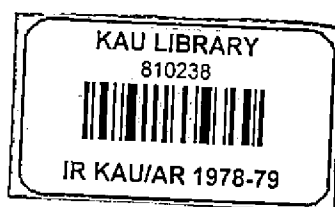


# ANNUAL REPORT

1978-'79



**KERALA AGRICULTURAL UNIVERSITY**

**VELLANIKKARA - 680 654, KERALA**

[ENGLISH]

**ANNUAL REPORT 1978-79**

*Copies 500*

*Cover design*

*G. Gopinathan Nair*

*Compiled by*

*Planning Section*

*Published in March 1980 by*

*The Directorate of Extension Education,*

*Kerala Agricultural University,*

*Vellanikkara - 680 654, Kerala.*

*Printed at*

*Kerala Agricultural University Press,*

*Mannuthy*

810238



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## INTRODUCTION

The Executive Committee of the Kerala Agricultural University has great pleasure to present to the General Council, the Seventh Annual Report of the University for the period from 1-4-78 to 31-3-79.

A General synopsis of the administrative and organisational set up of the University is given in Part-I of the report and Research work carried out by the University in Part - II.

Sri. N. Kaleeswaran, I. A. S. continued to be the Vice-Chancellor during the period under report. Sri. C. Poullose, Additional Secretary to Government continued to be the Registrar till Sri. E. Damodara Marar, Joint Secretary to Government assumed charge of the post of the Registrar on 6-8-1978; and the latter continued as Registrar during the period under report. Dr. V. S. S. Potti continued as Director of Extension Education. He was also in additional charge of the post of Director of Research till Dr. U. P. Bhaskaran assumed charge of the post on 31-5-1978. In the Faculty of Veterinary & Animal Sciences, Dr. P. G. Nair, continued as Dean; and he was the Dean of Post-graduate Studies as well. Dr. N. Sadanandan, continued to be the Dean of the Faculty of Agriculture during the period under report. Sri. A. T. Devassy continued to be the Director of Physical Plant till Sri. A. Sivathanu Pillai assumed charge of the post of Director of Physical Plant on 2-6-1978. Shri. Pillai continued as Director of Physical Plant during the period under report.

Sri. V. K. Damodaran, Associate Professor was holding charge of the post of Associate Dean, College of Horticulture till Dr. P. C. Sivaraman Nair assumed charge of the post of Associate Dean on 31-5-1978.

During the period under report, there were a total No. of 575 posts of teachers and 844 posts of non-teaching staff, besides 478 posts of Class IV employees under the University.

The total expenditure incurred by the University during the year came to Rs. 4,41,88,099.08 against

a receipt of Rs. 4,59,91,434.06 grants received from the State Government and I. C. A. R. As against the ICAR grant of Rs. 26,24,149.50 the grant received from the State Government was Rs. 1,30,00,000.00 under plan and Rs. 1,57,11,216.49 under non-plan.

The audit of accounts for the year 1975-76 was completed and audit reports issued. A total number of 15 audit certificates were issued covering a total expenditure of Rs. 69,65,431.20 during the period under report.

The administrative set up of the University remained unchanged. 15 ordinary meetings were held by the Executive Committee. The General Council held three ordinary meetings during the year under report. Important policy matters were discussed in the meeting of the Statutory Officials and two such Officers meetings were held during the year under report.

Seven first statutes and twenty two amendments to the existing statutes were issued during the period under report. Anomalies in pay revision based on Parity with the Kerala University scales of pay were settled and orders in this regard issued by the University during the period under report.

### TEACHING

The following teaching institutions were functioning under the University:

1. College of Agriculture, Vellayani, Trivandrum
2. College of Horticulture, Vellanikkara, Trichur
3. College of Veterinary and Animal Sciences, Mannuthy, Trichur
4. Institute of Agricultural Technology, Tavanur, Malappuram Dist.

Courses were offered leading to the award of the following Degrees and P. G. degrees, viz; B. Sc. (Ag.),

B. Sc. (Hort.), B. V. Sc. & A. H.; M. Sc. (Ag) M. Sc. (Hort.), M. V. Sc., Ph. D. and also a Diploma in Agricultural Sciences and Certificate course in the maintenance of farm equipments in the above institutions.

The total number of teaching staff in the three Colleges and Institute of Agricultural Technology, Tavanur were 329. Of these eighty persons were Ph. D. holders.

The distribution of teaching posts was as follows:-

Posts	Agri. College	Hort. College	Vety. College	IAT, Tavanur	Total
Deans	1	1 (Asso. Dean)	1	—	3
Professors	11	11	20	—	42
Associate Professors	33	11	36	1	81
Assistant Professors	44	24	41	2	111
Jr. Asst. Professors	28	10	45	9	92
Total	117	57	143	12	329

During the year under report, the following additional posts were created in the Teaching Institutions:-

1. Professors — 19
2. Associate Professors — 22
3. Assistant Professors — 42
4. Jr. Asst. Professors — 34

The staff members were given facilities to acquire higher qualification by granting deputation, study leave and leave for study purpose. 6 persons were deputed for ph. D. 16 persons were granted study leave and 84 persons leave without allowances. 2 persons have completed their Ph. D. Programme during the period under report.

The staff were given all encouragements for participation in International and National Seminars. 52 persons from teaching Institutions and Research Stations under the University participated in the National Seminars and workshops sponsored by the ICAR and other organisations.

College of Agriculture	—	18
College of Horticulture	—	17
College of Vety. & Animal Sciences	—	12
Research Stations/Schemes	—	5

Under the Extension Lecture Programmes, twelve extension lectures were conducted during the year under report by the College of Agriculture, College of

Vety. & Animal Sciences, College of Horticulture, Vellanikkara and the Institute of Agricultural Technology.

The following new departments were started in the College of Horticulture under the Faculty of Agriculture, with facilities for post-graduate courses.

- i) Pomology & Floriculture
- ii) Olericulture
- iii) Plantation Crops & Spices
- iv) Processing Technology

120 students were admitted to B. Sc. (Ag.), 39 to B. Sc. (Hort.), 61 to B. V. Sc. & A. H. courses during the year under report. For post-graduate courses, 68 students admitted for M. Sc. (Ag.), 14 M. Sc. (Hort.) and 8 for Ph. D. in the Faculty of Agriculture. In the Veterinary College; 25 students were admitted for M. V. Sc. and 8 for Ph. D. 51 students were admitted to the Diploma course in Agricultural Sciences at the Institute of Agrl. Technology, Tavanur. The students strength for the various courses were as follows:-

#### 1) College of Agriculture, Vellayani

B. Sc. (Ag.)	—	290
M. Sc. (Ag.)	—	83
M. Sc. (Hort.)	—	5
Ph. D. (full-time)	—	26
Ph. D. (part-time)	—	15

#### 2) College of Horticulture, Vellanikkara

B. Sc. (Hort)	—	123
B. Sc. (Ag.)	—	106
M. Sc. (Hort.)	—	20
M. Sc. (Ag.)	—	23

#### 3) College of Vety. & Animal Sciences, Mannuthy

B. V. Sc. & AH	—	202
M. V. Sc.	—	44
Ph. D.	—	11

#### 4) Institute of Agrl. Technology, Tavanur

Diploma in Agrl. Science	—	150
Agrl. Mechanic course	—	20

The students strength fixed for B. Sc. (Ag.) for the College of Agriculture, Vellayani is 100, but 50 students are being admitted in the College of Horticulture, Vellanikkara. The students admitted in the College of Horticulture, Vellanikkara for B.Sc. (Ag.) course will be sent to the College of Agriculture, Vellayani after completion of their two years course.

38 students belonging to other States were admitted to various courses. In the College of Agriculture, 235 students were benefitted by various scholarships sponsored by the ICAR, KAU and other funding agencies. The number of students benefitted in the College of Vety. & Animal Sciences was 165, that in the College of Horticulture was 187 and the number in the Institute of Agrl. Technology, Tavanur was 101.

During 1978-79, 78 students of B.Sc. (Agri.), 19 students of B.Sc. (Hort.) and 38 for B. V. Sc. & A. H. have successfully come out. In the post-graduate programme, 31 M. Sc. (Ag.) students, 4 M. Sc. (Hort) and 9 M.V.Sc. students have got their post-graduate degree. In the Agricultural Faculty, 2 students were awarded the Ph. D. Degree.

The strength of students in the hostels attached to the teaching institutions were as follows;

1. College of Agriculture, Vellayani —280
2. College of Horticulture, Vellanikkara —230
3. College of Vety. & Animal Sciences, Mannuthy —232
4. Institute of Agrl. Technology, Tavanur—150

Inter University Basketball Tournament for Women (South Zone) and All India Inter Zone were organised by the Kerala Agricultural University from 23-10-1978 to 7-11-1978.

The Kerala Agricultural University has instituted a Trophy named KAU Trophy for the winners of the South Zone. KAU Trophy was awarded to winner team of Bombay. 24 Universities participated in the tournament. Annual Inter Collegiate Tournament was also organised.

Three Physical Education Courses carrying one credit each (total 3 credits) have been included in the under-graduate curricula of the University. The students of the constituent colleges have actively participated in the Notional Service Scheme activities.

## RESEARCH

The Kerala Agricultural University after its inception in 1972 has re-oriented the Research policy of the Agrl. programmes to achieve the maximum productivity per Unit area, increasing the net income per unit area, developing a farming system for effective utilisation of all the available natural resources for Agricultural Production and generation of additional employment, improving the quality of Agriculture produce and solving the other biographical and socio-economic problems confronted by the farmers. A change over from the

Institutional Research as followed at the time of take over of the constituent colleges and Research Stations by the University, to the project based Research was the first step introduced for implementing 'Problem Oriented Research' as envisaged in the research policy of the University. Research work undertaken in the 3 constituent colleges of the University were mainly discipline oriented and was an integral part of the educational programmes whereas in Research Stations need based Research on Crops, domestic animals and birds of the State were envisaged. As a package approach for tackling the problems from all possible aspects inter-disciplinary and multi-faculty co-ordination is envisaged wherever necessary. Post-graduate research is also made as an integrated component of the University Research programme.

The research programmes were taken up in the constituent colleges and research stations under the University. The facilities for research work were provided by way of giving adequate staff and infra-structural facilities to the Researchers. The important findings of the University in the field of Research are briefly given below:

### (I) AGRICULTURE

#### I. RICE

##### Varietal improvement

The IXth Seed Release Committee held on 15-2-1979 approved the release of the culture M-11-57-5-1 of the cross between IR 8 x PTB 20 as M. O. 4 Bhadra. The variety is semi tall, medium bold grain size and is weekly photo sensitive and specially suited to Kuttanad Region, the rice bowl of Kerala, a red rice variety with a milling percentage of 73.5, it is tolerant to BPH, blight and blast. Its duration is 145-150 days during the first crop season (April/May to August/September) and 125-130 days during the main season of Kuttanad (August/September to February/March).

