



ACHIEVEMENTS & ACTIVITIES

KAU LIBRARY

808749



IR/KAU/DR

KERALA AGRICULTURAL UNIVERSITY

Banana Research Station - Kannara-680 652

&

Pineapple Research Centre, Vellanikkara-680 654

Kerala Agricultural University

CENTRAL LIBRARY

Vellanikkara, Thrissur - 680 656



Accession No..... 808749.....

Call No. IR-KAU/DR.....

KAUP 208/50,000/9/2000

808749

BANANA RESEARCH STATION
KANNARA-680 652

&

PINEAPPLE RESEARCH CENTRE
VELLANIKKARA-680 654

ACHIEVEMENTS & ACTIVITIES

Compiled by
Dr. L. RAJAMONY



Publication Unit
Directorate of Extension
Kerala Agricultural University
Mannuthy-680 651

English

BANANA RESEARCH STATION, KANNARA

&

PINEAPPLE RESEARCH CENTRE, VELLANIKKARA

-Achievements and Activities

Copies : 500

December 1990

Published by :

Dr. A. G. G. Menon

Director of Extension

Kerala Agricultural University

Mannuthy 680 651, Thrissur, Kerala.

Cover design

L. Rajamony

B. R. S., Kannara

Printed at

Ainikkattil Printers,,

Nadathara, Thrissur-680 751

808749
IR-RAJ/A C

CONTENTS

| | Page |
|---------------------------------------|------|
| 1. History | — 1 |
| 2. Objectives | — 2 |
| 3. Location | — 2 |
| 4. Agricultural Characteristics | — 5 |
| 5. Research Achievements | — 5 |
| 5.1 Crop improvement | — 6 |
| 5.2 Crop management | — 12 |
| 5.3 Crop protection | — 16 |
| 6. Present Programmes | — 17 |
| 6.1 Research | — 18 |
| 6.1.1 Banana Research Station | — 18 |
| 6.1.2 Pineapple Research Centre | — 32 |
| 6.1.3 Cashew Research Station | — 35 |
| 6.2 Extension | — 35 |
| 6.3 Other activities | — 36 |
| 7. Proposed Programme for VIII Plan | — 36 |
| APPENDIX | |
| I List of Scientists | — 38 |
| II Financial Outlay 1990-91 | — 45 |
| III List of Research Papers Published | — 47 |

Banana Research Station, Kannara and Pineapple Research Centre, Vellanikkara are the leading centres in Kerala where systematic research programmes on these crops are undertaken. A number of research findings in respect of crop improvement, crop management and crop protection have been recommended based on the experiments carried out here. Considering the main stream of research in the global scale and the location specific problems in Kerala, extensive research programmes are formulated in these centres now, to meet the future requirements of the farming community.

1. History

The implementation of a research programme on the bunchy top disease of banana at the College of Agriculture, Vellayani, Thiruvananthapuram during the year 1956 paved the way of banana research in Kerala. Later in 1958 another research scheme was taken up at the Agricultural Research Station, Mannuthy by Mr. P. V. George, the first Banana Research Officer.

The present Banana Research Station came into existence during the year 1963 as a centre of the Department of Agriculture, at Marakkal, Kannara, Thrissur. Under the All India Co-ordinated Fruit Improvement Project, a Centre was sanctioned at the Kannara Station by the ICAR for carrying out research on all aspects of banana during Fourth Plan period from 1-7-1970. The Co-ordinated Project was started initially with four Scientists and two Field Staff. When the Kerala Agricultural University formulated, the Station was taken over under their control from 1 - 2 - 1972. In 1974, the venue of the Pineapple Research was shifted to KAU Main Campus, Vellanikkara. Subsequently in the Fifth Plan period, the staff strength was increased to seven scientific, 10 technical and 10 administrative and supporting categories. The sub-project, NARP Phase-II, was started

from 1-4-1988 bringing Banana Research Station, Kannara - Pineapple Research Centre, Vellanikkara together under Kannara - Madakkathara Complex of the central zone of Kerala. During the same year the Banana Research Station celebrated its Silver Jubilee.

The detailed list of Heads of Station, scientists worked and the staff members now in position are furnished in Appendix-I. Financial outlay for the year 1990-91 is given in Appendix-II.

2. Objectives

The main objectives of these Stations are;

- i) To collect, conserve and evaluate large genetic stocks of banana and pineapple,
- ii) To develop better cultivar or clones of banana and pineapple through selection and hybridisation.
- iii) To standardise the agrotechniques in banana and pineapple for getting higher yield.
- iv) To formulate intercropping and rotation schedules in banana and pineapple to increase the returns from unit area.
- v) To find out the major pest and diseases of banana and pineapple by conducting regular survey.
- vi) To formulate control measures for pest and disease of banana and pineapple and
- vii) To formulate small scale post harvest processing techniques in banana and pineapple.

3. Location

The Banana Research Station is located at Marakkal, Kannara, Pananchery Panchayat of Thrissur Taluk in the Thrissur district. The exact location of the Station is twenty kilometres away from Thrissur town at 10°N latitude and 70°E longitude at an altitude of 55.6 M above the mean sea level.

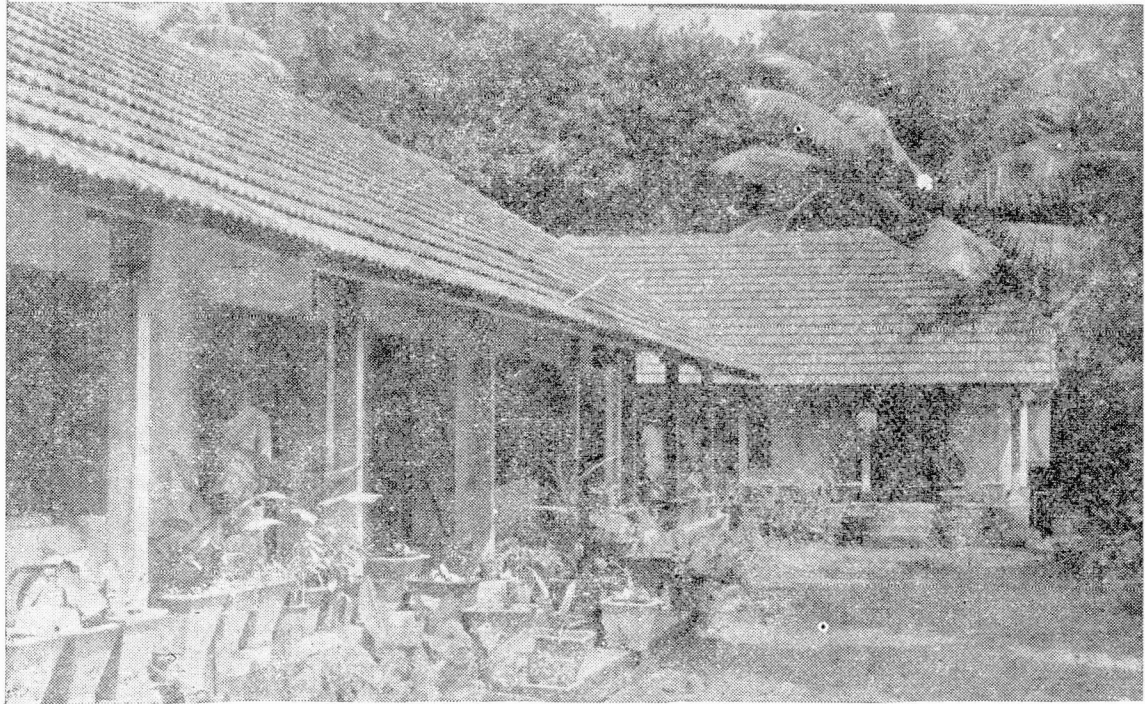


Fig. 1. Laboratory - cum - office building of the Banana Research Station.

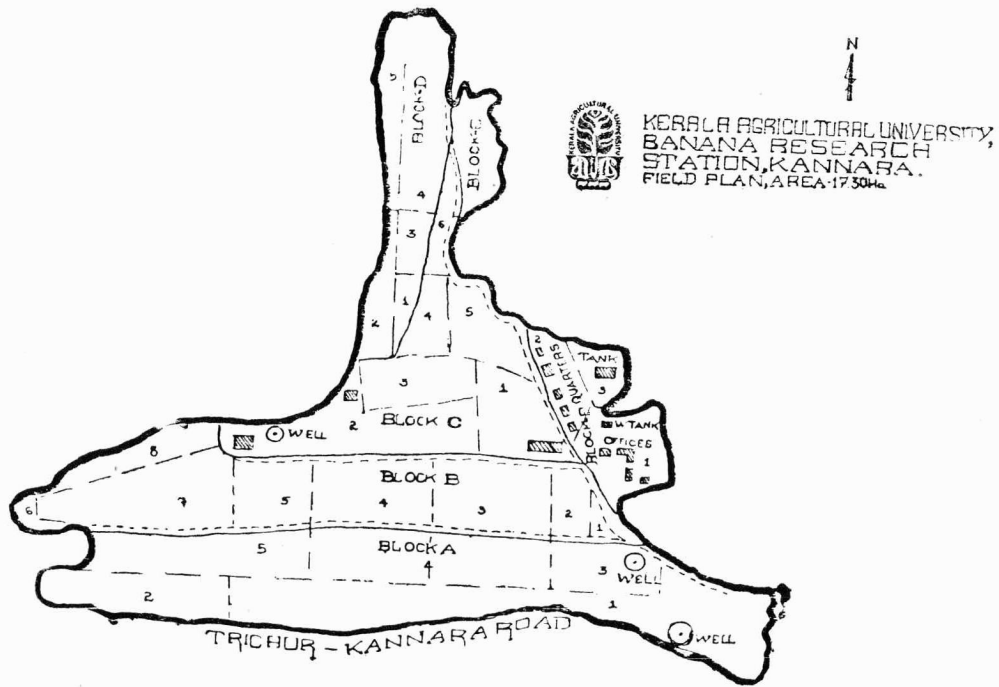


Fig. 2. Area of the Banana Research Station - a field plan.

The Pineapple Research Centre is situated 10 kilometres away from Thrissur town at the Main Campus, Vellanikkara and near to the NBPGR (Regional Centre).

4. Agricultural Characteristics

The average annual rainfall of Kannara is around 2500 mm distributed in a pattern of 1672 mm during the south-west monsoon, 800 mm during north-east monsoon and 28 mm during summer. The temperature range of this location is 26° C (mean minimum) to 31° C (mean maximum).

The soil is mostly laterite and black loam with medium fertility status and a p^H of 6.0.

The total area of Banana Research Station, Kannara is 17.3 ha divided into six blocks viz.,

A (58,500 m²), B (47,500 m²), C (24,100 m²),
D (27,450 m²), E (3,350 m²), F (12,100 m²).

