11) was realized from the sales of farm produce, and other sources during the year. The sale of cocoa seedlings under the FMCT project amounted to N391,056.00 during the period.

The breakdown is as follows:-

| Farm Produce & service | 1st Quarter Jan-March ₦ | 2nd Quarter April-June ₦ | 3rd Quarter July-Sept ₦ | 4th Quarter Oct. – Dec. ₦ | Total ₦ |
|---|---|---|---|---|---|
| Cocoa bean | - | 8,600.00 | 64,445.00 | 71,595.00 | 144,640.00 |
| Plantain | 3,310.00 | 160.00 | 150.00 | 3,300.00 | 6,920.00 |
| Plantain suckers | - | 300.00 | 825.00 | - | 1,125.00 |
| Maize | - | - | 290.00 | - | 290.00 |
| Tractor service | - | - | 500.00 | 500.00 | 1,000.00 |
| Rent on Quarters | 14,799.21 | 28,594.46 | 39,380.00 | 43,854.44 | 126,628.11 |
| Cashew seedling | - | 4,200.00 | - | - | 4,200.00 |
| Rest house | 200.00 | - | - | - | 200.00 |
| Cocoa pods | - | - | - | 2,500.00 | 2,500.00 |
| Total | 18,309.21 | 41,854.46 | 105.590.00 | 121,749.44 | 287,503.11 |
| FMCT Cocoa seedling | 35,840.00 | 231,840.00 | 122,356.00 | 1,020.00 | 391.056.00 |

**Staff Disposition and Welfare:** The staff strength of the station stood at 26 as at the 31st December, 2000. The list of staff is as shown below:

| | Owena | Ibule | Ile-Oluji | Onisere | Total |
|---|---|---|---|---|---|
| Principal Agric. Supt.1 (USS 11) | 2 | - | - | - | 2 |
| Principal Agric. Supt. II (USS 9) | - | 1 | - | - | 1 |
| Principal Executive Officer (USS9) | 1 | - | - | - | 1 |
| Senior Agric. Supt. (USS 8) | 1 | - | - | - | 1 |
| Senior Typist Gd.I. (USS 7) | 1 | - | - | - | 1 |
| Chief Driver (USS 6) | 1 | - | - | - | 1 |
| Senior Agric. Field Overseer (USS 5) | 2 | - | - | - | 2 |
| Senior Clerical Officer I. (USS 5) | 1 | - | - | - | 1 |
| Senior Field Overseer (USS 4) | 1 | 1 | - | 1 | 3 |
| Senior Agric. Field Overseer (Security USS 4) | 2 | - | 1 | - | 3 |
| Security Assistant (USS 3) | 2 | - | - | - | 2 |
| Agric. Field Attendant (USS 1) | 3 | 2 | - | - | 5 |
| Store Assistant (USS 2) | 1 | - | - | - | 1 |
| Security Guard (USS 2) | - | 1 | - | - | 1 |
| Senior Messenger (USS 2) | 1 | - | - | - | 1 |

**Research Activities:** All necessary data and collations were carried out on on-going experiments in the station. The experimental plots were also taken care of. Unavailability of labour affected some plots as regular weeding operation could not be carried out. However, maintenance operations and processing of farm produce were carried out. Some of the experiments are:

(a) Integrated Pest Management - Dr. O.L. Idowu
(b) Cocoa Rehabilitation and Degradation Agent - Adenikinju/Agbeniyi
(c) Cocoa Weedicide Trial on Young Cocoa Plantation - Dr. A.A. Adeyemi
(d) Effect of Inorganic Fertilizer on Coffee - Dr. C.R. Obatolu
(e) Roles of Termite in the Degradation of Trunk of Cocoa - T.C.N. Ndubuaku
(f) Seed Garden Reactivation – Badaru/Aikpokpodion
(g) Soil Based Fertilizer Trial on Cocoa – Dr. C.R. Obatolu
(h) Cocoa Multiple Trial – Dr. E.B. Esan

**FMCT/CRIN Cocoa Project**: The project was a great success in the station in terms of number of cocoa seedlings raised. The station raised 247,000 cocoa seedlings compared to the 56,000 raised in the previous year at two sites (Owena and Ibule).

**Weather Record**: Approval for the establishment of a new weather station was granted. Some of the equipment have been received while some will be purchased locally. The approval for the purchase of fencing wires and installation fee for the equipment is still being awaited. However, the total rainfall (mm) recorded for the year is as stated below:

| Quarterly Basis | Rainfall (mm) | No. of Days |
|---|---|---|
| 1st Quarter Jan-March | 15.4 | 4 |
| 2nd Quarter April-June | 726.9 | 37 |
| 3rd Quarter July-Sept. | 546.5 | 36 |
| 4th Quarter Oct-Dec. | 116.5 | 16 |
| Total = | 1,405.3 | 93 |

**Health Services:** Supply of drugs was once and it was the consignment of 1999. No drug was supplied in the year in spite of the station's requisition. The drugs got exhausted in the 2nd quarter of the year.
It is hoped the Headquarters would be magnanimous to resume the bulk purchase of drugs and subsequent supply to the substation in the new year.

**Industrial Field Practicals:** A student of the Federal College of Agriculture, Mr. Henry Adefisoye was at the station for his 3 months Field Practical Training from October-December 2000. He successfully completed the programme on 31/12/2000.

CRIN Governing Board's Visit: The newly constituted CRIN Governing Board led by the Chairman, Dr. E.V.O. Ogbeide visited the station on the 24th – 25th November, 2000. The visit was the concluding part of the comprehensive tour embarked upon by the Board members to the Southern Substations. The eight-man Board visited the plantations**,** Nursery and the residential quarters. Some projects were also commissioned during the visit. Other visitors include:

Dr. A.A. Adeyemi - Asst. Director, CRIN Ibadan, on the Board entourage
Mrs. C.I. Aisueni - Head, Admin. Group CRIN Ibadan, on the Board entourage
Dr. C.R. Obatolu - Asst. Director, CRIN Ibadan on transit
Mr. O. O. Oduwole - CRIN Ibadan on transit
Dr. E.B. Esan - Asst. Director, (CPP) CRIN Ibadan, on research programme
Chief Adegbulu - Ondo Farmers's Congress
Mr. Sonia Ebai - C.P.A. Secretary General
Mrs. F.A. Okelana - Co-ordinator (CRIN Owena) - on working tour.