Breeding and selection programmes for non lodging high yielding semi-tall varieties were in progress. Culture 1907 a derivative from the cross Bhaveni x Triveni and IET 1444 were found promising. Culture 1907 was found suitable especially under dry sown conditions.

Pure line selection of the local saline resistant variety '*Cheruviruppu*' has yielded two promising culture-74 and 174, suited to deep water salinity conditions as existing in Pokkali areas.

A medium duration culture-31-1, a derivative from the cross between Kottarakkara-1 and Poduvi

was found to thrive well in deep ill drained soils, as that of Kadakkal.

The cross between IR8 and Karivennel yielded a promising culture 7-1-1 which is resistant to BPH (Brown Plant Hopper) and BLB (Bacterial Leaf Blight).

A survey of the rice soils of Kerala was conducted to estimate the prevalence and damage caused by rice root nematode and it was found that nematode infection was high in Adoor area of Kottayam District.

#### Water Management

A cheap drip irrigation technique with micro tubes was developed at the Agronomic Research Station, Chalakudy for economically raising vegetables and pulses in rice fallows.

Studies conducted at Chalakudy have revealed that laying out sub-surface tile drains would enable farmers to use the sub-surface water for irrigation of substantial area during Rabi and early phase of summer rice crops especially in terraced paddy fields situated in the valleys.

#### Rice Based cropping pattern for Kerala

Studies were conducted on rice based cropping systems at Chalakudy, Karamana, Kayamkulam and Pattambi Research Stations. Rice-Rice-Groundnut or Rice-Rice-Vegetables patterns were found to register higher income to farmers from unit area than that from mono-culture of rice. Under limited moisture resources Rice-Rice-Sesamum was found to be the best. Rice-Rice-Fodder cowpea proved to be the best cropping sequence suited for mixed farms.

#### II. VEGETABLES

A collection of 56 different vegetables is maintained. There are 157 lines in tomato, 93 in chilly, 64 in bhindi, 43 in brinjal and 19 in winged beans collected and maintained for crop improvement programmes.

Breeding for cluster chilly resistant to leaf curl and bacterial wilt was taken up and two promising selections 36-1 and 39-1 have been isolated.

Two lines of chilly resistant to bacterial wilt CI, 32 d-0-1-19 and CI-9-C-C-1 have been isolated from the collections obtained from Asian Vegetable Research and Development Centre, Taiwan.

In brinjal one line Sm-6 was isolated, which possessed resistance to bacterial wilt.

#### III. SUGARCANE

For Pampa river bank area, variety Co-62175 was found to be best suited as plant crop and ratoon

crop. Variety Co-67-1 has been identified as a promising crop under short duration group.

#### IV. ESSENTIAL OILS

The technology for oil extraction from lemongrass has been improved. Chopping the leaves before distilling was found to increase oil recovery by 33 per cent.

Lemongrass oil has been detected to have juvenile hormone effect at lower doses for controlling insect pests.

#### V. RICE-CUM-FISH FARMING

Studies on Rice-cum-fish culture at Vyttila have revealed that *P. monadan* nets an yield of 80 kg/ha in a period of 30 days.

Studies on crop livestock-fish integrated farming system have been initiated at Coconut Research Station, Kumarakom. Common carp and *Etropolis* are grown in the intervening channels of coconut garden in this low lying area recycling the manure from cattle unit and pig unit in the station.

#### VI. COCONUT

Studies on the deterioration of stored copra revealed that chemicals like streptomycin, sodium carbonate and acetic acid were very effective in checking microbial contaminations of copra during processing and storage and thereby reducing the chances of health hazards due to the presence of toxins produced by micro organisms in copra.

#### VII. CASHEW AND SPICES

The use of locally available decomposable containers, particularly coconut husk has proved to be promising nursery techniques for minimising mortality and obtaining maximum survival of cashewnut air layers.

Pepper growing areas in Cannanore, Ernakulam, Kottayam, Quilon and Trivandrum districts were found to be infested with root-knot nematodes. Nematicides like termik and Nemagon and the indigenous material neem cake were found to be effective in controlling the root-knot nematodes,

Drenching the primary nursery beds with 0.3% Dithane M-45 was observed to be effective in controlling the damping off disease of cardamom.

#### (ii) ANIMAL SCIENCES

##### I. CATTLE AND BUFFALOES

In depth studies were conducted on utilization of unconventional feeds and agro-industrial wastes and cattle feeds. Long term study on lactation utilizing 25 parts of rubber seed cake in the

concentrate ration of dairy cows replacing equal parts of coconut cake yielded encouraging results as cost of production per kg. of milk was reduced to Rs. 1.11 from Rs. 1.25 with the conventional feed.

Preliminary studies to utilize coir waste (coconut pith) as cattle feed revealed that this material is rich in soluble carbohydrates.

Spent annats seeds were found to be fairly good source of protein and carbohydrate for cattle.

Another waste material coffee husk has been found to contain 5% crude protein. The waste could be incorporated upto 10% level replacing equal amount of rice bran in the ration for buffaloes calves.

## II. OTHER ANIMALS

The nutritional requirement of TON and DCP for adult elephants were determined.

While feeding palm leaf to elephants the necessity for supplementation with cobalt for synthesis of vitamin B<sub>12</sub> was found necessary.

It was observed that the indigenous pigs were inferior to exotic pigs with respect to body weight but their feed efficiency and carcass characteristics were comparable with those of exotic animals.

## III. ANIMAL DISEASES

Study on pneumonia in goats revealed that Ampicillin was the best drug on the basis of antibacterial sensitivity tests.

Investigation on rectal swabe from clinical cases of enterites in goats enabled isolation of pathogenic strains of E. coli and Salmonella.

Serological survey of free flying birds for new castle disease showed positive titres from crows, pigeons and sows of unknown history of vaccination.

## IV. ANIMAL REPRODUCTION AND ARTIFICIAL INSEMINATION

Investigation on the nature of infertility condition among cross bred cattle revealed that delayed maturity was a major problem.

Incidence of repeat breeding was noted to be 27.77% in breeding prior to 60 days than in breeding after 60 days (10.3%) of calving.

## V. FISHERIES.

Studies on rice-cum-fish farming showed that four fishes viz; Goramy, common carp, Tilapia and anc Etroplus can be cultured in pokkali saline fields with at least 30 cm. water.

Studies on nursery raising of prawn and fishes revealed that tiger prawns can be raised in nurseries under Kerala conditions.

## EXTENSION EDUCATION

### TRAINING PROGRAMMES

The Communication Centre and Central Training Institute established as part of the Directorate of Extension Education organised a large number of training programmes for the Technical personnel of the Department of Agriculture, Animal Husbandry, Dairy Development, Cardamom Board as well as School Teachers, Farmers and Bank Officers.

### WORKSHOPS AND SEMINARS

A workshop on production diseases of Dairy Cattle and another on popular writing for farmers—problems and perspectives were conducted during the year. A workshop on pulse production was also conducted at Pattambi.

### EXHIBITION

The University took part in three major exhibitions; one in connection with Trichur Pooram, another in connection with the International Cashew Symposium at Ernakulam and third at Kottayam.

### VISITS

An expert team consisting of Dr. V. S. S. Potti, Director of Extension Education (Leader), Dr. P. C. Sivaraman Nair, Assoc. Dean, College of Horticulture and Dr. M. Aravindakshan, Professor of Horticulture from the Kerala Agrl. University, visited Tripura State from 5th June to 12th June 1978 at the request of the Government of Tripura. The Team was invited by Sri. Nripen Chakravarty, Chief Minister of Tripura to study the feasibility of cultivating Plantation crops, spices and other horticultural crops on a commercial scale in the State and to make suitable recommendations.

### PUBLICATIONS

The periodicals of the University were brought out regularly. Kalpadhenu, Research Journals, Abstract and Agres News were the important periodicals.



## PRESS RELEASE

Two hundred and ninety six news items were released to the Press for publication and for All India Radio for broad-cast during the year.

## VILLAGE ADOPTION PROGRAMME

Village adoption programme started by the University with the view to developing closer relations and contacts between the Scientists and Farmers and to provide technical assistance for Agricultural Development were continued in 11 villages adopted by the University adjacent to the different University campuses and research stations spread throughout the State. Six large scale demonstrations having 2 hectare area each were conducted in six adopted villages. A special training course in mushroom production was conducted. Five demonstration plots of 2,000 sq. metre area were laid out to demonstrate inter-cropping of Groundnut in Tapioca.

## STRENGTHENING OF COMMUNICATION CENTRE

The University has initiated an Agricultural information communication programme as a part of its extension education activities for the furtherance of Agricultural Development in the State. The Centre has been strengthened with three sub units namely; publication unit, information unit and exhibition and graphic services.

## NATIONAL DEMONSTRATION PROJECT

Twenty five demonstrations were conducted during the year under report. Of these, six plots were under groundnut and tapioca and one plot of Horsegram as companion crop with tapioca. Other plots were of paddy.

## N. S. S. ACTIVITIES

Three hundred students of the University were on the rolls for regular N. S. S. activities and they were active in the fields. They frequently visited the houses in adopted villages and rendered advice on improved methods of cultivation and gave suggestions for improvement of conditions. The blood group of volunteers were ascertained and a list of blood donors was prepared. Volunteers donated blood as and when needed. A seminar on National Adult Education Programme was conducted at Trivandrum.

The Research Advisory Committee which was reconstituted during 1977-78 did not meet during the year under report.

The faculty Research Committee (Agri.) has met two times i.e. on 17-6-78, and 16 & 17.3.79 while the Faculty Research Committee (Veterinary & Animal Sciences) has met two times, i.e. on 4-12-78 and

28.3.79 during the period under report for consideration and approval of the new Research Projects

A total No. of 111 Research Projects under the Faculty of Agriculture, 53 Nos. under the Faculty of Veterinary and Animal Sciences and 15 Nos. under fisheries were also approved for implementation.

The Project Co-ordination Committee constituted during 77-78 for 14 project groups under the Faculty of Agriculture and 7 project groups under the Faculty of Veterinary & Animal Sciences met periodically and held discussions to chalk out the future programmes of Research Committee under the different groups and scrutinised in detail the new Research Projects to be placed before the Faculty Research Committee. Status papers identifying gaps in knowledge to tackle field problems and suggesting future programmes to be taken up under the different project groups were also prepared by the Project Leaders concerned.

The following research documents were compiled and presented to the General Council and Research Council members.

- |                                      |         |
|--------------------------------------|---------|
| 1) Status papers                     | 1978    |
| 2) Codified list of Research Schemes | 1978    |
| 3) Research Report                   | 1977-78 |
| 4) Research highlights               | 1977-78 |

During the year under report sanction from ICAR and outside agencies for the following schemes were received.