The agroclimatic situation of this location is very specific with respect to cropping. The area is upland with undulating topography and the cropping pattern is similar to the homesteads of Kerala. However the predominant position goes to coconut, arecanut and banana with paddy, tapioca and other tubers and vegetables (especially amaranthus) as the subsidiary crops.

The total area of the Pineapple Research Centre, Vellanikkara is 6.3 ha divided into six blocks. The soil is laterite.

5. Research Achievements

The Station is one of the few banana research centres in the country where rich genetic source have been maintained. All the recommendations and cultural practices related to Banana and Pineapple in Kerala were formulated based on the experiments conducted at these centres.

Within a short span of period, the Station produced a number of research findings for banana and pineapple growers of the State. Some of these are summarised hereunder.

5. 1. Crop improvement

The Station has collected and evaluated 120 indigenous and exotic cultivars of banana. Based on the research results obtained for the past few years, the following 18 cultivars were found to be suitable for large scale cultivation in Kerala:

- I. Dwarf dessert group
 - Robusta
 - Monsmarie
 - Giant governor
 - Dwarf cavendish

- II. Tall dessert group
 - Gros Michel
 - Amrit sagar
 - Chenkadali
 - Poovan
 - Njali Poovan
 - Palayankodan
 - Karpooravalli
 - Poomkalli

- III. Nendran group
 - Nedu Nendran
 - Zanzibar

- IV. Culinary group
 - Monthan
 - Bathees
 - Kanchikela
 - Nendrapadathi

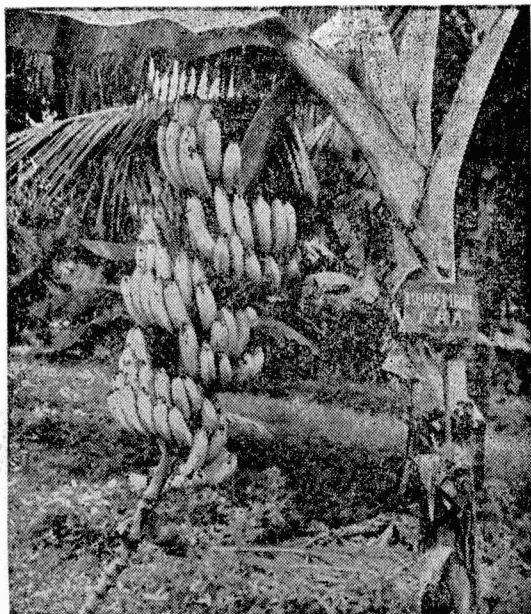


Fig. 3. Monsmarie - a dwarf dessert banana suitable for Kerala

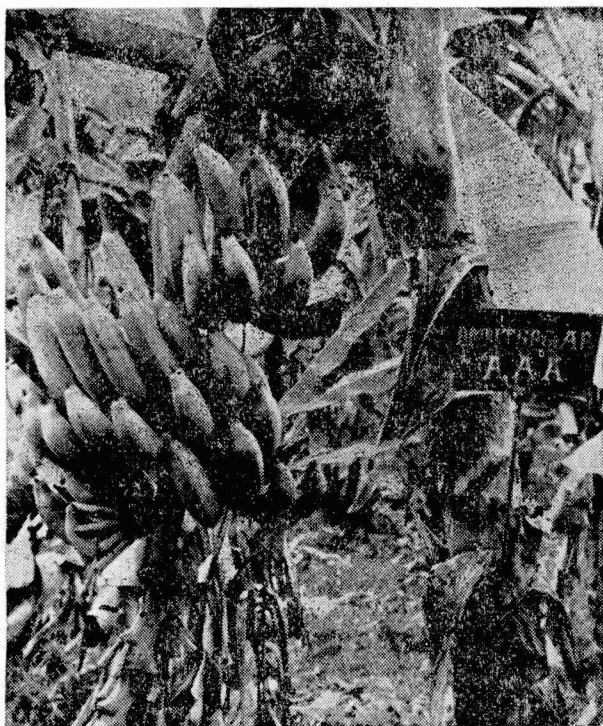


Fig. 4. Amritsagar - a dessert banana with high TSS.

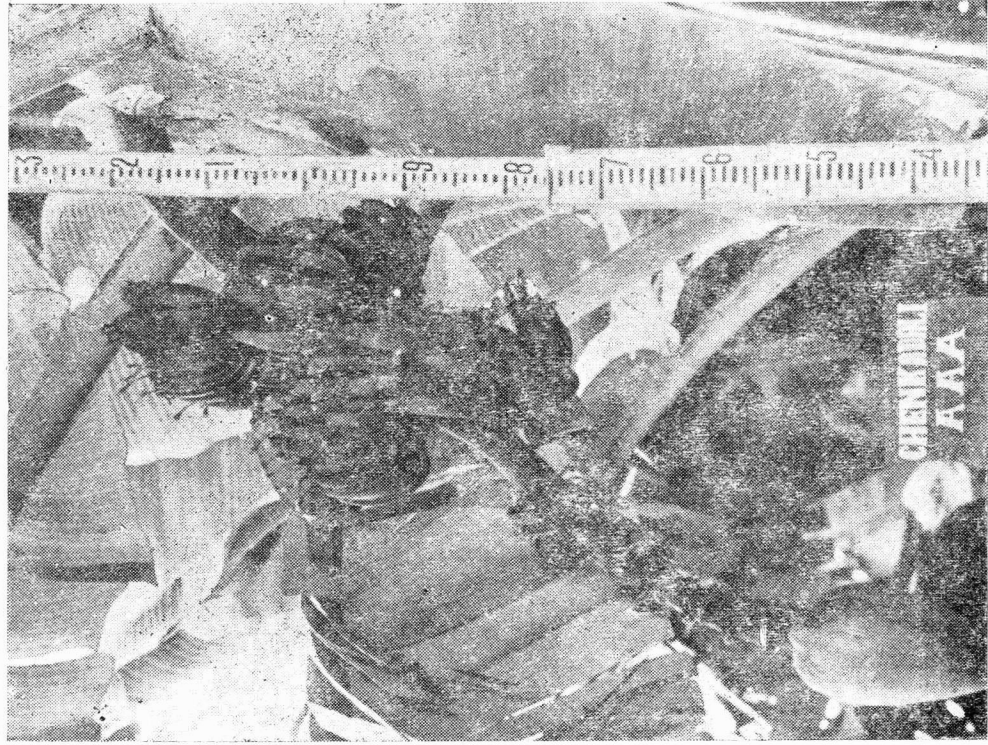


Fig. 5. Chenkadali (Red banana) - a precious variety of South Kerala

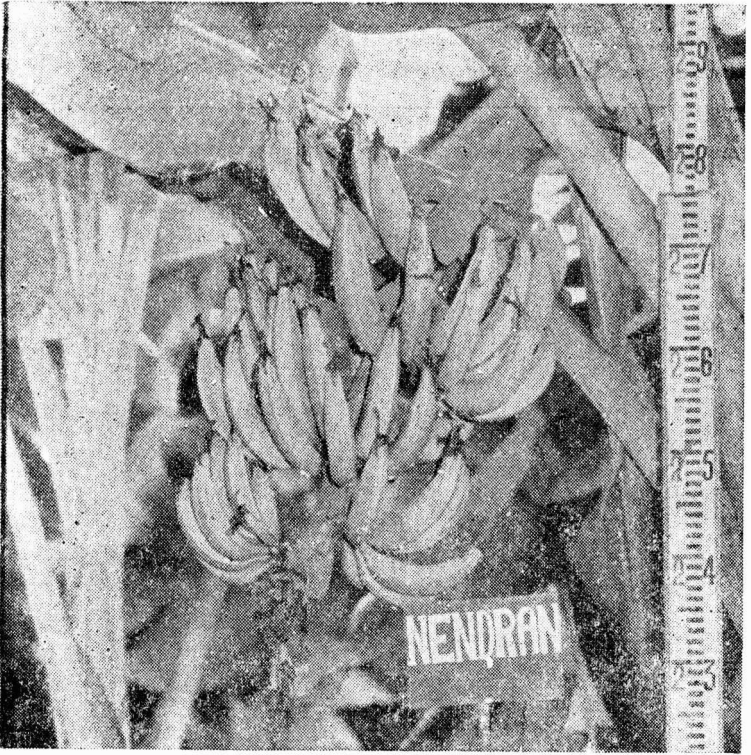


Fig. 6. Nendran - a traditional variety of Kerala

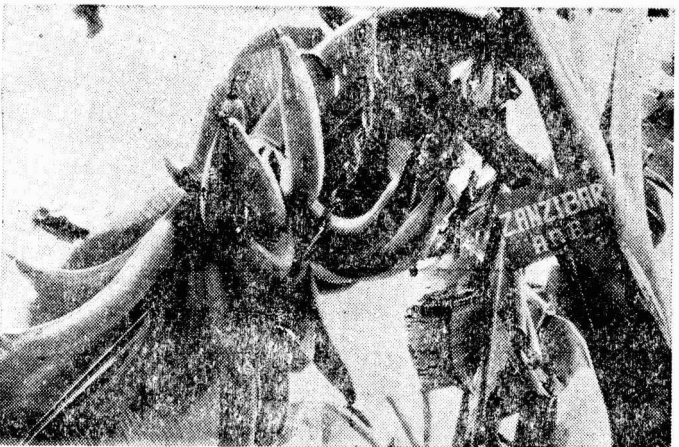


Fig. 7. Zanzibar - an introduced variety highly suitable for chips.



Fig. 8. Batheese - a culinary variety with superior yield.

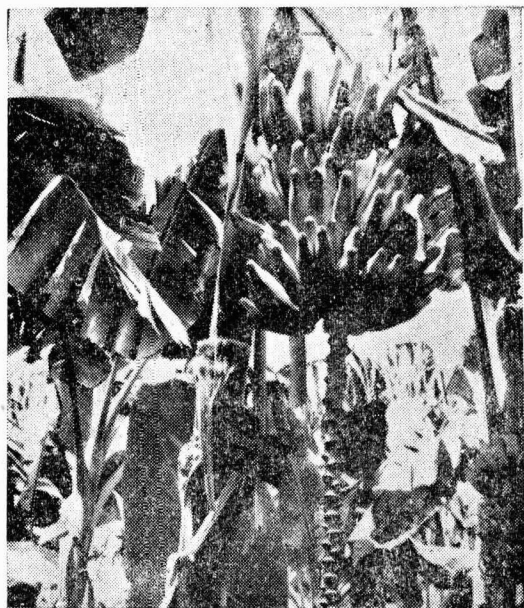


Fig. 9. Kanchikela - a culinary variety with tolerance to bunchy top disease.

Among the mutants of cavendish banana evaluated in the Station, "Monsmarie" excelled others in terms of bunch weight, fruit size, lesser acidity and higher sugar content.

Genome analysis in banana was attempted first time in Kerala on the collections available at this centre and the popular cultivars available within the State were grouped into four genomic classes, viz; AB, AAA, AAB & ABB.