**UHONMORA SUBSTATION** (Officer-in-Charge: J.A. Akinboboye)

The year was started on a shaky note as our thirty two (32) casual labour force was laid off and reduced to seven (7) by the end of April when rainy season operation was to start. This acute shortage of manpower consequently led to poor performance in the field, ground maintenance, security and in the office complex. Majority of residential buildings were taken over by weeds.

We only manage to raise our heads above the waters administratively as approval of numerous requests were not received from the Director/Chief Executive till the end of the year.

Farm operations performed during the period of report include maintenance of mandate crop plots through heavy weeding, clearing of land for maize cultivation, raising of FMCT cocoa seedlings and its advertisement. Others are : planting of plantain suckers, ground maintenance and replacement of dead cocoa, cashew and coffee seedlings and research data collection. Others were cutting of fire traces, cutting of mistletoe, and pruning of fan branches of cocoa.

**Research Activities**: Regular data collection continued on all experimental plots i.e Coffee Farming System, Coffee Organic Fertilizer Trial and Twenty Five Cashew Genotype Trial. Mulching and watering were carried out on the coffee seedling plot to keep them alive.

Research plots enjoyed good maintenance. Missing stands of cocoa, cashew and coffee due to the long drought were replaced.

**CRIN/FMCT Cocoa Seedlings**: By the end of May, 2000, we raised 80,950 seedlings, and 47,814 left over from 1999.

Our radio advertisement was on for one week on the Independent Radio, **Benin**-City. This was followed up with village to village advertisement, visiting churches, mosques and community leaders in order to get the message to the grass root.

The Station's water pump had problems during the early part of the year and it was rectified for the successful growth of cocoa seedlings raised.

By the end of planting season, Twenty eight thousand, two hundred and forty four (28,244) seedlings were sold. Bookings from farmers have not been encouraging probably because of unsteady rains, but more because of high cost of transportation in Edo and Delta States. There is apathy on the part of Edo State Cocoa Growing Farmers because of annual drought and fire disasters, reduction in cocoa price and **unavailability** of genuine chemicals in the market. Hence we have earlier sought the approval of the Director/Chief Executive to effect repairs on our broken down Pick-up van urgently so that we can use it for the facilitation of distribution of seedlings to farmers. The approval for this Pick-up repairs did not come from the Headquarters till the end of December, 2000.

**Efforts at Revamping Plots**: In 1999, four hectares of cashew and two hectares of cocoa were planted and in the year 2000, we began an aggressive planting of plantain suckers to serve as shade materials in gapping up cocoa plots. Eventually, two thousand (2000) cocoa seedlings of the Trinidad and Tobago variety were raised to gap up plots A1 and D2. Two hundred and five (205) cashew seedlings and eight (8) coffee seedlings were used in gapping up.

**Revenue**: A grand total of Three hundred and fourteen thousand, nine hundred and ten Naira, ninety eight kobo (N314,910.98) was realised between January and December, 2000.

The breakdown is as follows:

| | | ₦ |
|---|---|---|
| Cocoa beans | - | 56,221.00 |
| Cocoa pods | - | 350.00 |
| Plantain | - | 2,100.00 |
| Palm fruit | - | 1,300.00 |
| Oranges | - | 125.00 |
| Vegetable | - | 2,937.00 |
| Pine-apple | - | 320.00 |
| Cocoa seedlings | - | 112,976.00 |
| Rent | - | 129,501.98 |
| Stray goats | - | 1,400.00 |
| Mangoes | - | 250.00 |
| Cashew-apples | - | 60.00 |

| | | |
|---|---|---|
| Maize | - | 7,250.00 |
| Citrus seedlings | - | 120.00 |
| Total | = | **₦314,910.98** |

**Revenue Generation**: During the period of report, we planted one thousand, three hundred (1,300) suckers of plantain which would serve as shade material and for future revenue, plus a 0.6 hectare of maize.
**Enlightenment of Farmers**: A visit was made to Egbeigeere town, Akoko Edo Local Government by the Officer-in-charge to enlighten cocoa and kola growing farmers as a result of their request of 21st November, 2000. They never knew of CRIN Uhonmora substation since its establishment in 1967.
**Staff Disposition**: Staff strength as at the end of December, 2000 stood at 24 made up of five (5) senior staff, nineteen (19) junior staff, Messrs. R. Imuze and A. Iwere having retired in April and December respectively. Mr. Ogiugo Philip just posted to the substation and seven (7) casual workers left from a mass lay-off from thirty-two (32) casual workers I met in the substation on inception.
**Plot Maintenance**: Plot and ground maintenance suffered seriously in year 2000 because of acute shortage of manpower created by the lay-off of casual workers in late December, 1999. On inception I met thirty two (32) workers but the Uhonmora substation operated with only seven (7) casual workers from May till November made up of five (5) in the field and two (2) in the office. We had to employ six (6) more in November in order to be able to cope with watering of seedlings and all other farm operations.
**Health Care**: One thousand, one hundred and ninety one (1,191) patients were treated in the dispensary during the year. I use this opportunity to appeal to the Director/Chief Executive for an urgent approval for drugs whose request was made on 5th June, 2000 for the substation.
**Fire Problems:** The fire problems around the substation in the early part of the year was described as unprecedented for a long time. However, through hardwork on fire trace clearing and sleepless nights in the forest, the substation survived all the **odds.**
**The Station's Electric Generating Set:** The station's electricity generating set functioned well in the early part of the year but later gave us problems. First, it was the battery, then the alternator. All these problems were communicated to the Headquarters for rectification. Since then the Gen Set continued to perform well. But with scarcity of diesel to run the engine. Between June and July, our two (2) hour daily light was changed to one (1) hour and by August to December, we had to operate the engine one (1) hour in three (3) days as at times diesel was scarce and exorbitant, between N45.00 to N60.00 per litre. In this respect we are requesting the utmost consideration and approval of more fund from the Director/Chief Executive on the running of the Gen Set.
**Transportation :**
**The Pick-up Van**: The Pick-up van broke down in April, due to crank shaft problem. A quotation for its repairs was submitted to the Director/Chief Executive for approval urgently so that we could use this vehicle to facilitate the sale and distribution of FMCT cocoa seedlings to farmers and transportation of cocoa pods. By the end of December, 2000 the much awaited approval did not come. An appeal to the Director/Chief Executive to approve the repairs urgently was made as the cost of repairs will continue to increase.
**504 Station Wagon**: The 504 Station wagon "the old reliable" has been performing very well. However, it had an accident on the Estate in the early part of the year and it was repaired from the FMCT funds here because it was the only functional vehicle on the estate apart from the Suzuki motorcycle. Lately it was observed that costly parts of the vehicle were breaking down one after the other probably because a lot of these costly parts had never been changed since the vehicle was purchased in 1983. Hence permission has been sought from the Director/Chief Executive for an approval of N18,200.00 from the FMCT grant here to replace the carburetor, complete silencer and the master brake.
**The Tractor:** Records showed that the tractor (MF type) got knocked in 1999 and the good and bad engine parts, were packed into the store since then while the body and tyres had been lying in the open air. After a long search for a Mechanic since January, 2000, we eventually got one towards the end of June and his quotation for its repair was submitted to the Director/Chief Executive for approval.
**The Suzuki Motorcycle**: The motor-cycle performed well and was economic to manage.
**Retirement** : Mr. R. Imuze (Field Overseer) retired from the service of CRIN with effect from 5th April, 2000. Mr. A. Iwere: (Head Security Guard) also retired from CRIN service with effect from 31st December 2000. The substation is now left with three Watchmen to her 268.4 hectares estate. A case for the employment of more hands in the security section was made in letter of 28th April, 2000 and a reminder of 26th October, 2000 to the Director/Chief Executive.