- |   |   |   |
|---|---|---|
| 1) Establishment of a pepper progeny orchard at Pepper Research Station, Panniyur                     | — | Govt. of India                          |
| 2) Studies on the mirid bugs of Cashew and their control  | — | State Committee of Science & Technology |
| 3) Survey of edible mushrooms of Kerala and exploring possibility of their large scale multiplication | — | -do-                                    |
| 4) Control of rice leaf roller with viral pathogens   | — | -do-                                    |
| 5) Studies on pests of stored cashew and their control  | — | -do-                                    |

- 6) Role of suitable containers and potting mixtures in minimising mortality of transplanted cashew layers — -do-
- 7) Genetic studies on bio-chemical poly morphism and its association with economic traits in swine and poultry — -do-
- 8) Pulmonary pathology of animals in Industrial area — -do-
- 9) Survey, collection and evaluation of germplasm of Jack fruit — -do-

A special convocation of the University was held in the Main Campus on 29—7—1978 to confer the Degree of Doctor of Science (Honoris causa) on Dr. M. S. Swaminathan, Director General, ICAR for his outstanding contribution in Plant Breeding and Genetics, strengthening Agriculture research and education and for his innovative role in the development of Agriculture in India. Smt. Jyothi Venkitachellam, Governor and Chancellor of the University conferred the degree.

Shri. K. Sankaranarayanan, Hon'ble Minister for Agriculture & Development & Pro-chancellor of the University inaugurated the laying out of experiments at Vellanikkara on three crops, Cashew, Coconut and Pepper as a part of the implementation of Kerala

Agricultural Development Project at the Kerala Agricultural University.

Dr. G. Ramachandran, Vice-Chancellor, Gandhigram Rural Institute, Madurai visited the Kerala Agricultural University on 2.6.78. He attended a function arranged by the students of the Horticultural College, Vellanikkara and Veterinary College, Mannuthy.

The major works completed during the period under report year 1978-79 were construction of a building for Meat Technology at Mannuthy, construction of an extension to Vety. College, construction of teachers hostel at Vellayani (Type V) and construction of Ladies' Hostel for 100 students at Vellayani. The investment in the above works was Rs. 49,83,990/-

Major new works taken up during the year 1978-79 are detailed below:

- 1) Construction of a building for Dairy Technology at Mannuthy — 6.50 lakhs
- 2) Construction of Farmers' Hostel at KAU Main Campus, Vellanikkara — 7.20 ..
- 3) Construction of a Laboratory and Library building at Vellayani — 30.00 ..

□□

PART I

GENERAL

## CHAPTER I

# GENERAL ADMINISTRATION

The Kerala Agricultural University was established under the Kerala Agricultural University Act (Act 33 of 1971) during the year 1971.

The main campus of the University is functioning at Vellanikkara with two sub centres at Mannuthy and Vellayani respectively. The total area of the land under the University is 1,909 hectares.

The main construction works of the University was taken up with the financial assistance received from the ICAR. The liberal financial assistance of the State Government is also being extended for the rapid progress of the University. Besides, financial assistance was also received from the outside agencies like Rock Fellor Foundation, K.A.D.P. etc. for the implementation of Research Schemes.

### Officers of the University

#### *Chancellor*

Smt. Jyothi Venkitachellom,  
Governor of Kerala

#### *Pro-Chancellor*

Sri. K. Sankaranarayanan,  
Minister for Agriculture

#### *Vice-Chancellor*

Sri. N. Kaleeswaran; I. A. S.

#### *Registrar*

Sri. C. Poulouse upto 31-7-1978  
Sri. E. Damodara Marar from 6-8-78

#### *Comptroller*

Sri. P. Rajagopal

#### *Director of Physical Plant*

Sri. N. Sivathanu Pillai from 2-6-78

#### *Librarian*

Vacant

### Deans of Faculties

#### Agriculture

Dr. N. Sadanandan

#### Vety & Animal Sciences

Dr. P. G. Nair

#### Director of Students Welfare

Vacant

#### Director of Research

Dr. U. P. Bhaskaran from 31-5-78

#### Director of Extension Education

Dr. V. S. S. Potti

### Authorities of the University

The General Council, the Executive Committee, the Academic Council, the Faculties, the Board of Studies of Faculties and the Finance Committee are the statutory authorities of the University. The list of members of the authorities of the University are given in appendix—II.

### General Council

The General Council is the supreme authority of the University comprising of 17 Ex-officio members, 20 elected members, 17 nominated members. The council meets once in four months.

The General Council held 3 meetings during the year under report.

### Executive Committee

The Executive Committee is the Chief Executive body of the University and shall consist of 3 ex-officio members, 6 elected members and the member representing the Indian Council of Agricultural Research in the General Council.

The Executive Committee held 15 ordinary meetings during the period under report.

## Academic Council

The Academic Council is responsible for the maintenance of standards of instruction, education and examinations within the University and shall exercise such other powers and perform such other functions conferred or imposed upon it by statutes. The Academic Council held 2 ordinary meetings and one special meeting during the period under report.

## Board of Studies

There shall be a Board of Studies for each Faculty, to look after the Academic standards of the University. The Board of studies held meetings at periodical intervals.

## Finance Committee

The Finance Committee consisting of the Vice-Chancellor, the Finance Secretary to Government, the Comptroller and two members chosen by the Executive Committee, one from among its non-official members and other from among the ex-officio members is functioning at the University. The Finance Committee held two meetings during the period under report.

The names of the members of the authorities of the University mentioned above are given in appendix - II.

The sub Committees constituted by the Executive Committee continued to function during the period under report.

1. Research Council
2. Faculty Research Committee (Agri. and Veterinary and Animal Sciences.)
3. Research Advisory Committee
4. Variety Evaluation Committee
5. Selection Committee
6. Students Welfare Committee
7. Committee for deputation of Academic staff
8. Selection Committee for post-graduate courses
9. Selection Committee for under-graduate courses
10. Sports Board

11. Extension Advisory Committee
12. Planning and Development Committee.

The list of members of the various sub committees are given in appendix - III.

## University Administration

Her Excellency the Governor of Kerala is the Chancellor of the University. The Minister for Agriculture is the Pro-Chancellor. The Vice-Chancellor is the Principal Executive and Academic Officer of the University. He is the Ex-officio chairman of the General Council, Executive Committee and of the Academic Council. The Director of Extension Education, the Registrar, the Comptroller and the Deans of Faculties assist him in the Research administration, Extension Education activities, University administration including Academic administration, financial administration and administration of the respective faculties. The Director of Physical Plant is providing physical facilities required to the Teachers, Staff and Students of the University. The list of Administrative posts of the University is given in appendix - IV.

## University Organisation

There were two faculties viz; Faculty of Agriculture and Faculty of Vety. & Animal Sciences functioning under the University. The Kerala Agricultural University Act also provides to establish Faculties of Basic Science and Humanities, Co-operation, Home Science, Fisheries, Forestry, Agri Engineering and Technology etc. Preliminary steps have been taken to establish a faculty of fisheries. Steps had already been taken to establish a Fisheries Research Institution-cum-Research Complex and the site have been got approved by the ICAR. The establishment of the faculty of Basic Science and Humanities is also under active consideration of the University. The statutes for prescribing the qualification of the Dean has been got approved by the Chancellor.

For formulating the research policy of the University the Research Council and Research Advisory Committee was reconstituted:

The Extension Education activities were organised through the Director of Extension Education. The State Departmental Officers and the KAU staff have laid the basis for very cordial relationship

or implementing the Extension Education activities of the Kerala Agril. University.

#### **Administrative set up**

The Officers of the University are the Chancellor, the Pro-Chancellor, the Vice-Chancellor, the Pro-Vice-Chancellor if any, the Registrar, the Comptroller, the Director of Physical Plant, the Librarian, the Deans of the Faculties, the Director of Students welfare, the Director of Research, The Director of Extension Education and such other persons in the service of the University as may be declared as Officers of the University.

The Vice-Chancellor is a full time Officer of the University and the immediate overall control vested with him. Administrative control of the University is vested with the Registrar. The Preparation of the Budget statement of accounts and audit are controlled by the Comptroller. The Research administration, the Extension activities and Public relations are handled by the Director of Research and Director of Extension Education respectively. The Director of Physical Plant is the custodian of all properties and he will be responsible for the construction works, maintenance of buildings, purchase of vehicles etc. The resident teaching programme, professional competence evaluation and improvement of

curriculum activities, are managed by the Deans of the Faculties. The posts of the Librarian and the Director of Students Welfare were vacant during the period under report.

#### **Faculty Improvement**

The staff members were provided with facilities to acquire higher qualification by granting deputation study leave and leave for study purpose. Staff members were also sent for short term training course in various specialisation in the Agril. and Vety. Faculties and to attend seminars and symposiums organised by various scientific agencies/ICAR/institutes. The contributions of staff were also published in the journals like Anivet abstract, Agri. abstracts and Hort. abstracts.

The Research policy of the Agril. University was made more comprehensive to cover all economically important crops that can be successfully introduced animal sciences covering cattle, buffalo, goats, pigs, poultry and ducks, inland fisheries and integrated harvested farming. A total number of 111 research projects under the Faculty of Agriculture, 53 under the Faculty of Vety. & Animal Sciences and 15 Nos. under Fisheries were approved for implementation.

## CHAPTER II

# EDUCATION

### COLLEGE OF AGRICULTURE, VELLAYANI

The College of Agriculture was started in the year 1955 with the object of imparting scientific Agricultural education leading to Bachelor's Degree in Agriculture. Consequent to the establishment of the Kerala Agrl. University, College of Agriculture, Vellayani became one of the constituent Colleges of the University in 1972 and trimester system of instruction was followed.

At present the College of Agriculture has the following 11 departments.

Agronomy, Agricultural Botany, Agricultural Chemistry, Agricultural Entomology, Plant Pathology, Agricultural Extension, Horticulture, Agricultural Economics, Agricultural Statistics, Agricultural Engineering and Animal Husbandry.

In addition to the B. Sc. (Ag.) courses, M. Sc. (Ag.) courses, were also offered in the first seven departments and Ph.D. Courses in Agronomy, Agricultural Botany, Agricultural Chemistry, Agricultural Entomology and Plant Pathology.

### TEACHING STAFF

Dr. N. Sadanandan continued as Dean and Head of the Institution during the period under report.

A list of the academic staff in position in the various departments of the College during 1978-79 is given in appendix - V.