Variability studies have been conducted in various groups of banana and a wide and significant variations observed in plant height, girth, number of leaves, weight of bunch, number of hands, number of fingers and TSS.

Clonal variation studies were conducted with 144 Nendran and 24 Palayankodan clones collected from various banana belts of Kerala. Among the Nendran clones tried, clone numbers viz., 35 (muttathukonam), 49 (Kothala), 100 (Pandallore), 123 (Puthoor) and 132 (Poovanchira) were found to perform better than the local clones. All these clones were found promising at ARS, Mannuthy, ARS, Chalakkudy and RARS, Ambalavayal.

Clonal variation studies conducted in palayankodan cultivar, resulted in locating five superior clones viz., 7 (Morayur), 11 (Udumbanur), 18 (Anchal), 19 (Vellayani) and 21 (Kalavoor).

Hybridisation studies conducted at the Station with an objective to combine desirable economic attributes of banana produced seven hybrids. Pisang lilin, a diploid, acuminate cultivar, was found to be the best pollen parent with respect to the compatibility status. Among the seven hybrids produced, H_1 (Agniswar x Pisiang lilin) and H_2 (Vannan x Pisang lilin) were found superior to their parents in terms of bunch weight, number of hands, number of fingers and taste.

Screening experiments of popular banana varieties under coconut shade revealed that Njali Poovan and Robusta were found to be performed well as an intercrop.

As culinary varieties, Ashy bathees, Klue teparod and Lambi were found to have good quality and increased yield so as to popularise in farmers field.

Germplasm evaluation in pineapple could identify "Giant Kew" and "Kew" as the varieties with large sized fruit whereas "Queen", "Ripley Queen" and "Mauritius" with high TSS.

Clonal variation studies in pineapple var. "Kew" revealed the superiority with respect to the clones 2/81 (collected from Thrissur) and 2/82 (collected from Ernakulam) in laterite soil.

Hybridisation studies conducted in pineapple has resulted three series of F₁ progenies. Among these a hybrid plant, No. 7 (Kew x Ripley Queen) was found to possess better attributes with respect to fruit weight, low crown weight, high TSS and spineless leaves.

5. 2. Crop management

Among the planting seasons tried at this Station, April-May and August-September planting were found to be best for the rainfed and irrigated banana respectively.

The spacing and population density experiments conducted at the Station gave the following recommendations for the popular varieties:

| <u>Variety</u> | <u>Spacing</u> (m) | <u>No. of suckers/ha</u> |
|----------------------------|-----------------------|--------------------------|
| Poovan | 2.13 × 2.13 | 2150 |
| Chenkadali (Red banana) | 2.13 × 2.13 | 2150 |
| Palayankodan | 2.13 × 2.13 | 2150 |
| Monthan | 2.13 × 2.13 | 2150 |
| Nendran | 2.00 × 2.00 | 2500 |
| Gros michel | 2.40 × 2.40 | 1730 |
| Robusta,) | 2.40 × 1.80 | 2310 |
| Monsmarie,) | | |
| Dwarf cavendish) | | |



Fig. 10. H₁ - the first hybrid banana of Kerala produced by crossing Agniswar X Pisang lilin.

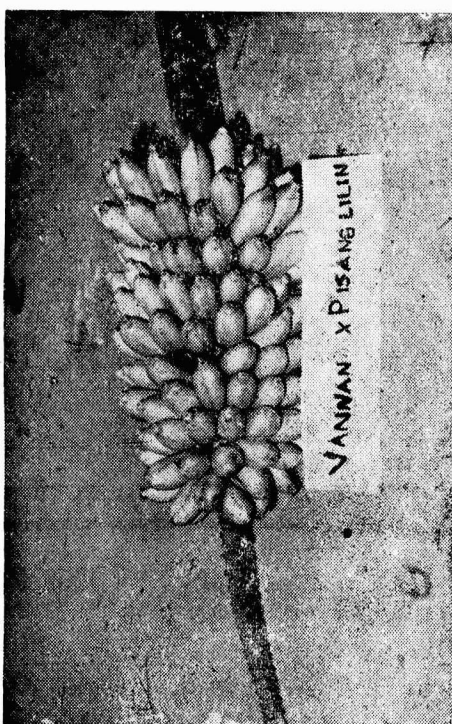


Fig. 11. H₂ - Hybrid banana evolved by crossing Vannan X Pisang lilin



Fig. 12. A Pineapple orchard in laterite soli

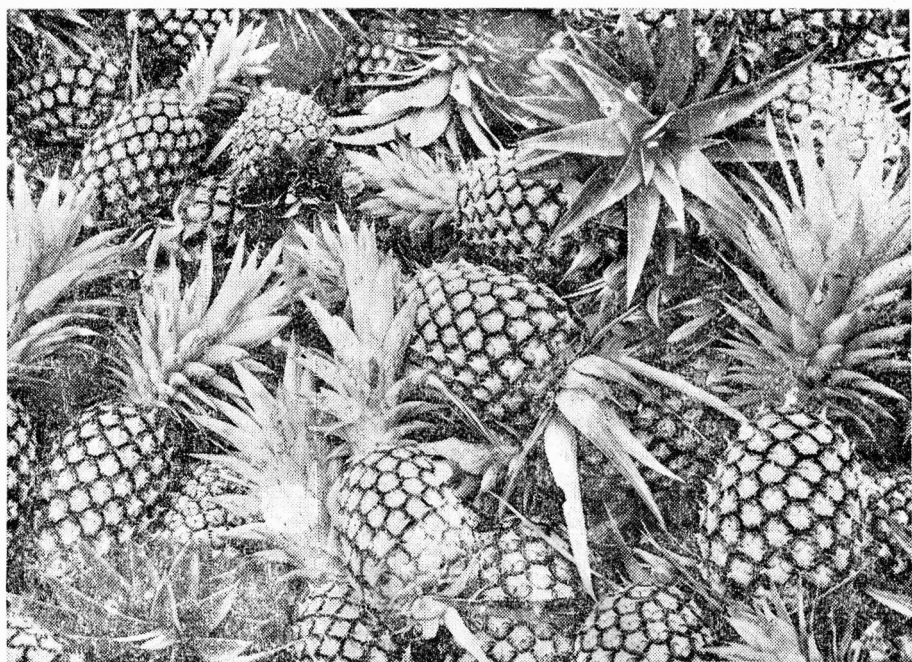


Fig. 13. Kew - a promising Pineapple variety for Kerala.

In the case of banana variety Robusta, single hedge method of planting with a plant population of 5000 suckers/ha raised at a spacing of 2 m between rows and 1 m between plants was found to give more yield than the recommended spacing of 2.4m × 1.8 m.

For ratooning in the Palayankodan variety of banana, retention of two suckers and manuring with 100:200:400 g NPK per plant during the first ratoon and at the half the dose (50:100:200 g NPK per plant) in the second ratoon was found to be optimum for maximum economic yield.

Paired row planting of Nendran banana at a spacing of 3 × 1 × 2 m was found to be ideal for accommodating intercrops and for getting maximum return/unit area. The cost benefit analysis revealed that paired row planting with Vellari as intercrop was the most beneficial (with a B/C = 3.74).

Studies on the banana based cropping system with various annuals revealed that Nendran + tapioca combination was best with B/C of 1.90 followed by Nendran and Elephant foot yam (B/C = 1.69).

Trimming of one or two terminal hands of Palayankodan bunch just after the hand emergence was found to improve the finger size.

For weed management in banana, raising two crops of cowpea in the interspace was found to be the best method for reducing weed growth upto 7 months.

Ratooning studies of pineapple under high density planting suggested that a population of 53,333 plants/ha (90 × 60 × 25 cm) was optimum for higher yield.

Depth of trench experiments revealed that deep trenches were found to be preferable for high density planting of pineapple in the case of plant crop.

Monoculture of pineapple was found to be more beneficial [B/C ratio 1.45 for plant crop] at a planting density of 44,444 plants/ha, when compared to crop combination of pineapple at a population density of 27,777 plants/ha

with ginger, turmeric, chinese potato, taro or cowpea as intercrops.

Hormonal application in pineapple have been standardised at this Centre. Application of ethephon (2-Chloro ethyl phosphonic acid] 25 ppm in aqueous solution containing 2% urea and 0.04% calcium carbonate found to be resulted in uniform flowering.

Application of kerosene [5 drops] was found effective in reducing crown length and weight of pineapple whereas 100 ppm alar increased the content of reducing sugar in fruit.

5. 3. Crop protection

Survey studies conducted in various banana growing tracts of Kerala revealed that rhizome weevil (*Cosmopolites sordidus*), aphids (*Pentalonia nigronervosa*) and nematodes (*Heterodera* sp and *Radopholus similis*] were the serious pests of banana.

Soil application of carbofuran or phorate @ 20 g per plant at the time of planting and once again the same dose three months after planting considerably reduced rhizome damage due to weevil attack and thereby increased yield.

First record of cyst nematode (*Heterodera* sp) infesting a fruit crop in the country was reported from this Station Association of other plant parasitic nematodes viz., *Radopholus similis*, *Pratylenchus coffeae*, *Helicotylenchus multicinctus*, *Rotylenchulus reniformis*, *Meloidogyne incoqnita*, *Hoplolaimus indicus* and *Tylenchorhynchus* sp. were proved experimentally in banana at this Station.

Field tolerance have been observed in varieties of banana namely, Kunnan, Poomkalli, Pisang lilin and Kadali against *Radopholus similis*. Kanchikela, a cullinary variety of banana was found to be free from *Meloidogyne incoqnita* as well as *Rotylenchulus reniformis*. Poomkalli and Nendrapadathi were also free from *M. incoqnita* whereas Monthan and Karpooravally were found with field level resistance to *R. reniformis*.

Application of carbofuran @ 20 g/plant at planting and the same dose 65 and 175 DAP in the leaf axils was found effective as an integrated control measure against rhizome weevil, banana aphids (thereby bunchy top disease) and nematodes in Nendran banana.

Sunnhemp was found to be the best antagonistic intercrop in banana var. Robusta followed by sesamum and marigold in controlling the nematodes,

Survey studies conducted in the various banana growing tracts of central region of Kerala revealed that Sigatoka leaf spot was the most widespread followed by bunchy top and kokkan disease complex.

Experimental results of the Station proved that the Sigatoka leafspot (*Cercospora musae*) disease of banana can be effectively controlled by spraying difoltan 0.3% or bordeaux mixture 1%.

The 'kokkan' disease complex, the etiology of which is still not clearly established was found to be a fast spreading menace to the banana crop in the State (especially in the central region).

Symptomatological studies on kokkan disease had revealed that the disease could be identified even in the early stages of growth (2-3 month) by the presence of reddish streaks which initiates from the base and develop upwards. The disease was found to be transmitted through suckers from one generation to another.