**Pension**: CRIN retired officers kept coming to the substation since May, 2000. I wish to note that hunger and suffering were written boldly on their faces. They were particularly disappointed at the end of the year when the much awaited money did not come. Something drastic must be done by the authorities to change this trend so that these people who have spent most of their useful time in life to serve the country do not continue to suffer.

**Outstanding Request:** Numerous requests made during the year did not receive the attention of the Director/Chief Executive. Inability to get urgent approval for these requests adversely affected operations of the Uhonmora substation. e.g.

1. Letter requesting for more hands in the Security section.
2. Letter requesting for permission to engage more casual hands for the substation.
3. Request for drug.
4. Request for permission to purchase vehicle spare parts.
5. Request for a Typist.
6. Request for a Messenger.
7. S.O.S. on dilapidated condition of Uhonmora substation buildings.
8. Request for permission to effect repairs on the broken down Pick-up Van.
9. Request for a Driver.

| **Rains** | **Date** | **Rainfall** | **No. of days** |
|---|---|---|---|
| January | 18th 2000 | 3.5mm | 1 |
| February | 18th " | 16.1mm | 1 |
| March | 20th " | 56.8mm | 1 |
| March | 25th " | 2.1mm | 1 |
| April | | 168.0mm | 8 |
| May | | 116.9mm | 9 |
| June | | 163.0mm | 8 |
| July | | 120.9mm | 7 |
| August | | 271.8mm | 16 |
| September | | 253.1mm | 15 |
| October | | 506.1mm | 14 |
| November | | 5.0mm | 1 |

**Visitors**: The following visitors called at the Substation during year 2000:

| | | |
|---|---|---|
| Dr. A.B. Fasina | CRIN Headquarters | Ibadan |
| Dr. C.R. Obatolu | CRIN Headquarters | Ibadan |
| Mrs. T.O. Akinwale | CRIN Headquarters | Ibadan |
| Dr. E.B. Esan | CRIN Headquarters | Ibadan |
| Mr. E.A. Fawole | CRIN Headquarters | Ibadan |
| Dr. O.L. Idowu | CRIN Headquarters | Ibadan |
| Mr. K. Badaru | CRIN Headquarters | Ibadan |
| 12 2nd Tier N.Y.S.C Members | Owan – West L.G.A. | Sabongidda – Ora |
| Mr. J.I. Omorogbe | T.C.U. | Benin City |
| Chief J.O. Ogunbayo | CRIN Headquarters | Ibadan |
| Mrs. F.A. Solola | Owan – West L.G.A. | Sabongidda – Ora |
| Mr. J. O. Ileso | " | " |
| Mrs. D.E. Ojehomon | " | " |
| Mr. G.E. Ubani | CRIN Headquarters | Ibadan |
| Mr. A.O. Adeyemi | CRIN Headquarters | Ibadan |
| Mr. E.A. Ayodele | CRIN Headquarters | Ibadan |
| Mr. A.A. Bolarinwa | CRIN Headquarters | Ibadan |
| Mr. N.O. Idemudia | Tax Office | Benin – City |
| Mr. S.O. Olaniyan | Consultancy | Benin – City |
| Mr. Ajibade | Head Grail Message Project | |
| | Royal Family | Auchi |

| | | |
|---|---|---|
| Prince Momoh | Royal Family | Auchi |
| Mr. Lucky | Uniben | Benin City |
| Dr. A.N.O. Onheruata | Uniben | Benin – City |
| Dr. Okoli | Owan – West L.G.A. | Benin – City |
| Dr. A.A. Adeyemi | CRIN Headquarters | Ibadan |
| Mr. J.O. Imen | Uhonmora – Ora | Sabongidda – Ora |
| Mr. A.S.B. Akanni | CRIN Headquarters | Ibadan |
| Mr. Esan | CRIN Headquarters | Ibadan |
| Oje Daniel & Co. | Uhonmora – Ora | Owan – West L.G.A. |
| Chairman & All Members of CRIN Governing Board | CRIN Headquarters | Ibadan |
| Mr. Aliu | CRIN Headquarters | Akoko Edo L.G.A. |
| Mr. Sola Adefaka | CRIN Headquarters | Ibadan |
| Mr. Cyril Imafidon | Sabongidda – Ora | Edo State |
| Mr. D.A. Omdodun | Eme - Ora | Edo State |
| Mr. D.S. Ikhile | Eme - Ora | Edo State |
| Mr. T.C.N. Ndubuaku | CRIN Headquarters | Ibadan |

**Meeting with the Odionurukpa of Uhonmora Community**

The Community summoned the new Officer-In-Charge to the community meeting to maintain the cordial relationship that has been existing between Uhonmora community and CRIN.