No. of Departments or sections newly started — Nil

### Admission of students

(i) Under-graduate course	:	61
(ii) Post-graduate course	:	
M. Sc. (Ag.)	:	53
M. Sc. (Hort)	:	2
Ph. D.	:	8

Class strength	:	The annual intake of students is as follows
B. Sc. (Ag.)	:	50/year
M. Sc. (Ag.)	:	6—10/Department/Year
M. Sc. (Hort.)	:	2—4           "   "
Ph. D.	:	2/Department/Year

the year-wise/course-wise strength of students as on: 31-3-1979 was as follows:

Programme	I Year	II Year	III Year	IV Year	Total
B. Sc. (Ag.)	58	49	96	87	290
M. Sc. (Ag.)	52	31	—	—	83
M. Sc. (Hort.)	2	3	—	—	5
Ph. D. (Full-time)	8	7	7	4	26
Ph. D. (Part-time)	—	—	—	—	15

Number of outside students                               Total No. 15

### Hostel strength (as on 31-3-1979) :

Mens' Hostel	:	121
Ladies' Hostel	:	111
P. G. Hostel	:	48

### Students achievements

#### (i) Under-graduate studies:

No. of B. Sc. (Ag.) students successfully passed out of the College during 1978-79 —78

#### (ii) Post-graduate studies:

Two candidates received their Ph. D. degree and 31 candidates their M. Sc. (Ag.) degree during the period under report. Four candidates received M. Sc. (Hort.) degree from this College during the above period.

### Students aid and Scholarships:

The following scholarships/educational concessions were awarded to the students during 1978-79.

<i>Nature of Scholarships/ concessions</i>	<i>No. of awardees</i>
(a) Scheduled caste and Scheduled tribe students concession	26
(b) Concession under Kumara-Pillai Commission Report	37
(c) KAU Merit scholarships	31
(d) National Merit scholarships to the children of school teachers	4
(e) National loan scholarships	17
(f) National Merit Scholarships	30
(g) ICAR Merit-cum-means scholarships	19
(h) ICAR Junior fellowships	11
(i) Educational concession to Nagaland nominee	1
(j) Educational concession to Meghalaya nominee	1
(k) Educational concession to Laccadive students	3
(l) Scholarships from Indian Potash Limited	1
(m) subarto Memorial scholarship	1
(n) Concession to other eligible communities	1
(o) KAU Junior Fellowship [M. Sc. (Ag.)]	51
(p) Sports scholarship	1

### Practical Training Programme

In addition to the regular practical training in the laboratories and fields, work experience programme had been instituted so that the Agricultural Graduate would get through practical experience. The work experience programme was distributed over the entire period of 4 years of the B. Sc. (Ag.) course. It consisted of growing all the important crops of our State like paddy, coconut, tapioca, banana, pulses, vegetables and maize. During the period under report, the first year students cultivated tapioca in an area of 2 cents/each student. In addition to this, two perennial trees were also allotted for maintenance to each student. This will be continued till the final year. The second year B. Sc. (Ag.) students raised a crop of banana at the rate of 20 plants per student. The third year students raised pulses (cowpea), fodder maize and vegetables during the year under their work experience programme.

The final B. Sc. (Ag.) students successfully cultivated paddy in the Kayal lands during Punja season.

Under the field training programme the final year B. Sc. (Ag.) students were taken to IPD Units and Research Stations for a period of one fortnight each to get them acquainted with the activities and working in the IPD Units and Research Stations.

### Study Tours

The Third year B. Sc. (Ag.) students were sent on an all India Study tour to different places and institutions of Agricultural importance in the country.

### Extra curricular and co-curricular activities

The College Union functioned properly during the period with Sri. K. Kishore Kumar as President and Shri. R. Sasidharan as General Secretary. Dr. N. Sadanandan, Dean continued to be the Patron of the students Union. The following members of the staff were nominated to the various offices shown against each.

President, Speakers' Club	—	Dr. A. M. Thampi
President, Planning Forum	—	Dr. Skariah Oommen
President, Athletic Association	—	Prof. J. B. Rose
President, Arts Club	—	Dr. Jose Samuel
Programme Officer, N.S.S	—	Dr. Skariah Oommen
Staff Editor	—	Dr. V. Gopinathan Nair
Co-ordinator, Hobby Centre	—	Prof. A. G. G. Menon

Shri. Mohammed Hussain acted as the Treasurer of the College Union.

### (a) Number of extension lectures, teaching seminars and workshops conducted.

The following extension lectures were organised during the period under report.

<i>Name of the speaker</i>	<i>Topic</i>
(i) Dr. K. Krishnamoorthy Director of Research, U. A. S., Bangalore	Crop growth stages- Agronomic Practices Yield
(ii) Dr. K. C. George, Department of Agrl Statistics, HAU, Hissar	Different techniques of estimating genetic diver- sities
(iii) Dr. R. S. Kurup, Additional Director, Bureau of Economics and Statistics, Trivandrum	Population of Kerala and its impact on agri- cultural development



- (iv) Dr. D. P. Songh, Vegetable Breeding  
Indian Horticultural  
Research Institute,  
Hassarghata
- (v) Agronomist, FACT, Fertilizer consumption  
always by Kerala farmers.

**(b) Seminars attended**

Prof. A. G. G. Menon attended the meetings of the Committees on Land development and Land Reforms, Intermedia Publicity Co-ordination Committee, Intergrated Rural Development and the All Kerala Seminar on Women and Development.

Prof. K. Srinivasan and Dr. A. M. Thampi participated in the Karshika Mela conducted in the Kavara-thi Island of the Union Territory of Lakshdweep.

Dr. C. Sreedharan attended the evaluation of Regional Fodder Research and Development Workshop held at Awadi and the Annual Workshop of AICARP, Palampur, Himachal Pradesh.

Dr. C. Sreedharan and Dr. R. S. Aiyer participated in the Indo-FAO seminar at New Delhi. Dr. R. S. Aiyer also attended the International Potash Symposium at New Delhi.

Dr. N. Mohan Das, Dr. A. Visalakshy and Dr. K. P. Rajaram attended the All India Symposium on Pest Residue in the Environment held at Bangalore. Dr. Abraham Jacob and Dr. T. S. Venkitesan participated in the ICAR Task Force meeting on Microbial control of rice pests and nematode pests of rice respectively, held at Cuttack.

**Publications**

Agricultural Research Journal of Kerala (Vol. 16 Nos. 1 and 2) and the Agri Abstract (Vol. II, No. 1 to 4) were published during the period under review.

Details of Research papers and other articles published by different members of the academic staff, are given in appendix - VI.

Research achievements of the academic staff of the College have been shown in Part - II Technical of the Annual Report.

**Extension Activities**

**Exhibitions:**

The Department of Agricultural Extension actively participated in the organisation and arrangement of the Kerala Agricultural University Pavilion at the SNDP Platinum Jubilee Exhibition held at Quilon during December, 1978.

**Village Adoption Programme**

A. Muttacaud Village—During the period under report, arrangements were made for establishing a Community Dairy in the village. Improved breeds of cattle were arranged to the farmers of this village with the assistance of SFDA and SBT, Vellayani. As a part of the arrangements for the installation of community sprinkler irrigation system in this Village, bonds of 23 farmers were executed with the SBT, Vellayani for making available loans for this purpose.

Few more farmers took up cultivation of groundnuts and pulses during the year. Cultivations of fodder crops was extended to fields of some more farmers.

During the period, 13 farmers and farm women of this Village were given training on mushroom growing. 24 rural youths of this village were given training in vegetative propagation of crop plants and were given certificates on successful completion of the course.

As a part of the ICAR Golden Jubilee celebrations, individual farm plans of 30 farmers selected as ICAR Golden Jubilee farmers of this village were prepared and arrangements were made for the supply of necessary inputs required by each farmer for the implementation of the production plan.

B. Kalliyoor Village—The second Gramavikasana Samithi was registered and started functioning in this adopted village from May 1978 onwards. During the period under report, financial assistance (medium term loan) was arranged to 22 farmers of the village for the purchase of milch animals through the SBT, Vellayani. Short term loans were issued to 36 farmers of this village through SBT, Vellayani for raising crops like betelvine, tapioca etc. Arrangements were also made to collect the milk and sent to the Central Dairy, Trivandrum through the Gramavikasana Samithi. Kitchen gardens were started additionally in 20 families and vegetable seeds were issued free of charge. 30 farmers were selected from this village as ICAR Golden Jubilee Farmers, Farm Plan of these farmers prepared and arrangement were made for supply of inputs required by each farmer

C. Village around Mar Ivanios College, Trivandrum. An Association of farmers viz; Mar Ivanios College Silver Jubilee Memorial Karshika Sangham was constituted in the village around the Mar Ivanios College, Trivandrum on the basis of guidance

provided by the University. 14 farm steads were selected for conducting field research and testing the adaptability and profitability of agricultural practices recommended by the University.

A method demonstration was arranged on the cultivation of mushroom for the benefit of the members of the Karshaka Sangam. The demonstration was a great success and the harvest of the mushroom cultivations was done by Most Rev. Mar Gregorios, Arch Bishop of Trivandrum on 31-3-1979.

Arrangements were being made for the distribution of seedlings and other planting materials of plantation crops and fruit crops at a subsidised rate to the members of the Karshaka Sangam.

### Training Programme

The following training programmes were organised and conducted by the training section of this College/Department during the period under report.

Sl. No.	Name of the training programme	No. of personnel trained
1.	Inservice Training for Junior Agricultural Officers of the State Department of Agriculture and KSCCLMB	112
2.	Training for the Managerial staff of Credit Co-operative Institutions	24
3.	Training for the members of voluntary organisations (Gandhi Smaraka Nidhi)	13
4.	Training for the Supervisors of Primary Land Mortgage Banks	34
5.	Training on Vegetative Propagation for the rural youth of adopted village (Muttakkad) of KAU	24
6.	Inservice Training of Agricultural demonstrators (Field training)	45
7.	Training on Fruit and Vegetable preservation for rural women	226

### Faculty improvement programme, Ph. D. deputations and study leave

Three members, one each from the Department of Agricultural Statistics, Agricultural Engineering and Agricultural Extension were deputed to undergo Ph. D. course at I. A. R. I. and Kalyani University, W. Bengal during the year 1978-79.

### Other activities

#### a) ICAR Skill contests

Skill contests on budding, grafting, cattle judging and ploughing for the students were conducted and results communicated.

#### b) Farmers consumer contact programme

The Department of Agronomy and M/s Madras Fertilisers Ltd; jointly organised, as in previous year, an Intensive consumer contact programme for the rice crop in the Alleppey District during August 1978. Thirty five students of the 3rd and 4th year B. Sc. (Ag.) course were selected for participation in the programme. These students were given proper training in advance. They contacted the individuals. Farmers in the selected area were explained the package of practices for rice with special reference to fertilizer application. The results of this programme were encouraging. As an incentive, the students engaged for this were given honorarium and D.A. of Rs 30/-.

Similarly M/s Rallis India Ltd; and the Department of Agronomy jointly organised another Intensive Consumer contact programme for Cocoa crop in Quilon District for one week during August 1978. Twenty students participated in this programme.