Spraying of growth regulator, NAA 200 ppm was found to be effective in increasing the bunch weight of kokkan affected Nendran banana.

Details of publication from the Station is furnished in Appendix III.

6. Present Programmes

Various programmes have been implemented in the field of research, extension and other farm developmental

activities. After the establishment of NARP programme the Station captured the lead function in banana and pineapple

6. 1. Research

During the period under report, 33 experiments in banana, eight experiments in pineapple, three experiments in cashew and one experiment in jack could be implemented, These experiments can be grouped into three Schemes (funding agencies) as given below:

| <u>Crop</u> | <u>AICFIP</u> | <u>NARP</u> | <u>KAU</u> | <u>Total</u> |
|-------------|---------------|-------------|------------|--------------|
| Banana | 24 | 7 | 2 | 33 |
| Pineapple | 5 | 3 | - | 8 |
| Cashew | - | 3 | - | 3 |
| Jack | - | 1 | - | 1 |
| Total | <u>29</u> | <u>14</u> | <u>2</u> | <u>45</u> |

All these experiments are ongoing and it is early to conclude. A brief resume of these experiments is given below:

6. 1. 1. Banana Research Station, Kannara

1. Collection, conservation & evaluation of banana germplasm/variatal studies in banana (AICFIP)

The experiment was started during the year 1973 with the objectives viz., i) to grow large genetic stock of banana for evaluation and ii) to select and popularise promising varieties.

Reaction of the popular and recommended varieties towards the leaf spot diseases revealed that all the popular dessert cultivars in the triploid acuminate group except Chenkadali (Red banana) were found susceptible whereas Poomkalli was resistant followed by Kanchikela and Monthan. Incidence of 'Kokkan' was found to be severe in Chenkadali, Playankodan, Karpooravally and Nendran.

The detailed list of germplasm collection is given below:

| Sl. No. | Name | Genomic grouping |
|---------|--------------------------|------------------|
| 1 | 2 | 3 |
| 1. | <i>Musa ornata</i> | AA |
| 2. | Adakka Kunnan | AAB |
| 3. | Adukkann | AB |
| 4. | Agniswar | AB |
| 5. | Alukhel | ABB |
| 6. | Amritsagar | AAA |
| 7. | Anaikomban | AA |
| 8. | Annan | - |
| 9. | Ashybathees | ABB |
| 10. | Bagnan | ABB |
| 11. | Bainsa | ABB |
| 12. | Barsai | ABB |
| 13. | Basrai | AAA |
| 14. | Beula | ABB |
| 15. | Bhurkhel | - |
| 16. | Birbutia | ABB |
| 17. | Bluggoe | ABB |
| 18. | Bodles Altafort | AAAA |
| 19. | Booditha Bontha Batheese | - |
| 20. | Boothibale | ABB |
| 21. | Chakkia | ABB |
| 22. | Charapadathi | ABB |
| 23. | Cheenabale | AAB |
| 24. | Chenkadali | AAA |
| 25. | Chetty | ABB |
| 26. | Chinali | ABB |
| 27. | Chinia | ABB |
| 28. | Chirapunchi | AAB |
| 29. | Co-1 | AAB |
| 30. | Dakshinsagar | ABB |
| 31. | Dudhsagar | ABB |

| | | |
|-----|---------------------|------|
| 32. | Dwarf Cavendish | AAA |
| 33. | Elavazhai | ABB |
| 34. | Ennabenian | ABB |
| 35. | Erachivazhai | AAA |
| 36. | Gauria | ABB |
| 37. | Govakkai | ABB |
| 38. | Gros Michel | AAA |
| 39. | Highgate | AAA |
| 40. | Hybrid Sawai | ABBB |
| 41. | Jurmani Koondali | ABB |
| 42. | Kadali | AA |
| 43. | Kalibale | ABB |
| 44. | Kalibow | AAB |
| 45. | Kallar | AAB |
| 46. | Kallu Monthan | ABB |
| 47. | Kanchikela | ABB |
| 48. | Karim Bontha | ABB |
| 49. | Karimkadali | AAB |
| 50. | Karpooravally | ABB |
| 51. | Klueteparod | ABBB |
| 52. | KNR 2/75 | ABB |
| 53. | Kodappanilla Kunnan | AAB |
| 54. | Kostha Bontha | ABB |
| 55. | Krishnavazhai | AAB |
| 56. | Kullan | AAB |
| 57. | Kunnan | AB |
| 58. | Lacatan | AAA |
| 59. | Ladies finger | AAB |
| 60. | Lambi | ABB |
| 61. | Malaikali | AAB |
| 62. | Malai Monthan | ABB |
| 63. | Malbhog | AAB |
| 64. | Mannan | AAB |
| 65. | Manoranjitham | AAA |
| 66. | Martman | AAB |
| 67. | Mas | AAB |
| 68. | Matti | AA |
| 69. | Mons Marie | AAA |
| 70. | Monthan | ABB |



808749

| | | |
|------|-----------------------|-----|
| 71. | Mottapoovan | AAB |
| 72. | Myndoli | AAB |
| 73. | Mysore Ethan | AAB |
| 74. | Nakitembe | AAA |
| 75. | Namrai | AA |
| 76. | Namkanika | AAA |
| 77. | Nattu Poovan | AB |
| 78. | Nendra Padathi | AAB |
| 79. | Ney Vannan | ABB |
| 80. | Njalipoovan | AB |
| 81. | Octoman | ABB |
| 82. | Patcha Bontha Bathees | ABB |
| 83. | Pachakappa | AAA |
| 84. | Pachanadan | AAB |
| 85. | Padalimoongil | AAB |
| 86. | Padathi | AAB |
| 87. | Palayankodan | AAB |
| 88. | Peddapacha | AAA |
| 89. | Perumpadali | - |
| 90. | Peyan | ABB |
| 91. | Pey kunnan | ABB |
| 92. | Pidimonthan | ABB |
| 93. | Pisang lilin | AA |
| 94. | Pisang Mas | AAA |
| 95. | Pisang Seribu | AAB |
| 96. | Poomkalli | - |
| 97. | Poovan | AAB |
| 98. | Rajavazhai | ABB |
| 99. | Radja sirre | AAB |
| 100. | Robusta | AAA |
| 101. | Sambrani Monthan | ABB |
| 102. | Sannachenkadali | AA |
| 103. | Sapuma! Annamalu | AAA |
| 104. | Sawai | ABB |
| 105. | Sikuzani | AA |
| 106. | Singhial | AAB |
| 107. | Sirumalai | AAB |
| 108. | Sugandhi | AAB |
| 109. | Thekkanthulladan | AAB |

| | | |
|------|--------------------|-----|
| 110. | Thiruvananthapuram | ABB |
| 111. | Tongat | AA |
| 112. | Valiya Kunnan | AB |
| 113. | Valiya Poovan | - |
| 114. | Vannan | AAB |
| 115. | Velipadathi | - |
| 116. | Vellapalayankodan | AAB |
| 117. | Venneetu Mannan | ABB |
| 118. | Virupakshi | AAB |
| 119. | Wather | AAA |
| 120. | Zanzibar | AAB |

Collections added in the germplasm during the year 1990.

| | | |
|------|---------------------------------------------------|-----------------|
| 121. | Ponnan | |
| 122. | Bhimkhel | |
| 123. | H ₁ (Agniswar × Pisang lilin) | |
| 124. | H ₂ (Vannan × Pisang lilin) | |
| 125. | H ₃ (Mannan × Pisang lilin) | |
| 126. | H ₄ (Harichal × Pisang lilin) | |
| 127. | H ₅ (<i>M. ornata</i> × Pisang lilin) | |
| 128. | H ₆ (Karpooravally × Pisang lilin) | |
| 129. | H ₇ (Klue teparod × Pisang lilin) | |
| 130. | Karpooravally (OP) | |
| 131. | Palayankodan clone - 21 | (Kalavoor) |
| 132. | " " - 19 | (Vellayani) |
| 133. | " " - 18 | (Anchel) |
| 134. | " " - 11 | (Udumbanoor) |
| 135. | " " - 7 | (Morayoor) |
| 136. | Nedu Nendran | |
| 137. | Chengalikodan | |
| 138. | Enikomban | |
| 139. | Mancheri Nendran | |
| 140. | Attu Nendran | |
| 141. | Padalimurian | |
| 142. | Nendran clone - 35 | (Muttathukonam) |
| 143. | " " - 49 | (Kothala) |

144. Nendran clone - 100 (Pandaloor)
 145. " " - 123 (Puthoor)
 146. " " - 132 (Poovanchira)
 147. Panang
 148. Kali
 149. Varavazha
 150. Anakomban - Sedapatti
 151. Poovazhai - Vridhachalam
 152. Monthan - Poondi
 153. Rasthali - TN
 154. Madavazha
 155. Navaral - Karinthurai
 156. Navaral - Perumthurai
 157. Koompilla Kannan
 158. Sambrani Poovan
 159. Pevazha
 160. Padatti - Idukki
 161. Ethan - Malappuram
 162. Njali Poovan - Idukki
 163. Atrasingan - KK
 164. Karivazha
 165. Charakali
 166. Rasagalli
 167. Poomkannankadali
 168. Kaliagalli
 169. Pachottan
 170. Aryanadu
 171. Pachanadan - Parali
 172. Malavazhai - Thaenmala
 173. Karibale
 174. Nella Bontha
 175. Rasthali - Erode
 176. Madhuraga (i)
 177. Raja bale
 178. Madhuraga (ii)
 179. Chandrabale
 180. Pachabale
 181. Vellipattubale
 182. Kalyanbale

- 183. Moris
- 184. Sakkai
- 185. Mysore Poovan
- 186. Erodekai
- 187. Manjavazha
- 188. Nattuvazha
- 189. Nani Poovan
- 190. *Musa balbisiana*

2. Screening of germplasm against leaf spot, fusarium and bunchy top (AICFIP)

The experiment was laid out during 1990 with tolerant cultivars viz., Kodappanilla Kunnan, Njali Poovan, Poovan and Karpooravally surrounded by susceptible varieties like Robusta and Nendran. The plants are yet to reach the flowering stage

3. Clonal variation studies in Nendran (AICFIP)

This experiment based on a survey work was initiated during 1978-79 in the districts of Trivandrum, Quilon, Kottayam, Calicut, Malappuram and Trichur. Altogether 144 clones were selected initially and from this, 15 clones were selected further and studied in depth. They were critically evaluated for three years, from which five were selected as better clones. All these clones were found to perform better than the local clones at Banana Research Station, Kannara and Agricultural Research Station, Mannuthy. Some of these clones gave better performance at Agronomic Research Station, Chalakkudy and Regional Agricultural Research Station, Ambalavayal. Replicated trials have been laid out at present in comparison to the popular clone 'Chengalikodan'.