Questions and comments raised by the community were:

1. Could CRIN supply them with chemicals as the ones being sold in the market are fake?
2. What can CRIN do for them on the menace of termites in farms and buildings?
3. Could CRIN provide spraying pumps e.g. the Mist blower?
4. They have been trying to organise farmer's field day without success.
5. Has CRIN been paying royalty to any community on the land we are occupying?
6. The Uhonmora community informed me that the land CRIN is occupying here is being disputed upon by the Uhonmora and Ozalla communities and the case is in court.

**OCHAJA SUBSTATION** (Officer-in-charge:. Y. Emiola)

**Personnel Report:**

The staff strength as at 1st January 2000 was made up of 4 senior staff and 16 junior staff. The substation enjoyed the 1999 promotion exercise which elevated one of the junior staff members to the senior staff cadre, and six other junior staffers were elevated to higher junior staff cadre, with effect from October 1999.

**Casual Labour Force**: Casual workers were strictly engaged for maintaining the newly established cashew fields. A total of 11 hectares of new cashew fields were adequately maintained in addition to the old cashew and kola plots.

**Field Establishment Maintenance**: Establishment and maintenance of additional 4 hectares of cashew (Oro Brazilian selection) was one of the main operations carried out. Efforts were intensified to ensure there was no fire out break in the plantation. Cutting of fire traces and regular patrolling of the plantations during the dry season, put all sources of fire hazard under control.

**New Planting**: In addition to the 7 hectares cashew plot planted in 1999, the substation (Ochaja), successfully established, maintained and sustained a 4-hectare cashew plot of Oro/Bbrazilian cashew nuts. The plot tagged millennium plot (2000/6) was designed to show the combined effect of nut-size and planting distance of cashew. The station proposed an establishment of at least 7 hectares. However, the available planting materials (nuts) could not sow more than four-hectares because of the introduction of new spacing trial which has increased the plant population per hectare. Consequently, the spacings were 9m x 9m; 8m x 8m; 6m x 6m. each hectare with 170 seedlings i.e (1/2 hectare of 9m x 9m; ¼ ha. of 8m x 8m; and ¼ ha. of 6m x 6m), while the whole 4 hectares had a total of 680 seedlings i.e 170 x 4. Growth records were taken in the plot. The growth and vigour of the newly established plots attracted the interest of some researchers and the designer of the experiment (the Coordinator of the substation – Mr. E.A. Ayodele). The substation is ever-ready to uphold the mission statement of the Institute, given all necessary assistance to perform without hindrance.

The station has a vision to extend her plantation and ensure that the cashew farmers in Kogi State accept CRIN as their natural choice of our mandate crops.

Already, the station has started receiving positive response from cashew farmers who are itching to organize a co-operative group for the benefit of getting new ideas and technologies from CRIN.

**Production/Distribution of Cashew Seedlings:** Sequel to the media publicity through the radio, on the availability of improved cashew seedlings, there was a significant increase in the demand by cashew farmers during the year under review. From the turn-out so far recorded, there is no doubt, that, cashew cultivation is gaining prominence both in crop husbandry and world market at large.

**Nursery Data Collection**: Data collection on the experiment 200/6 (millennium plot) started right from the nursery stage. Based on nut-size, the various nut-size categories i.e "Small", "medium", "Large" and "Jumbo" were sown in May 2000. Interestingly, the performance of the "Jumbo" size nuts was a sharp contrast to the past observation which used to record very slow and low germination percentage. Rather, the "Jumbo" this time around, competed equally with both the "medium" and "small" nut sizes to sprout after 13 days of sowing. And it was the "Jumbo" that first clocked over 25% on 17th day of sowing.

Although, "large" started shooting out fast between 20th and 30th days of sowing, "medium" started shooting out fast after 25th day, while small started to shoot out steadily as from 21st day of sowing.

**State of the Fields/Plantation**: In general, routine cultural activities carried out in the plots (old experimental and research), included, maintenance of the old existing and newly established plots.

(a) Cashew Plots

(b) Kola Plots: Sequel to the constant demand for kola planting materials (nuts), arrangements were made to collect proven kola nuts from Headquarters for distribution to the interested farmers. However, the substation could not get the planting materials (nuts) despite all the efforts officially made to secure the planting materials (nuts) from the Headquarters.

**Routine Activities**: Routine activities carried out in the substation also included:

(a) Maintenance of staff quarters and office premises

(b) Maintenance of substation's infrastructures and other resources

**Plots Maintained**:

(a) Research plots (5) NW7/NW/9A; SW4;SW5; SE/5A

(b) Commercial plots (5) SW/1;SW/2; SW/3; NW/1; NW/4.

**Level of Achievements:**

(a) Reconstruction of the substation's old bridge linking the staff quarters and office premises with the plantation (Experimental and commercial plots), through direct labour.

(b) Extraction and sterilization of cashew apple juice through CPU's cottage scale cashew apple juice extractor and sterilizer.

(c) Supply of 6,242 cashew seedlings to farmers. This is an increase of 148% over the 2,514 seedlings recorded in 1999.

(d) Initiation of repairs and rehabilitation of:
   (1) the grounded substation's water-tanker (now on the road)
   (2) the grounded substation's tractor (now on the road)
   (3) the grounded substation's 50KVA Gen set (now in top form)
   (4) the grounded V/W Kombi bus (about to be on the road)

(e) Maintenance and sustenance of the newly established 11.0 ha cashew fields (1999 and 2000 plantings).

(f) Construction of a concrete propagator through direct labour for raising kola seedlings.

**Innovations Introduced Through Distribution:**

(a) Introduction of profit making ventures through the appointed committee on:
   (i) Tractor
   (ii) Water tanker and
   (iii) Farm produce

(b) Introduction of accountability forum, where every senior staff member takes part in the disbursement of the fund sent to the substation.

**Suggestions for Improving Performance and Overcoming Constraints:**

(a) Provision of fund for the maintenance of the established experimental and commercial plots, particularly the newly established cashew fields (1999 and 2000 plantings).