#### c) College Library

During the period, the working hours of the library continued to be from 8 a. m. to 8 p. m. on all working days.

891 volumes were added to the library during this year making the total number of books in the library to 17, 160.

206 journals, including 120 foreign journals were subscribed to during the period. There are 3,300 back volumes of journals in the library.

Book Bank Scheme was continued this year also, whereby students were given text books at 50 per cent subsidised rate.

An exhibition of latest books in Agriculture and allied subjects was conducted in this College in which many leading publishers and book sellers participated.

#### d) College Dairy and Poultry Unit

A quantity of 59,758 litres of milk was produced in the College dairy during the year under report.

In the poultry unit, 1,786 eggs were produced. The dairy and poultry units are maintained for instructional purpose. 172 goats were inseminated artificially during the year. 268 cows and 214 she buffaloes were tested for pregnancy. These animals were brought to the College by the farmers of the adopted and neighbouring villages.

#### Research work

The details of research work carried out in the various departments of the College have been given separately in Part-II of this report.

#### INSTRUCTIONAL FARM, COLLEGE OF AGRICULTURE, VELLAYANI

This farm, which is a supporting institution to the College of Agriculture, Vellayani was established in the year 1955. The total area of the farm comes to 243 ha. of which 168 ha. are wet Kayal lands of the deepest bed of the Vellayani lake. All the physical amenities for imparting practical training to the students of both the U. G. and P. G. and for the research works of the staff members in almost all the important crops of the State were being provided by this farm.

#### Achievements during the year

Apart from the instructional importance involved in the cultivation of various crops, motives/major activities of the same are summarised below:

1. Production and distribution of quality coconut seedlings
2. Production and distribution of grafts, seedlings buddings, layers and rooted cuttings of various fruit trees and ornamental and other plants.
3. Production of vegetables for consumption and also for seed purpose.
4. Production and sale of banana and other fruits.
5. Punched cultivation of kayal lands in an area of 120 ha
6. Imparting field training to Agricultural Demonstrators of the Agricultura Department and Diploma trainees of the IAT; Tavanur.

#### Production and distribution of quality grafts Jack 'Muttom' Varikka, Mango, Sapota etc.

In view of the ever increasing demand for grafts, layers etc. especially jack grafts of Muttom Varikka, steps have been taken to raise more local root stock for increasing the number of graftings. The cost released during the year as the sale proceeds of seedlings, grafts layers, rooted cuttings etc. comes to Rs 69.102/20.

#### Production of Rubber

There is an area of 3.5 acres of rubber in tapping 880 Kg. of rubber sheets and 110 Kg. of scraf rubber have been produced during the year. An additional area of 5 acres is being newly planted with rubber.

#### Coconut Garden

More attention was given to the coconut plantations during the year. Systematic intercultivation and manuring were done. Two thousand nine hundred and fifty nine trees yielded a total of 1,58,131 nuts during the year. Of the above said number, 10,577 nuts have been reserved for seed purpose. The average yield of nuts during the year under report has improved from 47 in 1977—78 to 53.5 in 1978—79.

#### Banana Blocks

The outer fringer of the farm were divided into 21 blocks of approximately  $\frac{1}{2}$  to 1 hectare and entrusted to the care of one permanent male mazdoor and one women mazdoor. The main idea behind the programme was the upkeep and maintenance of young as well as growing coconut palms, over and above the production of banana bunches and suckers. Moreover this programme worked well as a check on the pilferage of farm produce by outsiders 5,152 Kgs. of banana have been produced in the farm during the year.

#### Puncha Cultivation

120 hectares of Kayal land was de-watered and brought under Punched crop. Though the planting was done as scheduled, due to untimely rains resulting in floods in February the crop raised in an area of 25 acres was decayed and caused delay in further planting resulting in the loss of an estimated yield of 30 tons of paddy.

Vegetable seeds have been sold from the farm for an amount of Rs. 4,465/58 during the year of report.

The following planting materials have been produced and distributed during the year.

1	Jack grafts	—	4627	Nos.
2	Mango grafts	—	2947	"
3	Guava layer	—	2414	"
4	Roses	—	1093	"
5	Cocoa	—	2123	"
6	Clove	—	963	"
7	Nutmeg	—	331	"

8	Cinnamon	—	448	..
9	Maltalemon	—	781	..
10	Rumbuttan	—	27	..
11	West Indian Cherry	—	967	..
12	Lovilovi	—	100	..
13	Star apple	—	213	..
14	Rose apple	—	213	..
15	Litchy	—	40	..
16	Papaya	—	295	..
17	Jamba	—	718	Nos
18	Banana sucker (superior)	—	154	..
19	Banana sucker (ordinary)	—	234	..
20	Sapota	—	564	..
21	Bread fruit layer	—	16	..
22	Jasmine	—	297	..
23	Croten	—	152	..
24	Hibiscus	—	58	..
25	Polyalthea	—	130	..
26	Bougainvilla (ordinary)	—	381	..
27	Bougainvilla (Mehra)	—	158	..
28	Curry leaf	—	282	..
29	Ixora	—	12	..
30	Palm	—	18	..
31	Allocasia	—	89	..
32	Cactus	—	7	..
33	Gerbera	—	12	..
34	Hydrangea	—	22	..
35	Dracaena	—	15	..
36	Fern	—	14	..
37	Orchid	—	9	..
38	Anthurium	—	4	..
39	Bogonia	—	25	..
40	Avocado	—	19	..
41	Coleus	—	36	..
42	Money plant	—	3	..
43	Thulasi	—	3	..
44	Komadan coconut seedlings	—	3376	..
45	Coconut seedlings (West cost Tall)	—	20372	..

#### Training Programme

One batch of 16 Agricultural Demonstrators of the Department of Agriculture had been trained in farm work for a period of 2 weeks. Another four batches have been trained for 2 days each

Ten batches of Agricultural Diploma students of IAT, Tavanur have been given training in farm work for 14 days. Another 3 batches of IAT Diploma students have been trained for one month during the year.

## COLLEGE OF HORTICULTURE, VELLANIKKARA.

The College of Horticulture was established on 28th October, 1972. The College functioned at Mannuthy till it was shifted to its permanent building at Vellanikkara. The academic buildings for the College were completed in September, 1977 and were inaugurated by then Hon'ble Prime Minister Sri. Morarji Desai. The College was actually shifted to Vellanikkara during November, 1977.

The College was started on October 29th 1972 with the initial intake of 20 students and was temporarily located at Mannuthy till it was shifted to Vellanikkara during November, 1977.

Dr. V. S. S. Potti, Director of Extension Education was in-charge of the Dean, College of Horticulture till 7th July 1975 when Dr. C. M. Jacob, Advisor, Kerala Agricultural University took charge. He continued to be in-charge till 22.4.1976. Sri. V. K. Damodaran, Associate Professor of Horticulture was in additional charge of the post from 23.4.1976 to 30.5.1978. Dr. P. C. Sivaraman Nair took charge as the Associate Dean on 31-5-1978 and continued to be so during the remaining period under report.

Initially, only 20 students were admitted for the course leading to B. Sc. (Hort) degree which is of 4 year duration after the pre-degree course. The number of admission was increased to 30 from the academic year 1976-77, excluding a few sponsored candidates from other States and institutions. B. Sc. (Ag.) degree programme was also introduced from 1977-78. The first batch of B. Sc. (Hort) students was passed out during 1976.

Master's degree programme were started during the academic year 1976-77 in six disciplines, namely, Horticulture, Agronomy, Agricultural Chemistry, Agricultural Botany, Agricultural Entomology and Plant Pathology. The first batch of 12 M. Sc. students passed out during 1978.

The details of sanctioned strength of teaching staff of the College have been shown in appendix-VII.

#### No. of departments or schemes newly started

The Kerala Agricultural Development Project (KADP) became operative at the College during the year under report. The sub-project for research and training under the Special Agricultural Deve-

lopment Unit (SADU) was started with effect from 18-4-1977. The project envisages the conduct of intensive research in coconut, cashew, pepper and cocoa. Out of the budget allotment of Rs. 43.74 lakhs, 31,86 lakhs have been spent during the year.

An adhoc scheme for the Survey collection and Evaluation of Germplasm Jack Fruit under the All India Co-ordinated Fruit Improvement Project, sanctioned by ICAR was started at the College during the year 1978-79, with the objective of identifying superior types of jack (*Artocarpus heterophyllus*) and to standardise orchard management of this crop.

The college consisted of 14 departments viz;

1. Pomology and Floriculture
2. Plantation Crops & Spices
3. Olericulture
4. Processing Technology
5. Agronomy
6. Agricultural Botany
7. Soil Science and Agricultural Chemistry.
8. Agricultural Entomology
9. Plant Pathology
10. Agricultural Economics
11. Agricultural Extension
12. Agricultural Statistics
13. Agricultural Engineering
14. Agricultural Meteorology

#### Admission of students

The following number of students were admitted to various courses during the period under report.

#### Undergraduate programme

	Men	Women	Total
First year B. Bc. (Ag)	38	21	59
First year B. Sc. (Hort)	20	19	39
<b>Total</b>	<b>58</b>	<b>40</b>	<b>98</b>

#### Post-graduate programme (M. Sc.)

	Men	Women	Total
Horticulture	4	8	12
Agronomy	4	0	4
Agricultural Chemistry	2	0	2
Agricultural Entomology	2	1	3
Plant Pathology	1	3	4
Agricultural Botany	1	1	2
<b>Total</b>	<b>14</b>	<b>13</b>	<b>27</b>

#### Class strength

B. Sc. (Hort)	I Year	20	19	39
"	II Year	15	20	35
"	III Year	12	17	29
"	IV Year	11	9	20
<b>Total</b>		<b>58</b>	<b>65</b>	<b>123</b>
B. Sc. (Ag)	I Year	38	21	59
"	II Year	32	15	47
<b>Total</b>		<b>70</b>	<b>36</b>	<b>106</b>
M. Sc. (Hort)	I Year	4	8	12
"	II Year	3	5	8
<b>Total</b>		<b>7</b>	<b>13</b>	<b>20</b>
M. Sc. (Ag)	I Year	10	5	15
"	II Year	6	2	8
<b>Total</b>		<b>16</b>	<b>7</b>	<b>23</b>
<b>Grand Total</b>		<b>151</b>	<b>121</b>	<b>272</b>

#### No. of outside students

a) Under-graduate students from the other States or Union Territories studying at this College are as shown below:

	Men	Women	Total
1 Manipur	7	8	15
2 Tripura	10	—	10
3 Andhra Pradesh	2	—	2
4 Pondicherry	1	—	1
5 Mahi	7	1	8
<b>Grand Total</b>	<b>27</b>	<b>9</b>	<b>36</b>

	Men	Women	Total
1. Karnataka	1	0	1
2. Andhra Pradesh	1	0	1
<b>Total</b>	<b>2</b>	<b>0</b>	<b>2</b>
<b>Grand Total</b>	<b>29</b>	<b>9</b>	<b>38</b>

#### Hostel strength

The College provided hostel facilities to boys and girls. The total inmates of Mens' Hostel is 131 and that of Ladies' Hostel is 99

## Students achievement

### a) Under-graduate studies

The third batch of B. Sc. (Hort) students (1974 batch) completed their degree programme on 5.8.1978 and 19 of them passed out.