4. Hybridisation studies in banana (AICFIP)

The experiment was started as the University Project during 1983 with an objective to combine desirable economic attributes scattered in various cultivars of banana.

Out of the four hybrids produced viz. , H₁ (Agniswar x Pisang lilin), H₂ (Vannan x Pisang lilin), H₃ (Mannan x Pisang lilin) and H₄ (Harichal x Pisang lilin), H₁ and H₂ were found promising. Both these hybrids were superior to their parents in terms of bunch weight, number of hands and number of fingers.

During the current year, crossing programme have been implemented in Nendran with all the dwarf clones available at this Station as the pollen parents with a view to produce dwarf clones of Nendran.

5. Spacing trial in banana [AICFIP]

The trial have been laid out during the current season with the objective to find out the optimum density and the most economic system of planting Nendran banana. Technical programme includes various systems of planting and different spacing within a system.

6. Standardisation of optimum dose and time of Nitrogen application in banana var. Nendran (AICFIP)

The experiment was started in 1989 with the objectives viz., i) to find out the need of N during vegetative phase and ii) to standardise optimum dose and time of its application.

7. Standardisation of optimum dose and time of Potassium application in banana var. Nendran (AICFIP)

The trial was laid out in 1989 with the objectives namely i) to find out the need of K during vegetative and reproductive phase and ii) to standardise optimum dose and time of its application.

The experiment was laid out in RBD with seven treatments and four replications.

808749

8. Standardisation of organic and inorganic fertilizer requirement in variety Nendran (AICFIP)

Along with the previous two experiments, this was also implemented during 1989 with the objectives viz., i) to find out the organic and inorganic ratio of manure and fertilizer on growth and yield of banana and soil properties and ii) to find out the effect on nematode population.

As in the previous two experiments, this was also laid out in RBD with seven treatments and three replications.

9. Water requirement studies in banana (AICFIP)

The experiment was laid out in RBD with four treatments fixed based on the cumulative pan evaporation data ranging from 40 to 100.

10. Management of kokkan disease of banana by the use of agrochemicals (KAU)

The experiment was started in 1986 with an objective to reduce the intensity of damage due to kokkan disease on banana. Treatments include agrochemicals viz., Terramycin, Penicillin, 2,4-D and NAA.

11. Crop rotation studies in banana variety Nendran (Ratooning vs Single crop) (AICFIP)

The experiment was started in 1987 with an objective to find out the best crop rotation for economic yield of banana. The trial was laid out in RBD replicated four times with the following treatments viz.,

1. Banana - tapioca - fallow - banana,
2. Banana - vegetables - banana - banana,
3. Banana - Banana+GM - tapioca - banana,
4. Banana - paddy (cowpea) - elephant foot yam - banana,
5. Control.

The project is in progress.

12. Survey and identification of weeds infesting banana orchards (AICFIP)

This project has been allotted by the ICAR during the National Workshop, AICFIP, held at Tirupathi in September, 1989.

Based on the technical programme, the initial survey was started from November, 1989. Further survey is in progress.

13. Estimating losses from weeds at growth and development and identification of critical stages (AICFIP)

This experiment was laid out in 1989 with the objectives viz., i) to estimate the losses from weeds at growth and development of banana and ii) to identify the critical stages of hand weeding for getting maximum returns.

The experiment is in progress.

14. Chemical control of weeds (AICFIP)

The experiment was started during 1987 with the objective to find out the most effective and economic method of weed control in banana variety Nendran.

The trial was laid out in RBD with eleven treatments and three replications. The results revealed that the banana plots intercropped with cowpea recorded minimum weed growth at three, five and seven months after planting indicating the long lasting effect of smothering weeds coupled with the addition of nitrogen.

15. Survey studies of insect pest of banana (AICFIP)

The experiment was implemented in 1988 with the objective to find out the different pest attacking banana and its population build up.

Survey conducted during the current year reveals the incidence of rhizome weevil, aphids, lacewing bugs, leaf eating caterpillars and thrips.

An unidentified pest has been observed in the Kannara region and the same sent to the Commonwealth Institute of Entomology for identification.

16. Biology and population dynamics of banana aphid (AICFIP)

The experiment was implemented in 1988 with the objectives viz., i) to study the biology and population build up in relation to the virus diseases and ii) to study the interrelationship among the population and weather parameters.

The result indicated that highest population was during the month of September. The initial experiments revealed that the life cycle for aphids was 8 days with 4 instars.

17. Chemical control of rhizome weevil (AICFIP)

The experiment was started in 1988 with the objective to find out how far insecticidal treatment of suckers at planting will check the infestation of rhizome weevil. the results revealed that Methyl demeton was the best in reducing rhizome damage followed by phosphamidon and carbofuran.

18. Survey and identification of banana nematodes (AICFIP)

The survey experiment was started in 1988 with the objectives viz., i) to identify the important banana nematodes in the State and ii) to study the pathogenicity of important banana nematodes.

The detailed survey conducted in various districts of the State projected the predominance of the nematod species namely,

1. *Radopholus similis*
2. *Meloidogyne* spp
3. *Rotylenchulus reniformis*
4. *Helicotylenchus* sp
5. *Hoplolaimus indicus*

19. Control of banana nematode using intercrops (AICFIP)

The experiment was not conducted last year, However

arrangements have been made to carry out this trial in Nendran during the current year.

20. Screening of banana against burrowing nematode *Radopholus similis* and *pratylenchus* sp (AICFIP)

The work is in progress.

21. Survey of fungal and viral diseases of banana (AICFIP)

The objectives of the experiment started during 1987 are:

i) to conduct survey in the banana growing areas of the State and

ii) to assess the intensity of fungal and viral diseases of banana

The details of the survey conducted during 1989 indicated that the incidence of leaf spot disease was more in Ernakulam and Thrissur districts compared to Palakkad and Malappuram. Similarly, it was observed that the incidence of Bunchy top and Panama wilt was found more in Ernakulam districts of the central region than the others.

22. Control of Panama wilt (AICFIP)

Initial pot culture experiment have been undertaken at present in Nendran.

23. Control of Sigatoka leaf spot disease (AICFIP)

The experiment was laid out during 1989 with an objective to find out suitable control measures for the leaf spot disease of banana by spraying different fungicides.

The results obtained during 1989 did not show any significant difference among the treatments. However Bavistin 0.1% gave highest yield in terms of bunch weight.

24. Control of kokkan disease (AICFIP)

The experiment was started in 1987 with the objectives viz., i) to identify the causal organism of Kokkan disease complex and ii) to study its pathogenicity.

The work is in progress.

25. Virus disease of banana (AICFIP)

The experiment was started in 1989 with an objective to detect the bunchy top and infectious chlorosis virus by the use of benedict solution.

The greenish brown coagulations was observed from both healthy and diseased plant sap.

26. Effect of number of suckers retained on the performance of ratoon crop of banana in coconut garden under partial shade (NARP)

The experiment was started in September 1989 with the objectives viz., i) to ascertain the number of suckers that can be retained for ratooning and ii) fertilizer dose to be applied to the ratoon crop.

The result obtained during the period indicated that the percentage of light transmitted to the ground under young plants spaced at 7.5 m apart varied from 10 to 45% from the basal region towards proximities. The banana plants under partial shade lagged behind the plants in open conditions with respect to date of flowering.

27. Ratooning of banana variety Nendran [NARP]

The plant crop was planted in September, 1989 with the objectives viz., i) to study the effect of planting depth, initial plant population and number of suckers retained on the performances of ratoon crop of banana and ii) to find out the economic life span of banana under ratooning.

The results obtained so far are premature since the first ratoon crop is in the field.

28. Ratooning of banana variety Palayankodan and the follower sequence [NARP]

The experiment was laid out during September, 1989 with the objectives, viz., i) to compare the yield performance of followers retained at different growth stages of mother plant and ii) to find out the optimum dose of fertilizers under prolonged ratooning.

The harvesting of first plant crop is continuing and the results are preliminary till this period.

29. Control of cyst nematode infecting banana var. Nendran (NARP)

The planting was completed on 13-10-89. The available data indicate that dip treatment viz., Dimethoate and Chloropyrifos were ineffective. The final population in root [10 g] was found to be maximum with 45 and 30 respectively. The highest bunch weight of 6.5kg was obtained in Carbofuran followed by phenamiphos [6.3 kg].

The experiment is in progress.

30. Management of nematodes infecting banana var. Nendran with special reference to burrowing nematodes *Radopholus similis* [NARP]

The experiment was started in 1989. Regarding the relative efficacy of different treatments on bunch weight and nematode control, better results were obtained with Carbofuran. Maximum fruit yield 6.5kg/plant was obtained from treatment involving use of Carbofuran. Soil application of phorate and other dip treatments were on par with each other.

31. Control of banana nematodes on var. Robusta using intercrops and its influence on the plant nematode population in roots/soil [NARP]

The experiment was laid out on 27-9-89 with the following treatments:

1. Banana + Marigold (2g/m²)
2. Banana + Sunnhemp (10g/m²)
3. Banana + Sesamum (5 g/m²)
4. Banana + Coriander (5g/m²)
5. Banana + *Aquorus calamus*
6. Banana + Carbofuran (40g/sucker)

Growing of different antagonistic plants and Carbofuran treatment at planting proved equally effective in reducing the nematode population and did not reveal any significant difference between them.

32. Intra-clonal variation studies in Palayankodan (KAU)

The experiment was started during the year 1985 with an objective to locate superior clones of Palayankodan, a popular dessert banana of the State.

Out of the 24 accessions (collected from various locations) evaluated three clones viz., Vellayani, Anchal and Kalavoor were found superior. MLT will be conducted with these clones.

6. 1. 2. Pineapple Research Centre, Vellanikkara

1. Collection, conservation and evaluation of pineapple germplasm/Varietal studies in pineapple (AICFIP)

The experiment was started in 1980 with the objectives viz., i) to evaluate the large genetic stock of pineapple and ii) to select better genotype.

Out of the 24 collections evaluated so far 'Giant Kew' and 'Kew' were found to be with larger fruits whereas Queen, Ripley Queen and Mauritius with high TSS.

2. Clonal variation studies in pineapple (AICFIP)

The project was started in 1981 with an objective to assess the natural genetic variability in pineapple.

Out of the 19 clones evaluated, clone (2/82) from Ernakulam and Clone (2/81) from Trichur were found superior to others.

3. Breeding new varieties of Pineapple (AICFIP)

The experiment was started in 1984 with the objectives namely, i) to improve the fruit characters and quality of 'Kew' and ii) to develop new variety for table purpose having high yield capacity,

So far we have produced 3 series of F_1 progenies. Among these, Hybrid No. 7, a spineless type, yielded relatively larger fruit with small crown and high TSS value.

4. Standardisation of depth of trench for planting pineapple var. 'Kew' (AICFIP)

The experiment was laid out in 1986 with an objective to find out the optimum depth of trench for planting pineapple in high density.