(b) Approval of increase in staff strength, to cope with the increasing workload in the substation.

(c) Engagement of laboratory technologists in the substation during cashew apple juice extraction, sterilization and distillation process.

(d) Inspection visits by the Engineering group from the Headquarters to certify the work on vehicles, plants and equipment in the substation.

**Report in the Year 2000 Budgetary Allocation for the Development of Infrastructures and other Sources:**

A total of N700,000.00 was approved for the following projects in the substation:

(a) Rehabilitation of the substation's Gen set

(b) Rehabilitation of the substation's water tanker Bedford lorry

(c) Rehabilitation of the substation's tractor

(d) Rehabilitation of the substation's staff quarters

(e) Purchase of new tyres for the substation's 404 Pick-Up, 504 Station-Wagon, and the tractor.

All appropriate steps were taken to ensure prudent spending of the approved allocation while official returns were made in respect of the allocation.

**Revenue**: The proceeds from the sales of farm produce (cashew nuts, cashew seedlings, vegetable and fire wood at the substation in the year 2000, amounted to N137,115.00.

**Philanthropic Gesture**: The Gaco of Ochaja, Mallam Musa Ibrahim on the 3rd May 2000, presented a wall clock to the substation's Library in appreciation of the Institute's concern for the welfare of workers.

**Visitors**: The underlisted visitors came to the substation during the year 2000.

| Date | Names | Address | Purpose of Visit |
|---|---|---|---|
| 19/1/2000 | Mr. Friday Aduku | Kogi State ADP (Ammoma) | Familiarization visit |
| 19/1/2000 | Mr. Daniel Seriki | " " " | " " " |
| 19/1/2000 | Mr. Bakare E.O.O. & team of Auditors | CRIN Hqts. Ibadan | Official assignment |
| 3/2/2000 | Mall. Zakari Abdullahi | Ankpa L.G. Ankpa | Familiarization visit |
| 7/2/2000 | Ogbadu J.J. | NCS Lagos | Requisition for cashew |
| 14/2/2000 | Achimugu, A.S. | IDAH | planting materials |
| 18/2/2000 | Mrs. Ochada, R.O. | Girls' Sec. School | Familiarization visit |
| 21/2/2000 | Okolo, C.C. Mrs. | NIFOR, Benin | Familiarization visit |
| 21/2/2000 | Mr. Akin Ayodele | CRIN Hqts. Ibadan | Official |
| 22/4/2000 | S.A. Ogbadu | NACN LTD. Kaduna | Requisition for cashew |
| 5/5/2000 | A.A. Bolarinwa | CRIN Hqts. Ibadan | Audit assignment |
| 8/5/2000 | Hon. J.O. Awoniyi | GRA Lokoja | Requisition for cashew |
| 10/5/2000 | HIS HIGHNESS ONU OF EGUME | EGUME | Courtesy visit |
| 10/5/2000 | Umoru Mohammed | HODA Omala L.G. | Courtesy visit |
| 26/5/2000 | Salami, A.A. | FDA, Ubiaja | Procurement of cashew |
| 30/5/2000 | Mr. Ashock & Others | Olam Nig. Ltd. Ankpa | planting materials |
| 6/6/2000 | Hon. Jibrin Yunisa | Govern's Office | Familiarization visit |
| 6/9/2000 | Ajasoel, D.M. | KG. Forestry Project | Requisition for cashew planting materials |
| 6/9/2000 | B.W. Ejum | Anyigba | Familiarization visit |
| 6/9/2000 | S.A. Zakari | Dekina L.G.A | Familiarization visit |
| 24/9/2000 | Eddy Alalade & Co. | CRIN Hqts. Ibadan | Audit assignment |
| 24/9/2000 | A.S.B. Akanni | CRIN Hqts. Ibadan | Audit assignment |
| 24/9/2000 | A.A.Bolarinwa | CRIN Hqts. Ibadan | Audit assignment |
| 18/12/2000 | Akin Ayodele | CRIN Hqts. Ibadan | Official (S/Chemistry) |
| 18/12/2000 | P.O. Adebola | CRIN Hqts. Ibadan | Official (P/Breeding) |
| 29/12/2000 | S.O. Agbeniyi | CRIN Hqts. Ibadan | Official (P/Pathology) |

**Labour Strength/Plot Maintenance**: The labour force remained at 20 i.e. 4 senior staff and 16 junior staff members.

**Weather**: Table shows the rainfall data during the year 2000.

: **Year 2000 Rainfall Data**

| Month | No. of Rainy Days | Total Rainfall/Month (MM) |
|---|---|---|
| January | - | - |
| February | - | - |
| March | 2 | 1.8 |
| April | 6 | 98.8 |
| May | 4 | 86.2 |
| June | 15 | 283.7 |
| July | 11 | 138.8 |
| August | 16 | 149.2 |
| September | 18 | 194.6 |
| October | 8 | 86.3 |
| November | 1 | 2.8 |
| December | - | - |
| Total | 81 | 1.2 |
| Average | 6.75 | 88.35 |

The station maintained the eleven casual workers, for the maintenance and sustenance of the 11.00 ha. new cashew establishment (199/6; 2000/6). It was incredible that the casual workers remained co-operative, hardworking and patient, despite the heavy work load and meagre financial resources of the sub-station.

**Staff Requirements:**

| Post | Salary Grade (HATISS) | Total No. Required | No. in Post |
|---|---|---|---|
| Higher Agric. Supt.(HAS) | 07 | 2 | - |
| Agric. Supt. (AS) | 06 | 2 | - |
| Field Attendant | 01 | 30 | 2 |
| Nursing Sister/Supt. | 08 | 1 | - |
| Health Attendant | 02 | 1 | - |
| Library Assistant | 03 | 1 | - |
| Driver/Tractor Mech. | 02 | 2 | - |
| Plant Operator | 02 | 1 | - |
| Security Guard | 01 | 10 | 4 |

**Field Management/Maintenance**: The maintenance of the newly established 11.00 ha. cashew plots was given top priority. Fire traces were cut to prevent fire hazard in the plots. In general, routine field cultural operations were carried out in all the old existing and newly established plots.

**Data Collection:** Physical measurements on girth, height, number of leaves and branches were taken in plots SE/5A-D (1999, germplasm collection).