### b) Post-graduate studies

The following number of M. Sc. students (1976 batch) completed their degree programme.

Horticulture	— 8
Agronomy	— 2
Agrl. Chemistry	— 1
Agrl. Botany	— 1
Agrl. Entomology	— 1
Plant Pathology	— 1
	14

## Student aid and scholarships

A total of 187 students of the College availed of scholarships, fellowships etc. of various types during the year 1978-79. These include National Merit Scholarship to 30 students, Kerala Agrl. University Merit Scholarship to 19 students and ICAR Junior Fellowship to 3 students.

The details of the students aid and scholarships enjoyed during the year are given below:

Sl. No.	Detailed statement of concessions	No. of scholarships			Total
		Post-Doctoral	P.G.	U.G.	
1.	KAU Merit Scholarship	-	4	15	19
2.	KAU Fellowship	-	22	-	22
3.	KAU Incentive Fellowship	-	1	-	1
4.	ICAR Merit-cum-means Scholarship	-	-	14	14
5.	ICAR Junior Fellowship	-	3	-	3
6.	Concessions to SEBC and forward communities under Kumara Pillai Commission Report	-	-	43	43
7.	Post. Metric Scholarship to SC/ST students	-	2	17	19
8.	National Loan Scholarship	-	-	14	14
9.	National Merit Scholarship	-	-	30	30
10.	State Scholarship for proficiency in Sports	-	-	1	1
11.	Concessions to students belonging to X,ian Converts from SC/ST	-	-	3	3

12. Post Metric Scholarship to SC/ST Students—Govt. of Manipur	-	-	1	1
13. BC WD—State Scholarship—Backward class—Andhrapradesh	-	-	3	3
14. Payment of Scholarship by Lakshdeep, Andaman	-	-	1	1
15. Payment of stipend by Government of Tripura	-	-	10	10
16. Scholarship to SC students from Government of Pondicherry	-	-	1	1
17. Fellowship awarded by M/s IDL Chemicals	-	1	-	1
18. CSIR Post-doctoral Fellowship	1	-	-	1
<b>Grand Total</b>	<b>1</b>	<b>33</b>	<b>153</b>	<b>186</b>

## Practical Training Programme

Besides regular practical classes in the laboratories and Instructional Farms under graduate students were given the following assignments in order to develop confidence, technical skill and competence.

- i) Plot cultivation of various annual crops
- ii) Providing 3 perennial crops for each student for maintenance
- iii) Implementation of "Earn-while-you-learn" Programme.

## Extra curricular and co-curricular activities

*Study tours:* The 1st, 2nd and 3rd year undergraduate students of the college were taken on tour within the State, South India and North respectively during the period under report.

## Village adoption programme and National Service Scheme

Dr. P. Balakrishna Pillai, Associate Professor, continued to be the Programme Officer of National Service Scheme. He also continued as the Project Leader of the Village Adoption Programme for the Ollukkara Village. One day Training camps for farmers were organised at Holy Family L. P. School, Mannuthy, Don Bosco High School, Mullakkara and M. T. M. Orphanage, Kalathode. A special training course in mushroom production to the members of Mahilasamajam of the adopted village was conducted. The teachers of the college led discussions on various topics at the meetings of the village Samithy of the adopted village. The production plan of the village

was prepared and seeds and planting materials of various crops were distributed to the farmers. Demonstration plots for groundnut as an inter-crop in tapioca, groundnut as a pure crop in rice fallows and cowpea as a pure crop in rice fallows were laid out. Kitchen gardens were prepared and maintained by N. S. S. volunteers in schools and other public establishments. Adult Education Centres were functioned at Harijan Colony, Pattalamkunnu, Harijan Colony, Mullakkara and Instructional Farm, Mannuthy. Camps and Agricultural Seminars were also conducted. N. S. S. volunteers donated blood to the Blood Bank of the General Hospital, Trichur.

#### No. of Extension Lectures, Teaching Seminars and Workshops conducted

Two important seminars and one workshop were conducted during the period under report.

*The details of participation by the Academic staff of the College in various symposiums, Seminars and workshops conducted by outside bodies are furnished below.*

Dr. Abi Cheeran, Dr. C. K. Peethambaran and Dr. C. C. Abraham, Dr. (Mrs.) Ambika Varma, CSIR Fellow.

Dr. M. Aravindakshan, T. Vilasachandran, and K. Gopikumar attended the International Symposium on Cashew held in March, 1979 at Cochin.

The members of the staff attended the Seminar on Post-harvest Technology organised by Kerala Agril. University. Dr. P. K. Gopalakrishnan and Dr. K. V. Peter attended the Vth Workshop of AICUIP of ICAR at Tamil Nadu Agril. University, Coimbatore. Dr. C. Ramachandran attended Vth Workshop on tuber crops of ICAR at the College of Horticulture.

Sri. V. K. Damodaran attended the 4th Workshop meeting of All India Co-ordinated Spices and Cashew Improvement Project held at Panaji, Goa, in September, 1978. Sri. V. K. Damodaran and Smt. P. K. Valsalakumari attended the first International Symposium on Cashew held at Cochin from 12th to 15th March, 1979. Sri. Damodaran also attended the 10th annual meeting of the Indian Cashewnut Development Meeting held at Cochin in February 1979.

Dr. R. Vikraman Nair and Dr. K. Kumaran attended a training on Cocoa at the Cocoa Research Institute, New Tafo, Ghana and at the Oil Palm Research Station Kade, Ghana from August to November, 1978.

Sri. G. K. Balachandran Nair attended a two months training at the CRRRI, Cuttack on the management of upland rice from 1.8.78 to 30.9.78.

Dr. A. I. Jose, attended the All India Course on Water Relations of Plant Communities organised by the UNDP Centre of Soil and Water management, Hariyana Agril. University, Hissar from 18th to 25th September, 1978.

Dr. D. Dale participated in the All India Symposium in Insect Pest Management—Present, Past and future at the University of Udaipur, Rajasthan from 25—27 November, 1978

Sri. G. Madhavan Nair attended the All India Symposium on Sericulture Sciences held at the U.A.S., Hebbal, Bangalore from 4th to 6th October 1978.

Dr. C. C. Abraham participated in the Seminar in connection with the Silver Jubilee Celebrations of the Pepper Research Station, Panniyur on 15-12-78.

Dr. P. B. Gopinath, under went the training on Rodentology held at Jodhpur, Rajasthan from 7-8-78 to 31-10-78.

Dr. C. K. Peethambaran attended the annual conference of Indian Phytopathological Society held at Baroda.

Dr. K. M. N. Namboodiri participated in the 7th Workshop of Sugarcane Workers held in Pune during October, 1978.

The Department of Agril. Economics organised a Seminar on problems of Rural Labour of Kerala during December 1978. Papers were presented by experts from various institutions such as Centre for Development Studies, Trivandrum, Indian Statistical Institute, New Delhi, University of Calicut, Indian Institute of Management, Bangalore etc.

Dr. P. Balakrishna Pillai, Department of Agro Meteorology attended the Annual Conference of the Indian Society of weed Science held at Marathwada Agril. University, Parbhani from 29th to 31st June, 1979. A number of Agril. Seminars, Camps and Field days were organised under the auspices of the N.S.S. and Village Adoption Programmes.

#### Publications

The details of the Scientific and popular articles, books technical bulletins etc. published are given in appendix—VIII.

1. No. of Scientific papers published during the year

—76

2. No. of popular articles	—31
3. Technical bulletin	— 1
4. Books	— 1

The research activities carried out by the academic staff of the College have been given in Part-II (Technical) of the Annual Report.

#### Extension activities

The College undertook various short term training programmes to farmers, gardeners, employees of commercial banks and railways, school teachers, Agricultural Demonstrators and Agricultural

Officers independently as well as under the auspices of the Directorate of Extension Education of the Kerala Agrl. University.

The members of staff actively participated and led discussions on various topics at seminars and camps organised by the University, Department of Agriculture, Co-operative Societies, Banks and other public agencies.

Advisory services were rendered to farmers and field supervisory staff in solving specific problems in farming, preparation of farm plans, landscape designs etc. to institutions and professional societies was also undertaken by the College.

#### Training programmes undertaken

Name of the training programme	No. of batches	No. of trainees/ batch	Total No. of trainees	Duration	Department
1. Gardener's Training programme	3	15	45	3 months	Pomology
2. Inservice Training for Railway staff	1	16	15	1 "	"
3. Cashew Pest control (imparted to FAO/UND participants)	1	2	2	1 "	Entomology
4. Mushroom training	1	10	10	1 "	Pathology
5. Soil testing training to School teachers	1	8	8	15 days	Chemistry
6. Training in Agrl. Meteorology	1	11	11	1 week	Agro-Meteorology

#### Faculty improvement programme, Ph. D. deputation & study leave

A large number of Scientists of the College participated in conferences, seminars, workshops, summer institutes and exchange programmes organised at national and international levels,

Dr. R. Vikraman Nair, Associate Professor, Agronomy and Dr. K. Kumaran, Assistant Professor, Botany were deputed to undergo training on cocoa and oil palm in Ghana (West Africa) from 1—8—1978 to 20—11—1978.

#### Students' Welfare Activities

The Students' Union of the College of the year 1978-79 was inaugurated by Sri. S. G. Sundaram,

Chairman of Rubber Board and Cardamom Board. The following were the office bearers of the Union.

Patron	: Dr. P. C. Sivaraman Nair
Associate Patron	: Dr. P. K. Gopalakrishnan
President	: Sri. Sajan Kurian
Vice President	: Kum: Rangama Damodaran
General Secretary	: Sri. J. C. Damien
Assoc. Secretary	: Kum: Subha Mary Mathew
President, Planning	
Forum	: Dr. C. C. Abraham
Secretary, Planning	
Forum	: Sri. J. K. Sivan
President, Quiz Club	: Dr. A. I. Jose
Secretary, Quiz Club	: Sri. P. J. Ranjith
President, Arts Club	: Dr. K. Kumaran



Secretary, Arts Club : Sri. A Rajagopal  
 President, Athletic Association : Dr. P. J. Joy  
 Secretary, Athletic Association : Sri. P. Jayakumar  
 President, Social Service League : Sri. K. P. Ramachandran Nair  
 Secretary, Social Service League : Sri. Koshy Earnest  
 Staff Editor : Dr. R. Vikraman Nair  
 Student Editor : Sri. Somasundaran Mampally

The Arts Club was inaugurated by Sri. G. Gopalakrishnan, Script Writer on 17th Feb. 1979. The Arts Club organised various arts programmes on the occasions of the College Union inauguration, Kerala Agril. University Youth Festival arts competitions, Kerala Agril. University Union inauguration, intermural arts competitions and the College Day. The arts club arranged an entertainment programme in connection with the All India Inter University Basket Ball Tournament held at Vellanikkara.