The results pointed out that for the plant crop deeper trenches were found better however the effect was not significant in the case of first ratoon crop.

5. Standardisation of nutrient requirement of ratoon crop of pineapple [AICFIP]

The experiment was laid out in 1987 with an objective to find out the optimum NPK requirement of the ratoon crop of Kew pineapple.

The experiment is in progress.

6. Standardisation of spacing for prolonged ratooning of pineapple (NARP)

The experiment was started in 1989 with the objectives viz., i) to find out optimum spacing for planting pineapple var. Kew for taking more than two ratoon crops economically.

The results obtained during the period indicated that when the crop was 6 month old the high density plantings of 40,000 to 53,000 plants/ha had produced more number of leaves (20 to 24 leaves per plant) than low density plantings viz., 18,000 to 37,000 plants/ha (19 to 20 leaves per plant).

7. Staggering fruit production in pineapple by adjusting planting time and growth regulator application [NARP]

The experiment was planted during May 1989 to September, 1989 period with different dates of plantings and time of hormone applications as treatments with the objectives to study the feasibility of pineapple fruit production throughout the year.

The results during the period indicated that there is no marked difference between different date of plantings, viz., May, July and September with respect to vegetative characters.

8. Keeping quality of pineapple fruit as well as canned slices in syrup with reference to maturity at harvest (NARP)

The experiment was started in 1989 with the objectives viz., i) to find out the optimum maturity level of harvest in pineapple for different purposes of processing under Kerala conditions.

The experiment consisted of seven treatments as date of harvests and harvested fruits were stored by two methods. The slices of fruits harvested at different periods were canned in syrup and kept under ambient temperature conditions of Kerala.

The results during the period indicated that harvesting pineapple after 130 days is the best with respect to keeping quality of slices and the attributes like flavour and sweetness was better in such cases. In the case of fruit of early maturity the slices are small and empty space is more.

9. Utilization of jack fruit for product development [NARP]

This experiment is to be started during the fruit season of 1990 with the objectives viz., i) to standardise the procedure for developing various products from jack fruit.

10. Selection, standardization and product development in banana [NARP]

The experiment was started in 1989 with the objective to screening banana varieties to standardize various products in banana like clarified juice, beer, dried ripe banana, dehydrated raw banana and banana leather.

During the period, the experiment on preparing banana beer was conducted and the result indicated that the beer brewed from hybrid banana fruits found satisfactory.

6. 1. 3. CASHEW RESEARCH STATION, MADAKKATHARA

1. Spacing trial In cashew using clonal planting material [NARP]

The experiment was started in 1989 with the existing plantation at Cashew Research Station, Madakkathara with the objectives to determine the optimum spacing for cashew when air layers are used as planting material.

The results indicated that a spacing of 4 m × 8 m and 4 m × 4 m was advantageous even in the eighth year of planting with respect to calculated per hectare yield. The maximum per tree yield was obtained in 4 m × 12 m spacing followed by 4 m × 8 m spacing.

2. Pruning and training studies in cashew (NARP)

The experiment was started in 1989 with the existing plantation at C. R. S, Madakkathara with the objectives viz. i) to find out whether cashew is amenable to pruning without loss of yield and ii) to standardise the optimum level of pruning in cashew.

The experiment is in progress.

3. Nutritional studies in cashew using clonal planting material (NARP)

The experiment was started in 1989 in the erstwhile KADP area at Madakkathara with the objectives viz., i) to formulate manurial schedule for cashew and ii) to study the pattern of uptake of Major nutrients.

The results are preliminary in nature.

6. 2. Extension

Scientists of this Station played vital role in the field of extension activities especially to the banana and

pineapple farmers. As the part of the survey programme, the Scientists give critical advice to the farmers and collect the feed back from the progressive and experienced cultivators.

The lab-to-land and village adoption programmes are being implemented in the Station. Timely technical Information on various aspects of banana cultivation are being given through radio and other media. Field training to farmers, students and teachers are given regularly. Scientists of this Station also handle classes in training courses, seminars etc.

6. 3. Other activities

A model homestead garden with coconut based multi-species high density cropping system is being maintained in the 'A' block of the Station to provide learning situation to the visitors. This was highly appreciated by the recently visited XXI IDA mission on 4-10-1990.

Production and distribution of quality planting materials of banana and pineapple is a regular activity of the Station. Since the demand for banana suckers is huge, separate programmes have been earmarked for rapid multiplication of suckers of popular banana varieties.

Similar to banana, Kannara is famous for vegetable cultivation [especially Amaranthus]. Special emphasis have been given to produce sufficient quantity of vegetable seeds under the Central Sector as well as the Revolving Schemes of the University.

Along with the implementation of NARP Phase-II programme, civil works namely, labourers waiting shed, tiller shed, farm storage house and a staff quarter have been completed. Construction of a laboratory-cum-library building is in progress under the KAU Scheme.

7. Proposed Programme for VIII plan

Extensive research programmes have been proposed from this Station for considering in the VIII Plan period.

Three proposals namely, (i) Utilisation of agricultural by product for a pilot paper plant, (ii) Breeding pineapple for yield and quality and (iii) Breeding programme in banana to evolve dwarf Nendran and popular varieties with resistance to biotic stress have sanctioned by the University with a total outlay of 40.12 lakhs. Out of this an amount of 4.02 lakhs have been earmarked during the current financial year for the first and second proposals mentioned above.

APPENDIX — I
LIST OF SCIENTISTS

| Sl. No. | Name of Scientist | Designation | Period | |
|----------------------------|--------------------------------|-------------------------|----------|------------|
| | | | from | to |
| 1 | 2 | 3 | 4 | |
| A. HEADS OF STATION | | | | |
| 1 | Sri K. Balakrishnan Nair | Banana Research Officer | 14-8-62 | 3-12-62 |
| 2 | Sri. P. V. George | —do— | 1-7-62 | 13-7-64 & |
| | | | 11-10-64 | 30-6-68 |
| 3 | Sri. C. N. Jayasankaran | —do— | 13-7-64 | 10-10-64 |
| 4 | Sri. K. G. Jacob | —do— | 1-7-68 | 30-6-70 |
| 5 | Sri. P. G. Veeraraghavan | —do— | 8-6-71 | 23-2-73 |
| 6 | Sri. K. Kannan | Horticulturist | 24-2-73 | 31-7-76 |
| 7 | Sri. S. Balakrishnan | Junior Horticulturist | 1-8-76 | 1-6-78 |
| 8 | Sri. P. C. Jose | Associate Professor | 1-7-78 | 20-2-81 |
| 9 | Dr. M. N. Chandrasekharan Nair | —do— | 21-2-81 | 31-3-81 |
| 10 | Sri. P. A. Varkey | —do— | 1-4-81 | 3-12-84 |
| 11 | Dr. K. Pushkaran | —do— | 4-12-84 | 2-5-89 |
| 12 | Sri. V. K. Raju | Associate Professor | | |
| | | NC (Hort) | 3-5-89 | 8-12-89 |
| 13 | Dr. Job Sathya Kumar Charles | Associate Professor | | |
| | | NC (Nemat.) | 9-12-89 | 4-3-90 |
| 14 | Dr. L. Rajamony | Associate Professor | | |
| | | (Hort) | 5-3-90 | Continuing |

| 1 | 2 | 3 | 4 |
|--------------------------------------------|------------------------------|-----------------------------------------|--------------------------------------|
| B. SCIENTISTS WORKED AT THE STATION | | | |
| 1 | Sri C. Janardhanan | Research Assistant | 1-7-61 30-6-62 |
| 2 | Sri M. Abdul Kalam | —do— | 1-7-61 9-10-61 |
| 3 | Sri Paul Thomas | —do— | 14-12-61 7-3-62 |
| 4 | Sri G. Gopinatha Pillai | —do— | 20-7-62 17-12-62 |
| 5 | Sri George Mathew | —do— | 26-10-62 28-5-68 |
| 6 | Sri Baby Jacob | —do— | 17-12-62 20-4-63 |
| 7 | Sri Ravikumar Praseedom | —do— | 23-4-63 28-9-63 |
| 8 | Sri Philip Zacharia | —do— | 11-9-63 11-12-68 |
| 9 | Sri M. Oommen | —do— | 1-1-66 28-5-68 |
| 10 | Sri Indrasenan | —do— | 23-11-67 22-2-68 |
| 11 | Sri K. U. Saleem | —do— | 9-7-68 30-6-69 |
| 12 | Sri R. Gopimony | Research Assistant/Jr. Plant Breeder | 9-10-68 20-12-68 & 1-4-76 31-7-76 |
| 13 | Sri George John | Plant Pathology Assistant | 11-4-68 20-12-68 |
| 14 | Sri U Mohammed Kunju | Horticultural Assistant | 16-8-68 30-6-69 |
| 15 | Sri K. N. Balakrishna Pillai | —do— | 11-6-68 1-1-74 |
| 16 | Sri A. K. Varghese | Research Assistant | 22-1-69 31-12-69 |
| 17 | Sri C. K. Prabhakaran Thampi | —do— | 1-7-69 12-12-72 |
| 18 | Sri M. Gopalakrishnan | —do— | 30-1-70 5-5-70 |
| 19 | Sri Natarajan | Plant Pathology Assistant | 22-4-72 8-12-72 |
| 20 | Sri S. Karthikeyan | Research Assistant | 1-7-71 22-4-72 |
| 21 | Sri K. C. Varghese | —do— | 22-4-72 22-9-72 |

(Contd.)