**MAMBILLA SUBSTATION** (Officer–in-Charge: R.A. Madehin)

The substation's programme for the year commenced with the maintenance of existing coffee and tea plots. Nursery operation centered on hardening process and watering for the tea cuttings raised in 1999. The beginning of the rainy season, with the first rain of 59.3 mm. came precisely around Mambilla Plateau on the 19th of March year 2000. This also marked the commencement of growing season.

One hundred thousand (100,000) tea cuttings were projected for raising and approved for the year. Work started in May 2000 with the provision of fund by the Director/Chief Executive. This was successfully executed. The raised cuttings underwent the hardening process to enhance well-nurtured tea seedlings.

With polythene bags (20,000) made available by the Programme leader for Coffee (Dr) Mrs) F.A. Okelana, the coffee berries sown on the beds were transplanted into the polythene bags for further nurturing. Fertilizer was thereafter administered.

The coffee and year 1999 Tea Nurseries were renovated after the construction of year 2000 Tea Nursery. Meanwhile, weeding of the existing coffee and tea plots were carried out with the prevailing rainy season from mid-March to 22nd of October year 2000.

The Brazilian cashew nuts sent by the Programme Leader Cashew Mr. E.A. Ayodele for representation in all the Substations was divided into two with the bulk of the nuts raised in Mayo-Selbe because of suitability of the weather there. This was also in line with the directive from the Co-ordinator Dr. C.R. Obatolu, Asst. Director (TTDP). The non-suitability of the weather conditions on the plateau to support germination was buttressed with zero percentage germination obtained after sowing. With the success of the cashew nuts raised in CRIN Demonstration plot at Mayo-Selbe, the Substation could now boast of representation as planned.

As against the previous year's experience, there was no single fire incidence in Mayo-selbe in the year 2000. This could be attributed to the effectiveness of the fire traces cut and the alertness of the workers in the station.

**Physical Development**: Year 2000 marked a lot of transformation in the Substation, courtesy fund provision by the Director/Chief Executive. Renovation work was carried out in both the office complex and the residential quarters. Pipe-borne water was introduced in to the office complex and the only tractor in the Substation, which was hitherto non-functional was put back on the road. The body of the rickety 504 station wagon of the Substation was refurbished with introduction of new tyres. Befitting set of chairs were provided for the Rest House after renovation.

**Accrued Revenue:** The total sum of Ninety thousand, nine hundred and seventy six Naira, ninety four kobo was generated for the whole year. The revenue generation on quarterly basis is shown in the Table below:

| 1st Quarter | 2nd Quarter | 3rd Quarter | 4th Quarter | Total |
|---|---|---|---|---|
| Jan – March | April – June | July – Sept. | Oct – Dec. | |
| N18,690.07 | N18,207.48 | N25,293.16 | 28,386.23 | N90,976.94 |

**Personnel**: As against twenty four (24) staff in 1999, Kusuku and Mayo-Selbe maintained nineteen (19) staff with three (3) senior and sixteen (16) junior staff. The former Higher Executive Officer now on retirement was replaced by a Principal Executive Officer II, Mr. E.A. Deji with effect from April 2000.
There was the need to fill the vacant posts of typist, three security men, one health attendant and five assistant field attendants for the smooth running of the substation.

**Weather Record**: The total amount of rainfall recorded for the year was 3387.0 m.m. with the breakdown on quarterly basis as stated below:

| 1st Quarter mm | | | 2nd Quarter mm | | | 3rd Quarter mm | | | 4th Quarter mm | | | Total |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Jan | Feb | Mar | Apr | May | June | July | Aug | Sept | Oct | Nov | Dec | |
| - | - | 61.6 | 396.4 | 369.7 | 549.3 | 444.2 | 496.1 | 736.7 | 333.2 | - | - | |
| Total/Qrt | 61.6 | | | 1315.4 | | | 1677.0 | | | 333.2 | | 3,387.2 |

**Visitation**: Various categories of people from CRIN Headquarters, Taraba State and other walks of life visited the substation in year 2000. The visitors and detailed particulars on them are as follows:

| No. | Name | Position | Address | Date of visit | Purpose |
|---|---|---|---|---|---|
| 1. | Abraham Garku | Farmer/Village Head | Donyaji | 18/1/2000 | Invitation to his cocoa farm |
| 2. | Dr. C.R. Obatolu | Asst. Director (TTDP) | CRIN Headquarters Ibadan | 05/05/2000 | Official |
| 3. | E. A. Fawole | Head P/Pathology Group P/L for Tea | CRIN Headquarters Ibadan | 05/05/2000 | Official |
| 4. | Abel Bonghit | Head Small Scale Coffee/Tea Farmer | Furmi | 15/05/2000 | Tea seedling request for year 2001 |
| 5. | M.G. Usman | Agric Loan Officer | Central Bank of Nigeria Yola | 18/05/2000 | Administration of questionnaire on coffee |
| 6. | Mohammed H. Dikko | Farm Manager | Mbazarari Mambilla Cattle Ranch Yelwa | 22/08/2000 | Securing coffee seedlings from the substation |
| 7. | S.P. Ikaa with P/Secretary Taraba Ministry of Commerce, Protem Chairman Taraba State Coffee/Tea Association and Vice- Chairman Sardauna Local Government | Leader of Coffee Profile Survey Team from Abuja | Federal Ministry of Commerce Abuja | 22/08/2000 | Official |
| 8. | Jonah Nbamga | Agricultural Extension Officer | T.A.D.P. Agro ForestryApple Farm Nguroje | 29/08/2000 | Official |
| 9. | Eddy, O. Alalade & Co. (External Auditor) with Mr. A.S.B. Akanni of Internal Audit CRIN Headquarters | Auditors | No. 6 Dejo Oyelese Street Old Bodija Ibadan | 15/09/2000 | Auditing of the Substation Accounts |
| 10. | Rev.O.O. Oduwole | Head Econs & Statistics Group | CRIN Headquarters Ibadan | 15/09/2000 | Administration of questionnaire on Small Scale Tea Farmers |

| | | | | | |
|---|---|---|---|---|---|
| 11. | Coffee/Tea Association of Nigeria | Executive Members | National Secretariat Gembu, Taraba State | 9/11/2000 | Familiarisation tour of Coffee/Tea Nurseries |

**IBEKU SUBSTATION** (Officer-in-Charge: M.S. Efunla)

**Field Operations**: Routine management operations vis-à-vis slashing, pruning, removal of mistletoes, spraying against pests and diseases as well as weeds, harvesting and processing of farm produce were promptly carried out during the year under review. Some of the abandoned plots were also reclaimed while chemicals were used to eliminate the giant trees within the experimental plots. Maintenance of grounds, lawns and roads around the Office and the abandoned Quarters was not left out. Gapping up of missing stands in Commerical plots 5 and 8 was done in the third quarter of the year.