The Athletic Association organised the Annual Athletic Meet. A good number of rolling trophies were newly installed for athletic items. The College teams secured recognition in many items of sports and games at the inter collegiate competitions. An open table-tennis tournament was also conducted by the Association.

The Quiz Club held frequent quiz competitions, student lecture programmes and regularly published the Quiz Bulletin, the monthly general knowledge bulletin of the Club. The College quiz team participated in a large number of competitions and secured the rolling trophy at the KAU Inter Collegiate competitions. The team was ranked third at the Trichur District Inter Collegiate Sports Quiz Competitions.

The Planning Forum was inaugurated by the eminent Educationalist and Writer Prof. Syed Moideen Shaw. The Planning Forum conducted various debate and literary competitions and actively participated in the KAU Youth Festival Competitions.

The Social Service League organised social service activities in association with the N. S. S. and Village Adoption Programmes. The League functioned a refreshment stall for about 2 weeks in connection with the Inter University Basketball tournament.

### Distinguished Visitors

The following distinguished personalities visited the college during the period under report.

1. Her Excellency Smt. Jyothi Venkitachallam, Governor of Kerala.
2. Dr. M. S. Swaminathan, the then Director General of ICAR
3. Dr. A. Umali, Asst. Director General, F. A. O.
4. Mr. T. G. Chler, World Bank Consultant on Cashew
5. Dr. Harban Singh, Chief of Agril. Expert, Dept. of Agril., Govt. of India.
6. Dr. C. Prasad, Asst. Director General, I. C. A. R.
7. Dr. M. V. Pylee, Vice-Chancellor, University of Cochin
8. Swami Harinama Ananda Chinmaya Mission, Bangalore
9. Mr. D. P. Bagchi, Secretary, Agriculture

### Other activities

#### College Library

The Library facilities of the College were considerably improved during the year under report.

Particulars	Total No. available as on 31-3-78	No. added during 1978-79	Progressive total
Books	4075	2987	7062
Journals, Indian	35	9	44
Journals, Foreign	25	10	35

## COLLEGE OF VETERINARY AND ANIMAL SCIENCES

The Veterinary College was established in 1955 at Mannuthy and it became a constituent unit of the Agricultural University when it came into existence in 1972. Dr. P. G. Nair continued as Dean and Head of the Institution during the period under report.

The College has 18 departments either headed by a Professor or Associate Professor. The two Veterinary Hospitals, one at Mannuthy and the other at Trichur along with the Livestock Farm, One Poultry Farm, the Pig Breeding Farm and A. I. Centre in the Campus, serve as instructional Units.

The details of teaching staff of the various departments have been shown separately in appendix - IX. The research achievements of the academic staff during the year has been given separately in Part - II (Technical).

Forty students are admitted every year for the B. V. Sc., and A. H. degree course, excluding students from outside the State and nominees of I.C.A.R.

Seventeen departments of the College are offering M. V. Sc. degree programmes and the maximum capacity for admission in each department is 4 (hence total for M. V. Sc. 68 seats). Four departments are offering Ph. D. with a maximum of 2 seats in each (total 8 seats).

During the year 61 were admitted for undergraduate (B. V. Sc. & A. H.) 25 for M. V. Sc. and 8 for Ph. D. programmes.

#### Class strength

B. V. Sc. & A. H.	—	202
M. V. Sc.	—	44
Ph. D.	—	11
Total	—	257

#### No. of outside students

State/Country	No. of students
1. Malaysia	2
2. Mauritius	1
3. Kenya	1
4. West Indies	1
5. Nigeria	1
6. Goa	1
7. Lakshadweep	4
8. Pondicherry	4
9. Bhutan	2
10. Jammu & Kashmir	26
11. Himachal Pradesh	2
Total	45

#### Hostel strength

There are 3 hostels, namely, (1) U. G. Hostel (Men), (2) P. G. Hostel (Men) and (3) Womens' Hostel.

	U.G. Hostel	P.G. Hostel	Womens' Hostel
Men students	137	26+10	—
Women students	—	—	44
Teaching staff	5	7	3
Total	142	43	47

#### I. Students achievements:

i) *Under graduate students:* Thirty eight students passed out, eligible for B. V. Sc. & A. H. degree.

ii) *Post-graduate students:* Nine qualified for M. V. Sc. degree.

#### Student Aid and Scholarships

Sl.No.	Nature of concession	No. of awardees
1.	SC/ST	18
2.	Kumara Pillai Commission	35
3.	Fee concession to OBC/OEC	2
4.	Educational Concessions to students from Jammu & Kashmir from their Govt.	4 Postmetric Scholarship 21 Educational loan from J & K Bank Limited.
5.	Edl. concession for Nagaland	...
6.	Edl. concession for Meghalaya	...
7.	Edl. concession for Lacadwes	4
8.	Edl. concession for Bhutan	2
9.	Full fee concession for children of political sufferers	...
10.	Scholarship for proficiency in sports	...
11.	Govt. of India General cultural Scholarship	1
12.	KAU Merit scholarship	39
13.	National Merit Scholarship	5
14.	ICAR Merit cum-means scholarship	13
15.	National Service Talent Scholarship from ICAR	...
16.	National loan scholarship	5
17.	KAU Fellowship for P. G. students	9
18.	ICAR Jr. Fellowship	3
19.	ICAR Sr. Fellowship	4
Total		165

#### II. Practical training programmes

The main training programme was the 9 month training for Senior Officers of the State Animal Husbandry Department. Besides this, short-term training programmes were conducted for Dairy Extension Officers, Artificial Inseminators, Farmers, AFPRO trainees, Pre-release Military personnel etc. One student from Netherlands had practical training in Animal Husbandry for 9 months.

#### III. Extension Activities

The College participated in the Trichur Pooram Exhibition, Village adoption Programmes and NSS activities.

Conducted classes for the 9 months training programmes and the AFPRO trainees,

The department has taken classes for 9 months diploma course and has conducted short term training course for Veterinary Surgeons, Dairy Extension Officers inseminators and farmers. The staff of the department were deputed for sterility camps organised by the Animal Husbandry department and Dairy Development Department. Twenty two sterility camps were attended during the year under report. The department looked after the reproductive health of the University Livestock Farm, Mannuthy and Thumburmuzhi. The mobile sexual health control programme was continued by the Department utilizing the vehicle allotted for the purpose. The project provided expert service required in the breeding of cattle at the door of the farmer at a reasonable cost:

Ten popular articles were published in newspapers. Conducted classes for AFPRO trainees on Livestock breeding. Imparted training to Village Development Workers in Goat Farming. Supplied cross-bred bucks for breeding purposes to farmers and developmental agencies, Artificial inseminations were conducted in goats,

Notes on results obtained from research conducted were sent to Veterinarians in the field.

The following training courses were conducted:

1. Nine month Senior Officers training course
2. Training in Dairy Farming and management practices of 4 weeks duration to candidates sponsored by AFPRO
3. Refresher course of 2 weeks duration for Dairy Farm Investigators deputed from the State Dept. of Dairy Department.
4. Training for Veterinary Surgeons of KADP
5. Training for one month for pre-release defence personnel in Dairy farming.

The 9 month diploma course was being conducted and co-ordinated by the Professor of Extension. The trainees were taken on an All India Study tour including Anand where the AMUL pattern of Dairy development was studied, to Indian Vety. Research Institute, Izatnager, etc.

Dr. M. Krishnan Nair gave a Radio Talk on Marek's disease.

The staff of the Department attended the 2 Veterinary hospitals to impart training to students in clinical pharmacology.

The following training programmes were taken up during the year under report.

1. One month training on 'Practical Poultry Keeping' to Village Development Officers of the Rural Development Project from 16-2-79 to 16-3-79 (10 trainees)
2. Chick sexing training from 16-1-79 to 15-3-79 (2 trainees)
3. Short term training (4 weeks) course for Poultry farmers (2 batches)
4. Associated in practical farm training programme for Livestock Assistant Trainees (2 batches)

#### IV. Seminars, Package of practice, meeting etc.

Faculty staff participated in the one day poultry Seminar conducted at Kottayam on 17-2-1979. Associated in the Pooram Exhibition.

Dr R. Sabarinathan Nair, Associate Professor of this Department participated in the one day Seminar organised under the Village Adoption programme held at Nadathara and Kozhukkully on 17-3-79 and 27-3-79.

Dr. C. P. N. Iyer, Professor attended FAO/SIDA International Seminar in Animal Reproduction at Tirupati from 20-11-78 to 7-12-78.

Dr. E. Madhavan attended the summer Institute in Infectious abortion from 6-6-78 to 5-7-78 at Mathura Vety. College.

Dr. Alikutty visited Lekshdeep as a member of a Team to investigate on an unknown disease prevailing in cattle.

Dr. G. R. Nair, Professor of Extension represented the Kerala Agricultural University at the National Workshop on Akash Bharati held at the Directorate of Extension Education at IARI, New Delhi from 16-5-78 to 18-5-78.

Dr. P. K. Abdulla, Professor, Department of Microbiology attended and presented a paper on 'Incidence of Salmonellosis in Kerala' in a Symposium on Enterobacteriaceae at Haryana Agril. University organised by the University Grants Commission during November 1988.

Dr. A. Rajan presented the following subjects in various Seminars and Conferences:

- 1) Environmental Carcinogens (Faculty Seminar)
- 2) Halmetological Examinations as an aid to diagnosis (Veterinary Surgeons Conference)
3. Carcinoma of the Paranasal sinuses of domestic animals (Indian Association of Pathologists and Microbiologists)

4. Incidence and Epidemiology of Carcinomas of sinuses (Indian Cancer Research Institute)

Dr. A. K. K. Unni, Professor of Poultry Sciences attended the 21st Indian Veterinary Conference held at Cuttack in June 1978.

Dr. R. Padmanabha Iyer participated in a Seminar on Zoonoses under the auspices of the Indian Vet. Association, Kasaragod on 18-2-79.