| 1 | 2 | 3 | 5 | |
|----|-------------------------------|---------------------------------------------|---------|----------|
| 22 | Smt D. Droupathi Devi | Horticultural Assistant | 22_4_72 | 7_8_72 |
| 23 | Dr K. John Kuriyan | —do— | 7_8_72 | 8_12_72 |
| 24 | Sri G. K. Balachandran Nair | Research Assistant/Jr. Res. Officer | 1_7_72 | 28_2_74 |
| 25 | Sri. K .M. Kochunny | —do— | 1_7_70 | 12_8_71 |
| 26 | Dr. K. Karunakaran | —do— | 20_8_71 | 15_11_71 |
| 27 | Sri M. Nazim | —do— | 20_5_71 | 16_8_71 |
| 28 | Sri P. Varadarajan Nair | Junior Research Officer | 25_6_73 | 7_10_73 |
| 29 | Dr K. Kumaran | Research Assistant | 1_4_74 | 20_3_75 |
| 30 | Smt K. C. Marykutty | —do— | 1_1_74 | 25_7_78 |
| 31 | Sri G. R. Pillai | Junior Research Officer | 21_5_74 | 31_7_76 |
| 32 | Sri B. Babu | —do— | 26_9_74 | 10_12_75 |
| 33 | Dr N. Gangadharan Nair | Research Assistant | 1_4_74 | 20_11_74 |
| 34 | Sri M. R. Chidananda Pillai | Junior Horticulturist | 1_8_76 | 3_4_77 |
| 35 | Dr M. N. Chandrasekharan Nair | Junior Plant Physiologist | 1_4_76 | 31_3_81 |
| 36 | Sri D Joseph | Jr. Entomologist-cum-Nematologist | 1_4_76 | 6_8_76 |
| 37 | Sri Gurjit Singh Pruthy | Junior Instructor | 19_5_76 | 2_10_76 |
| 38 | Sri Job Sathya Kumar Charles | —do— | 5_5_76 | 2_8_76 |
| | | | 9_11_80 | 20_10_88 |
| 39 | Sri K. K. Raveendran Nair | Asst. Professor (Entomology/ Nematology) | 16_8_76 | 30_6_78 |
| 40 | Sri B. Mohan Kumar | Junior Instructor | 2_9_76 | 1_11_76 |
| 41 | Sri I. P. Sreedharan Nambiar | Asst. Professor (Agronomy) | 4_4_77 | 19_9_79 |

| 1 | 2 | 3 | 4 |
|----|--------------------------|----------------------------------|-------------------|
| 42 | Dr. N. Krishnan Nair | Associate Professor (Botany) | 26_4_77 7_5_79 |
| 43 | Smt K Santhakumari | Assistant Professor (Entomology) | 1_4_79 16_5_79 |
| 44 | Sri N. Nandakumar Menon | Junior Instructor | 7_1_77 31_3_77 |
| 45 | Sri P. H. Latif | Junior Instructor | 1_7_77 19_10_77 |
| 46 | Sri P. Sukumaran Nair | —do— | 7_7_77 15_11_77 |
| 47 | Sri B. K. Jayachandran | —do— | 4_10_77 18_10_77 |
| 48 | Sri T. R. Gopalakrishnan | —do— / Asst. Professor (Hort) | 22_12_77 26_12_77 |
| | | | 23_11_80 1_1_81 & |
| | | | 1_4_79 15_10_79 |
| 49 | Smt T. Radha | —do— | 24_12_77 26_12_77 |
| | | | 1_4_79 23_8_79 & |
| | | | 29_12_86 19_9_89 |
| 50 | Smt P. A. Nazeem | —do— | 24_12_77 26_12_77 |
| 51 | Smt Valsamma Mathew | —do— / Asst. Prof. Hort) | 9_1_78 20_10_78 & |
| | | | 16_3_82 30_11_83 |
| 52 | Smt K. Layla Mathew | —do— | 2_2_78 8_7_82 |
| 53 | Smt S. Shilaja | —do— | 15_2_78 20_10_78 |
| 54 | Smt K. R. Lyla | —do— | 1_4_78 20_10_78 & |
| | | | 1_7_80 27_11_80 |
| 55 | Sri C. S. Jayachandran | —do— | 30_9_78 15_10_79 |
| 56 | Sri K. V. Subramaniam | Junior Asst. Professor | 1_4_79 10_3_80 |

| 1 | 2 | 3 | 4 | |
|-----|----------------------------|-----------------------------------------|----------|-----------|
| 57. | Sri T. E. George | —do— / Asst. Prof/Assoc.Prof. NC (Hort) | 1_4_80 | 2_1-81 & |
| | | | 30-11-88 | 22_6_90 |
| 58 | Sri T. M. Kurian | Asst. Professor (Agronomy) | 11_12_80 | 8_7-83 |
| 59 | Sri P. K. Rajeevan | Asst Professor (Horticulture) | 2_1_81 | 5_6_84 |
| 60 | Smt G Padmakumari | Associate Professor (Plant Pathology) | 5_3_81 | 18_1_82 |
| 61 | Smt K. T. Prasannakumari | Junior Asst. Professor | 26_5_80 | 22_11_80 |
| 62 | Sri V. V. Radhakrishnan | —do— | 26_5_80 | 27_12_80 |
| 63 | Sri K. Sudhakara | —do— | 28_5_80 | 8_7_80 |
| 64 | Smt Maicykutty. P. Mathew | Junior Asst. Professor | 28-11-80 | 16-3-82 |
| 65 | Smt Sabeena George | —do— | 29-11-80 | 2-2-81 |
| 63 | Sri K. C Aipe | —do— | 3-1-81 | 16-3-82 |
| 67 | Dr Susamma Philip | Associate Professor (Plant Pathology) | 24-1-82 | 14-7-82 |
| 63 | Smt C. K. Geetha | Junior Asst. Professor | 20-7-82 | 5-6-84 & |
| | | | 29-8-90 | 27-9-90 |
| 69 | Smt P. Santhakumari | Asst. Professor (Plant Pathology) | 11-1-82 | 30-8 83 |
| 70 | Smt S, Prasannakumari Amma | Asst. Professor (Horti) | 8-7-83 | 3-6-86 |
| 71 | Smt Baby Lissy Markose | Junior Asst. Prof. /Asst. Prof. (Hort) | 23-11-83 | 31-3-84 & |

| 1 | 2 | 3 | 4 | |
|----|----------------------|-------------------------------|----------|---------------------|
| | | | 8-5-89 | 23-8-90 (on leave) |
| 72 | Smt Alice Kurien | Asst. Professor | 30-11-83 | 31-12-84 |
| 73 | Smt P. V. Nalini | Junior Asst. Professor | 21-7-84 | 29-7-85 |
| 74 | Smt A. K. Babylatha | —do— /Asst. Professor | 9-11-84 | 27-10-86 & |
| | | | 28-8-89 | 8-12-89 (on leave) |
| 75 | Sri B. R. Reghunath | Asst. Professor (Hort) | 9-11-85 | 29-12-86 |
| 76 | Smt A. Suma | Junior Asst. Professor | 4-8-86 | 21-8-87 & |
| | | | 1-9-88 | 22-6-90 |
| 77 | Dr K. Pushkaran | Associate Professor (Ag. Bot) | 3-12-84 | 2-5-89 |
| 78 | Dr E. V. Nybe | Asst. Professor (Hort) | 10-6-86 | 19-5-89 |
| 79 | Dr V. S. Sujatha | Junior Asst. Professor (Hort) | 13-8-87 | 31-8-88 |
| 80 | Miss Darley Jose | Junior Asst. Professor (Hort) | 22-8-87 | 31-7-89 (on leave) |
| 81 | Sri V. K. Raju | Associate Professor NC (Hort) | 3-5-89 | 8-12-89 |
| 82 | Smt Rema Menon | Asst. Professor) (Hort) | 16-9-89 | 17-10-89 (on leave) |
| 83 | Smt C. A. Mary | Assoc. Professor NC (PP) | 3-5-90 | 23-8-90 " |
| 84 | Sri P. G. Sadhakumar | Asst. Professor (Hort) | 2-6-90 | 10-9-90 " |
| 85 | Sri Jacob John | Assoc. Professor NC (Proc.) | 8-7-88 | 12-1-90 " |
| 86 | Sri A Anilkumar | Junior Asst. Prof. (Extn) | 12-2-90 | 24-5-90 |

1

2

3

4

(Date of Joining)

6. SCIENTISTS WORKING AT PRESENT

| | | | |
|-----|------------------------------|-----------------------------------|----------|
| i) | <u>AICFIP</u> | | |
| 1. | Dr. L. Rajamony | Associate Professor [Hort] | 31-1-90 |
| 2. | Smt. T. Premalatha | Junior Asst Professor [Hort] | 21-6-90 |
| 3. | Smt. S. Estelitta | Junior Asst. Professor [PP] | 8-5-85 |
| 4. | Sri. Gregory Zachariah | Junior Asst. Professor [Ag. Bot.] | 1-6-90 |
| 5. | Smt. K. Krishnakumari | Junior Asst. Professor [Hort] | 2-6-90 |
| 6. | Smt. N. Anitha | Junior Asst. Professor [Ent.] | 31-1-90 |
| ii) | <u>NARP</u> | | |
| 7. | Dr. Job Sathya Kumar Charles | Associate Professor NC [Nemat.] | 21-10-88 |
| 8. | Smt. P. K. Sudha devi | Assistant Professor [Hort] | 27-9-90 |
| 9. | Smt. A. Suma | Junior Asst. Professor [Hort] | 27-9-90 |
| 10. | Sri. K. P. Pradeep | Junior Asst. Professor [Agron.] | 27-9-88 |
| 11. | Smt. Omana Pavunny | Junior Asst. Professor [Hom. Sc.] | 16-6-90 |

APPENDIX-II
FINANCIAL OUTLAY 1990-91
BRS, Kannara & PRC, Vellanikkara

I. NON-PLAN

| <u>A. Ruuning Expenses</u> | | <u>B. Farm Operation</u> | |
|----------------------------|-------------|-------------------------------|----------|
| Salaries | 1,56,000 | Salaries | 52,000 |
| T. A. | 6,000 | T. A. | 3,000 |
| Recurring charges: | | Other charges: | |
| Maintenance of vehicle | 8,000 | Cost of Permanent Labour | 4,48,000 |
| Office expenses & misc. | 15,000 | Cost of Seasonal Labour | 70,000 |
| PCR | 3,000 | Maintenance of farm machinery | 6,000 |
| Furniture | 5,000 | Chemicals/Fertilizers | 45,000 |
| | | Other farm expenditure | 15,000 |
| Total [A] | 1,93,000 | Total [B] | 6,39,000 |
| | Total A+C + | | 8,32,020 |

II. AICFIP

| | | | |
|-------------------|----------|--|--|
| Salaries | 4,45,000 | | |
| T. A. | 5,000 | | |
| Recurring charges | 60,000 | | |
| Total | 5,10,000 | | |

III. NARP PHASE-II

| | | | |
|---------------------|----------|-------------------------------|--------|
| A. Pay & allowances | 2,46,000 | B. University Share | |
| ROC | 72,000 | Basic cultivation cost | 47,000 |
| Books & Journals | 5,000 | Station maintenance/utilities | 15,000 |
| <hr/> | | <hr/> | |
| Total [A] | 3,23,000 | Total [B] | 62,000 |
| <hr/> | | <hr/> | |
| Total A+B 3,85,000 | | | |

IV. PLAN

| | | | |
|-----------------------------------|----------|------------------------------|----------|
| A. <u>Bye-Product Utilization</u> | | B. <u>Breeding Pineapple</u> | |
| Farm Development | 50,000 | Farm Development | 96,000 |
| Recurring charges | 16,000 | Recurring charges | 10,000 |
| Equipments | 1,00,000 | | |
| <hr/> | | <hr/> | |
| Total [A] | 1,66,000 | Total [B] | 1,06,000 |
| <hr/> | | <hr/> | |
| Total A+B + 2,72,000 | | | |