**Research Activities**: Collection of data particularly on fungicide Screening Trials and Selection on ESCAPE materials on Cocoa went on unabated during the year and relevant data forwarded to the investigators in the Headquarters promptly.

**Nursery Operations**: A total of 39,930 cocoa seedlings were raised in the Nursery under the FMC Project, out of which 9,815 seedlings were sold and sum of N41,710 realised, as against 34,000 seedlings raised last year out of which only 3,826 seedlings were sold and sum of N19,130 realised. The provision of a tractor will no doubt boost the sale and increase the demand on the part of the local farmers.

**Revenue**: The sum of N149,225.80 was realized from the sale of farm produce for year 2000 as against the sum of N98,643.00 realised in the year 1999 fiscal year. As stated in my earlier reports, the recruitment of more casual labour for the maintenance of the plantations would enhance more productivity and increase in revenue. The detail of the accruing revenue stipulated above is shown below viz:

| | N |
|---|---|
| Cocoa beans | 73,100.80 |
| Cocoa Seedlings | 41,710.00 |
| Cocoa Pods | 500.00 |
| Sugar Cane | 360.00 |
| Banana | 280.00 |
| Pineapple | 5.00 |
| Cashew Nuts | 30,650.00 |
| Firewood | 2,620.00 |
| Total | 149,225.80 |

**Physical Development**; Minor repairs were carried out in the main Office block at Ibeku. Also all the window louvres stolen sometime in 1996 were replaced and old signboards refurbished. The Office block at Ugbenu, which is in a state of disrepair needs to be repaired before the next rainy season.

**Staff Dispositiion:** The staff strength as at the end of December 2000 declined from 18 to 15 this is sequel to the retirement of three of our field staff, namely: Mr. M. Unubuogu who retired from the service in January while Messrs John Kalu and Charles Ukwu retired in October 2000. Mr. R. Odozor assumed duty in January 2000 after completing a 2-year training course at Agricultural Training Centre at Ochaja in Kogi State.

The casual field workers as at the end of the year stood at eighteen, fourteen casual field workers and four casual security guards. More casual hands are needed to maintain the plantation and beef up the security of the station as the number at present is grossly inadequate.

**Transportation**: The engine of the only utility vehicle in the station Peugeot 404 Pick-Up was over-hauled and minor body repairs carried out. The repair of the waterpump inclusive. This substation is in dire need of another sound vehicle to support the existing one as the latter is not big enough to contain all the staff. The provision of a tractor would help alleviate the farmers' problem of evacuating purchased seedlings to their respective farms.

**E.R.L.S.:** In our bid to make the impact of the Institute more felt by the people of Abia State, frantic efforts were made by visiting the Local Farmers and attending the Monthly Technology Review Meeting organized by the Abia State Agricultural Development Programme during which lectires were delivered on the Nursery and Field establishment as well as harvesting, processing and storage of Cocoa and Kolanut. The assistance of the Headquarters by provision of more fund to be able to reach out to more farmers and Farmers' Associations in this regard is hereby solicited.

**Visitors**: The station hosted the newly appointed members of CRIN Governing Board and other prominent personalities during the year under review. These included the Chairman of the Board, Dr. J.E.V.O.

Ogbeide, The Director/Chief Executive –Dr. Ayoola Fasina , Alh. Aliyu Umar, Alh. Abba Sadiq, Honourable Taiwo Alagbe, Chief (Sir) Willy Wabara, Mrs. C.I. Aisueni, Mrs. C.R. Alao, Dr.(Mrs.) M.U.B. Mokwunye, Engr. (Dr.) M.C. Nwachukwu, Abia State Permanent Secretary in the Ministry of Agriculture, Mr. A.A. Onireke from National Steel and Raw Materials Exploration Agency, Mr. E. Iwegbulan from Abia State ADP. Messrs G.E. Ubani and A.O. Adeyemi from CRIN Headquarters, Mr. C.A. Adebagbo from FRIN, Umuahia and Mr. O. Ojimgba from Federal University of Agriculture, Umudike amongst others.

**AJASSOR SUB-STATION** (Officer-in-Charge: G.O. Adeyemo)

**Staff Strength:** The year started with 41 members of permanent staff comprising 7 senior staff and 34members of the junior staff cadre. The station also had 3 casual security men and 24 casual field workers under CRIN/FMC&T programme.

Formerly, fund allocation for payment of casual workers wages were given to substations by the Management but a circular Ref. FIN/46/Vol.IV/001 received on the 6/12/99 directed that each station should employ sizeable number of workers whose wages could be paid from revenue generated by the station.

In response to this circular, the 43 casual workers who were then on the station's payroll were immediately disengaged and the station was left with only 3 casual security men and the 24 workers on the F.M.C.&T cocoa seedling production project.

**Research Activities:** Research data were adequately and promptly collected on the following experimental plots.

1. F3 Amazon fungicide trial
2. Experiment II (Cocoa Rehabilitation)
3. Farming System
4. Kola Fertilizer Trial
5. Tea Trial

These experimental plots were well kept and data taken were always sent to appropriate research officers at CRIN Headquarters.

**Routine Activities:** The cultural operations which included slashing in cocoa, kola, coffee and tea plots were carried out during the year ended 31st December, 2000. During the period, prompt harvesting and processing of cocoa were vigorously pursued. Palm-fruits were also harvested from CRIN/NIFOR Experimental plot and sold to prospective buyers.

Pruning of cocoa, removal of mistletoes were given adequate and necessary attention required. The office and residential quarter environments were maintained. Visits to cocoa farmers in the Local Government Area to discuss the activities of Cocoa Research Institute of Nigeria and its mandate crops were given prominence.