APPENDIX III

List of Research Papers Published

- Balakrishnan, S., Nair, P. C. S, Nair K. K. R. and Nambiar, I. P. S. (1978). Estimation of leaf area in pineapple. *Agri. Res. J. Kerala* 16 (2) : 247-248.
- Charles, J. S. K. (1990). Burrowing nematode, *Radopholus similis* (Cobb 1893) Thorne, 1949 attacking banana and their management in Kerala-An overview. *Paper presented at the Zoological Society of London Symposium 3-4 May, 1990,*
- Charles, J. S. K., Abraham, C. C., Joy, P. J. and Varkey, P. A. (1986). Occurrence of *Cosmosopolites sordidus* (Germar) as an internal borer in banana peduncles. *Agri. Res. J. Kerala* 24 (1): 77.
- Charles, J. S. K. and Pushkaran, K. (1988). Banana Research Station, Kannara-A glance. *Director of Extension, KAU*, pp. 32.
- Charles, J. S. K., Thomas, Y, Venkitesan, T. S. and Abraham, C, C. (1986). Integrated control of the rhizome weevil and burrowing nematode infesting banana var. Nendran. *Pesticides* 20: 10-11.
- Charles, J. S. K. and Varkey, P. A. (1984). An abnormal inflorescence in banana var. Palayankodan, *Agri. Res J, Kerala* 22 (2): 197.
- Charles, J. S. K. and Venkitesan, T. S. (1984). New hosts of *Heterodera oryzicola* (Rao and Jayapraksh, 1978) in Kerala, India. *Indian J. Nematol*, 14 [2]: 181-182.
- Charles, J. S. K. and Venkitesan, T. S. [1990]. Banana cyst nematode, *Heterodera oryzicola* Rao and Jayadrakash 1978. Poster demonstrated at the

Poster Session of the Zoological Society of London Symposium 3-4 May, 1990. "The environmental impact of burrowing animals and animal burrows".

- Charles, J. S. K., Venkitesan, T. S. and Pushkaran, K. [1988]. Nematodes attacking banana and their control. *A technical bulletin, Director of Extension, Kerala Agri. univ.* pp. 15.
- Charles, J. S. K., Venkitesan, T. S. and Thomas, Y. [1983]. Field screening of banana against the burrowing nematode, *Radopholus similis* Cobb (Thorne). Paper presented at the *third Nematol. Sym. held at Solan, May 24-26.*
- Charles, J. S. K., Venkitesan, T. S. and Thomas, Y. (1985). Correlation of plant growth components to bunch weight in banana infested with burrowing nematode, *Radopholus similis* in the banana cultivar Nendran. *Indian J. Nematol* **15** (2) : 186-190.
- Charles, J. S. K. and Venkitesan, T. S. and Thomas, Y. (1985). Comparative efficacy of antagonistic intercrops with Carbofuran in control of burrowing nematode in the banana cultivar, Nendran. *Indian J. Nematol.* **15** (2) : 241-242.
- Gopimony, R. (1980). Genomic classification of 25 banana cultivars of Kerala. *Agri. Res. J. Kerala* **18** (2) : 236-238.
- Gopimony, R. Balakrishnan, S. and Kannan, K. (1976). A note on germinating seeds of pineapple. *Agri. Res. J. Kerala* **14** (2): 194-195.
- Gopimony: R and Kannan, K. (1978). Effect of gamma radition on the sucker production in banana rhizomes. *Agri. Res. J. Kerala* **16** (1) : 82-84.

- Gopimony, R. and Marykutty, K. C. (1980). Intragroup Correlations in three genomic groups of banana. *Agri. Res. J. Kerala* **18** (1) : 40-44.
- Jose, P. C. (1980). Field evaluation of different insecticides for control of banana aphid, *Agri. Res. J. Kerala* **18** (1) : 109-110.
- Jose, P. C. [1981]. Reaction of different varieties of banana against bunchy top disease. *Agri. Res. J. Kerala* **19** (2): 108-110.
- Kurien, T. M., Prabhakaran, P. V. and Varkey, P. A. [1985]. Path co-efficient analysis in Nendran variety of banana. *South Indian Horticulture* **33** (1) : 1-5.
- Mary George, Balakrishnan, S., Pillai, G. R. and Gopalakrishnan, R. [1978]. Studies on the performance of some mutants of Cavendish banana. *Agri. Res. J. Kerala* **16** [1]: 14-17.
- Marykutty, K. C., Nambiar, I. P. S., Balakrishnan, S. and Nayar, M. N. C. [1979]. Effects of storage as sprouting of banana suckers var. Robusta. *Agri. Res. J. Kerala* **17** [2]: 278-279.
- Mathew, V. and Aravindakshan, M. [1981]. Nutrient uptake in rainfed banana var. Palayankodan. *Agri. Res. J. Kerala* **19** [2]: 54-61.
- Nair, K. K. R. [1979]. Studies on the chemical control of banana rhizome weevil. *Agri. Res. J. Kerala* **17**: 280-281.
- Nair, K. K. R. [1979]. Studies on the chemical control of banana nematodes. *Agri. Res. J. Kerala* **17**: 232-235.
- Nair, K. K. R., Joseph, D. and Balakrishnan, S. [1977]. Control of banana rhizome weevil (*Cosmopolites*

sordidus G) and banana aphid (*Pentalonia nigronervosa* Coq) by the use of granular systemic insecticides. *Agri. Res. J. Kerala* 15 97-99.

- Nair, M. N. C. and Mathew. L. [1981]. A note on the effect of population density on fruit set in the ratoon crop of pineapple. *Agri.Res. J. Kerala* 19 [1] : 93-95
- Nair, M. N. C., and Nayar, N. K (1979). A note on premature conversion of axillary vegetative buds into inflorescence in banana. *Agri. Res. J. Kerala* 17 (1): 101-102.
- Nayar, N. K., Balakrishnan, S. and Shilaja, S. (1978). Effect of weight of suckers of Nendran banana on plant growth and yield. *Agri. Res. J. Kerala* 16 (2): 257-259.
- Nayar, N. K., Lyla, K. R. and Mathew, V. [1979]. Genetic variability in dessert type banana. *Indian J. Agric. Sci.* 49: 414-416.
- Nayar, N. K., Mathew. V. and Lyla. K. R. (1980). Estimation of genetic variability for qualitative traits in certain culinary bananas. *Proc, Nat. Semin. Banana Prod. Tech. Tamil Nadu Agric. Univ., Coimbatore, India*, pp 57-61.
- Nambiar, I. P. S., Balakrishnan, S. and Marykutty, K. C. (1979). Influence of desuckering and retention of varying number of suckers on plant growth and yield of Robusta banana. *Agri. Res. J. Kerala* 17 (2): 248-250.
- Nambiar, I P. S., Balakrishnan, S., Pillai, M. R. C. and Marykutty, K. C, (1978). Effect of application of graded doses of lime on the growth and yield of banana variety Zanzibar. *Agri. Res. J. Kerala* 17 (1) 128-129.

- Nambiar, I. P. S., Marykutty, K. C., Balakrishnan, S., Pallai, M. R. C. and Nair, M. N. C. (1979). Effect of split application of N and K on banana var. Nendran. *Agri. Res. J. Kerala* 17 (2): 275-277,
- Pillai, G. R., Balakrishnan, S., Veeraraghavan, P. G., Santhakumari, G. and Gopalakrishnan, R. (1977). Response of Nendran banana to different levels of N, P and K. *Agri. Res. J. Kerala* 15 (1): 37-40.
- Pushkaran, K. [1989]. Gamma rays favour hybrid seed germination. *Banana Newsletter* 12 : 3.
- Pushkaran, K. [1989]. A highly fertile interspecific cross in Musa. *Banana Newsletter* 12: 13.
- Pushkaran, K. [1989]. Recurrent mutagenesis as a tool in banana breeding. *Banana Newsletter* 12: 13.
- Pushkaran, K. [1989]. Extent of 'bud sports, in Red banana *Banana Newsletter* 12 : 15.
- Pushkaran, K., Aravindakshan, M., Rajeevan, P. K., Babylatha, A. K., Varkey, P. A., Suma, A. and Darley Jose [1989]. Performance of four banana hybrids *Banana Newsletter* 12: 17.
- Pushkaran, K., Babylatha, A. K., Suma, A., Sujatha V. S. and Darley Jose [1989]. Banana genetic resources assembled in Kerala. *Banana Newsletter* 12 : 14.
- Pushkaran, K., Geetha, C. K., and Varkey, P. A. [1989]. Intercropping increases income from Nendran banana. *Banana Newsletter* 12: 31.
- Pushkaran, K., Nybe, E V and Prasannakumari Amma [1989]. Paired row planting of banana for better intercropping. *Banana Newsletter* 12 : 28.
- Pushkaran, K., Suma, A., and Babylatha, A. K. [1989]. Suitable banana cultivars for intercropping in coconut garden of Kerala. *Banana Newsletter* 12 : 20.

- Rajeevan, P. K. and Geetha, C. K. [1984]. Variability studies in the ratoon crop of banana. *South Indian Hort.* 32 (4): 197-200.
- Rajeevan, P. K., Unnithan, V. K. G. and Geetha, C. K. [1984]. Estimation of leaf area in banana var Nendran Musa AAB Group using linear parameters *Agri. Res. J. Kerala* 22 (2) : 200-201.
- Suma, A., Pushkaran, K., Babylatha, A. K., Nybe, E. V. and Darley Jose [1988]. Comparative evaluation of banana cultivars in coconut garden. *Ind. Coconut J.* 20 7: 23-25
- Veeraraghavan, P. G. [1972]. Manurialcum liming experiment. of Nendran banana. *Agri. Res. J. Kerala.* 10 (2) 116-118.
- Venkitesan, T. S. and Charles, J. S. K. [1983]. Sucker dip treatment for banana nemetode control. *Paper presented at the third Nematol. Sym.* held at Solan from May 24-26.
- Venkitesan, T. S. and Charles, J. S. K. (1985). A note on the occurrence of Heterodera infestation in banana. *Paper presented at the fourth Nematol. Sym.* held at Udaipur on May 17th.
- Venkitesan, T. S. and Charles, J. S. K. [1988]. Efficacy of two methods of application of pesticides on the control of the burrowing nematode *Radopholus similis* (Cobb) in banana. *South Indian Horticulture* 36 (4) : 197-200.
- Vijayaraghava kumar, George, K. C. and Nayar, N. K. (1984). Statistical analysis of the influence of biometric characters on yield in some culinary variety of banana. *Agri. Res. J. Kerala.* 22 (1) : 67-72.
- Vijayaraghava kumar, Gaorge, K. C. and Nayar, N. K. 1984. Comparative study of the contribution of biometric characters on yield in dessert varieties of banana. *Agri. Res. J. Kerala.* 22 (2): 155-160



Kerala Agricultural University
CENTRAL LIBRARY
Vellanikkara, Thrissur - 680 656



Accession No.

Call No.

COVER - RAJAMONY

AIYNIKKATTIL PRINTERS, NADATHARA