**Number Of Plots:** There is a total number of twenty seven plots consisting of cocoa, kola, coffee and tea. Out of these plots, research work is presently being conducted on five plots viz:

(i) Farming System Experiment
(iii) Experiment II – Rehabilitation of cocoa planted in the year 1967
(iv) 1967 F3 Amazon for the fungicide experimental trial being conducted.
(v) Tea plot: Maintenance and data collection

**Assigned Production Targets:** A total of three hundred and fifty thousand, (350,000) cocoa seedlings under the CRIN/FMC&T) project was to be produced by the substation for the planting season with a view to selling the seedlings to cocoa farmers in the substation's location area at highly subsidized rates.

Of this set target, two hundred and fifty two thousand (252,000) seedlings were produced. The inability to meet up with the production target was mainly due to the in-sufficient planting materials especially cocoa pods from the seed garden.

During this period, much efforts were geared towards the prompt and regular harvesting of ripe cocoa pods, kola-nuts and palm-fruits. A total of One million two hundred and sixty one thousand eight hundred and sixty eight Naira fifty kobo was internally generated through various sources for the year ended 31st December, 2000.

**Sources of Revenue from January to December. 2000**

| | | |
|---|---|---|
| Cocoa Seedlings | - | ₦1,004,050.00 |
| Cocoa pods | - | 5,450.00 |
| Dried cocoa beans | - | 67,433.00 |
| Kola-nuts | - | 6,880.00 |
| Palm-fruits | - | 13,100.00 |
| Transportation | - | 131,630.00 |

| | | |
|---|---|---|
| House-Rent | - | 23,255.00 |
| Health Care Services | - | 5,150.00 |
| Banana | - | 140.00 |
| Oranges | - | 3,340.00 |
| Mango | - | 1,400.00 |
| Plantain | - | 40.00 |
| | | ₦ 1,261,868.50 |

**Constraints:** It is rather impossible for everything to move smoothly without one thing or the other lacking. The major constraints experienced during the year under review included in-sufficient field staff, drivers and lack of sufficient fund for the procurement of some essential items such as fuel etc. The Management of the Institute should reconsider its earlier decision on the payment of wages by the substations from revenue because the internally generated revenue from the substations were often inadequate due to fluctuations in the yield of farm produce occasioned by natural factors. If wages are included in the subvention received from the Headquarters for the payment of casual workers, the morale of the workers will be boosted thereby enhancing higher efficiency and increased productivity.

**Extension Programme:** Farmers within and outside the Local Government Area were at the substation to seek solutions to the various problems encountered on their cocoa farms. During the year under review, visits to farmers' farms were conducted educating them on the current techniques of handling their cocoa farms and the activities of CRIN.

Advertisements were made on Cross-River State Broadcasting Corporation F.M. on the availability of hybrid cocoa seedlings for the farmers at highly subsidized prices.

Farmers were also informed that seedlings purchased would be transported to their farm sites at affordable costs.

**Weather Records:** A total of 41,746.3mm of rainfall was recorded during the year.

**Visitors:** Many important and eminent personalities visited the substation in the year 2000. Among them were Dr. O.L. Idowu – Assistant Director, Product Development and Technology Transfer (PDTT). He was at the substation on official assignment. Messrs E.A. Ayodele, Fawole, Omolaja and the Internal Auditors from CRIN Headquarters were also on official duty to the substation.

Mr. Samuel Ebohon – Principal Administrative Officer from Headquarters was at the substation.

The 8 – member Governing Board of the Institute paid a familiarization tour to the substation.

The Board Chairman and his members on arrival at the station were treated to a warm reception by the people of CRIN Community, Ajassor.

In his address, he announced the immediate purchase of the 75,000 cocoa seedlings lying in the nursery by the Cross River State Government and the submission of appropriate memorandum on the request for connection of the substation to the National Grid for Electric Power Supply and water supply network. He further pronounced the immediate conversion of ten casual workers comprising of nine field workers and one security guard working at Okondi experimental plot to established staff.

The newly refurbished Mercedes 911 water-tanker and a 5 ton Bedford lorry which had been abandoned since 1982 were re-commissioned for use by the Board's Chairman – Dr. John E.V.O. Ogbeide.

The Director/Chief Executive of the Institute Dr. A.B. Fashina who is also a member of the Governing Board of the Institute directed that a follow-up letter be written to the Secretary to the Cross-River State Government for connection of the substation to electricity national grid and the urban water supply for which action was taken.

The Ajassor Traditional Rulers Council led by the Clan-Head Ntufam Raymond E. Nku paid an official farmiliarization visit to the Sub-station on assumption of office as the new Clan-Head. The Ajassor Clan Traditional Rulers Council's entourage arrived the substation by 12.00 noon. The leader of the team Ntufam Raymond E. Nku intimated the station on the purpose of their visit. It was stated that they had come to further improve on the existing cordial relationship between them and the Institute and to pass their request to the Director/chief Executive.

In their request, they appealed to the Management of the Institute to give consideration to the Ajassor indigenes on the issue of employment. Stating further that it was the only major benefit that could be got from the Institute for the establishment of Cocoa Research Institute of Nigeria's substation on Ajassor land.

The Chiefs were, however, told by the Officer-in-charge that the message would be conveyed to the appropriate authority for action.

A comprehensive report on the visit was written and sent down to the Director/Chief Executive.

**Achievements:** During the year under review, tremendous achievements were made. The M.F 265 Tractor was totally refurbished and had since been in operation. Also, the 50 KVA electric generator which had been out of use for some years back as a result of engine knock was put in place and the entire CRIN Ajassor community enjoyed the excellent performance of the generator. The generator was usually operated for three hours daily and at times for additional one hour whenever the need arose.

The Mercedez Benz 911 water-tanker was also refurbished. This made the seedling production work very easy. Repair of the 5-ton Bedford lorry that had knocked engine since 1982 was undertaken. The Eicher Truck given to the substation was also given a face-lift. The body-work and spraying were carried out on the vehicle. The vehicle, however, required urgent over-hauling of its engine.

**Foot Note:** Out of the 150,000 cocoa seedlings bought by a customer, 104,000 have not been lifted.