V. Distinguished visitors who visited Veterinary College between 1-4-1978 and 31-3-1979

1. Sri. G. Bhaskran Nair, Chief Secretary to Govt. of Kerala on 26-5-1978.
2. Dr. G. Ramachandran, Vice-Chancellor, Gandhigram Rural University on 3-6-1968.
3. Professors, T. P. Gopala Swamy & A. Sundar of Indian Institute of Management, Bangalore on 23-6-1978.
4. Dr. Devendra Malaysian Agri. Research & Development Institute, Serdan, Malaysia on 31st October, 1978.
5. Prof. John Francis of University of Queensland, Vety. School, Brisbane, Australia on 15-11-1978.
6. Sri. D. P. Bagohi, Secretary to Govt. of Tripura on 11.1.1979.
7. Dr. John Barnabas, Ahmednagar College, Ahmednagar on 8-2-1979.
8. Prof. G. Winqvist, International Prof. of Pathology, University of Uppasala, Sweden on 12-2-1979.
9. Mr. Kortlany, Advisor to Govt. of India on ducks on 18-10-1978.

VI. Other events

The experts of the College associated with the Farm School on AIR (Profitable Poultry Production organized by the A. I. R.)

Diagnosis of diseases and preventive inoculations were conducted in many villages.

A radio talk on Rabies was given by Dr. M. Soman on 10-2-79.

VII. Publications

The details of research papers and other articles published by different members of the faculty are given in appendix-X.

## INSTITUTE OF AGRIL. TECHNOLOGY, TAVANUR

The institute was under the direct control of the Director of Extension Education since it was taken over by the University on 12-12-1975.

Sri. P. K. Gangadhara Menon continued as Special Officer till 6-9-1978 and Sri. P. N. Pisharody took charge as Special Officer from 7-9-1978 and continued throughout the period. The details of staff is separately appended (Appendix-XI).

### ACADEMIC COURSES AND TRAINING PROGRAMME

#### A. Diploma in Agril. Sciences

This course was converted into Diploma Course with 7 trimesters. Under the Diploma in Agril. Sciences course, the students are taught the following subjects.

1. Agronomy	— 21 credits
2. Plant Protection	— 17 ..
3. Horticulture	— 18 ..
4. Agril. Engineering	— 14 ..
5. Animal Husbandry	— 14 ..
6. Agril. Economics	— 8 ..
7. Agril. Extension	— 10 ..

Another 10 credits are also assigned to the work experience programme in which the students are expected to raise different crops. The students are also sent to various research stations under Kerala Agricultural University, Dist. Agril. Farms, Seed Farms, I. P. D. Units and Coconut Package Units for studying the field problems and for equipping them for different items of Field work.

There are 50 students admitted to the 1st Batch. They completed the course including the field training on 8-4-1978. 43 came out successfully.

The second batch students consisting of 49 left the course on 20-10-78 out of which 46 have successfully completed the course.

The third batch of 50 students admitted on 1-8-1977 are expected to leave the course in October 1979 after completing the field training.

The 4th batch of the Diploma in Agril. Sciences started with 51 students on 17-8-78 have completed two trimesters out of 7 trimesters during the period under report.

19 SC/ST/OBC students of 2nd, 3rd and 4th batch were sanctioned the Harijan Welfare Educational concessions.

48 FC students & 34 SEBC students were also sanctioned educational concessions under KPCR Scheme of the Harijan Welfare Department.

#### **Short term training course in repair and maintenance of Tractor and other Agrl. implements**

This course is of one year duration intended to provide sufficient practical training and theoretical knowledge in operation, maintenance and repair of Farm machineries, Plant protection equipments and tractors and tillers. The 3rd batch of one year Agrl. Mechanic course was commenced from 12-12-78 with 20 students.

#### **Livestock Assistants' Training**

The second batch of Livestock Assistants' Training course was commenced on 16-1-1978 and terminated on 15-12-1978.

Seventy candidates were admitted for the course at the beginning, comprising of 60 candidates sponsored by Animal Husbandry Department, 4 by Union territory of Lakshdeep and 6 by Kerala Agrl. University. The training programme was 11 months duration comprising of 9 months on campus training at the Institute and 2 months field training conducted at different Vety./A. H. institutions of Animal Husbandry Department and Kerala Agrl. University. During the course of training at the Institute, theory classes, Practical classes, presentation of assignments by the trainees, periodical class tests, screening educative films, guest lectures and study tours were conducted. Over and above these, regular practical training was given to the Dairy Unit, Poultry Unit and Vety. Hospital attached to the Institute, 12 guest lectures were delivered by the different officers of the Department and University.

#### **Inservice training course for Agrl. Demonstrators**

The second batch of inservice training course of 6 months duration for Agrl. Demonstrators deputed from the Department of Agriculture was commenced from 2-5-1978 and completed on 1-11-78. The course for the third batch was commenced from 25-10-78 and completed on 24-4-79.

#### **Instructional Farm**

The farm extending over an area of 26 ha. also provided facilities for the practical classes of the Diploma students and trainees besides being a source of income to the Institute.

#### **PADDY**

Out of the area earmarked for paddy cultivation, first crop paddy was raised in 9.05 ha., second crop paddy raised in 0.75 ha. Rohini, Triveni and Jaya were the varieties selected for paddy cultivation.

#### **BANANA**

A total of 550 numbers of Nendran suckers, 50 nos. of different varieties like Zanzibar, Poovan, Padda Pacha, Dwarf cavandish, Monzamaric were planted during the period.

#### **COCONUT**

A total number of 1,050 bearing coconut palms exist in the farm including 10 hybrids, one spikata and 2 dwarf orange. A total of 38,756 nuts were obtained during the year. Average yield per tree is 59 Nos.

#### **TAPIOCA**

Cultivated in an area of 0.7 ha. of which 0.6 ha. was under M/4 and 0.1 ha. under different varieties (H-1687, H-2054, H-1249).

#### **VEGETABLES**

An area of 0.3 ha. was under Amaranthus, Bhindi, Bittergourd and Ashgourd.

#### **COCONUT SEEDLINGS**

Out of 601 Nos. of seed coconuts sown, 529 Nos. were germinated. 438 Nos. of seedlings were distributed during the year under report.

#### **GINGELLY**

An area of 6 ha. was under gingelly varieties being Kayamkulam — 1 and local. The yield of gingelly was very poor because of the extremely hot climate and also because of the sesamum phyllody.

#### **OTHER CROPS**

##### **CASHEW**

A total of 270 cashew trees about 4-4½ year old exist in the farm area. They have not started bearing.

##### **PEPPER**

A total of about 90 bearing varieties of local variety and 37 Panniyur-1 are available in the farm. Another 30 cuttings of Panniyur-1 were rooted and planted during last year. A total quantity of 64 Kg. of dry pepper was obtained during the year.

##### **NUTMEG**

A total of 65 nutmeg plants of 3 to 8 years in age exist in the Farm. 8 plants have started flowering. 300 gr. mace has collected during the year. Cocoa — 50 plants (9 year old) Sapota — 25 plants (9 year old)

## DAIRY AND POULTRY

The following is the present stock of Livestock and Poultry as on 1-4-1979.

	Stock as on 1-4-1979	
Cows	...	18
Bullocks	...	1
Calves including Heifers		1
	Total	20
Poultry birds	...	61

A total number of 9,246 eggs were obtained from the Poultry Unit during the period from 1-4-78 to 31-3-1979. 22,808 litres of cow milk were also produced in the Dairy Unit during the period.

### Vet. Hospital cum-A. I. Centre

The unit started functioning from February 1977. The instructor in A. H., the Junior Instructor (Livestock Assts' Training course) and one L. S. A. Grade II are attending to the hospital duties.

A total number of 1,214 cases brought by the Public were treated in the hospital during the period.

Bovine	...	858
Caprine	...	216
Avian	...	121
Canine	...	19
Equine	...	...
		1,214

Besides, 89 artificial insemination cases were also attended to.

### Extension activities

A bench mark survey in respect of 30 marginal farmers selected from the adopted village, Tavanur was conducted as a part of the ICAR Golden Jubilee Celebrations.

Two training classes on pulses crop cultivation in Rice fallows and poultry keeping on a subsidiary occupation were organised for the benefit of farmers.

Out of the total amount of Rs. 1,900/- sanctioned under Village adoption programme for the year 1978-79, an amount of Rs. 1,072/81 were utilised for various programmes as shown below:

Trial plots groundnut and cowpea...	Rs. 854.31
Distribution of chicks	...Rs. 200.00
Organisation of training camps	...Rs. 18.50
Total	<u>...Rs. 1072.81</u>

Twelve guest lectures were delivered on the following topics by different officers of the Department and University.

1. Fodder production —Dr. M. S. Nayar
2. Role of Livestock Asst. in Animal Husbandry activities—Dr. K. P. Kesavan Nair
3. Pig Farming —Dr. P. Ramachandran
4. Livestock & Poultry diseases and their control —Dr. E. P. Paily
5. Feeding of cattle and Poultry — Dr. C. T. Thomas
6. Poultry Farming — Dr. A. Jaialudin
7. Role of Biological Products and their utilisation — Dr. M. R. Murugan
8. Livestock improvement activities under KLD & MM Board — Dr. D. V. P. Nair
9. First aid in Vety. science — Dr. P. O. George
10. Maintenance of records of Deptl. Institutions — Dr. K. P. K. Nair
11. Dairy Farming — Dr. K. Pavithran
12. Animal Husbandry activities under Intensive cattle Development Project. — Dr. M. Chandrahasan

### Library

Library facilities are adequate for the present academic and training courses in progress. A reading room is also functioning besides the main Library. The institute is subscribing to 26 Scientific & popular journals.

She staff consists of one Librarian and one Library Attender only.

### GENERAL

The students of the Institute actively participated in the Inter Collegiate competition in Football, Volleyball and Sports meet organised by the University.

The students of the institute had also taken part in the District Volleyball Tournament and were Runner up.

The first issue of the I.A.T. Magazine 1977-78 was published in October 1978 incurring an expenditure of Rs.3, 350/- I.A.T. students Union inauguration was held on 29-12-78. The literary club brought forth a magazine called "Tharangam" on the day. Two symposia were also conducted during the period of January and March 1979.

A total expenditure of Rs. 8,10,891/89 was incurred during the year 1978-79 against the receipt of Rs. 2,37,744/63.

The following planting materials were produced and distributed during the year.

Sl. No.	Particulars	Distribution in Kg.
<b>Seeds</b>		
1.	Paddy seed	16,943.00
2.	Cowpea seed - C1-52	80.50
3.	Cowpea seed - New era	281.750
4.	Cowpea seed - Kanakamani	212.100
5.	Gingelly seed	109.100
6.	Bhindi seed	9.016
7.	Ashgourd	0.300
8.	Bittergourd seed	7.750
9.	Cucumber seed	0.525
<b>Seedlings</b>		
10.	Nendran Suckers	1785 Nos.
11.	Pepper cuttings	198 "
12.	Coconut seedlings	808 "
13.	Tapioca stem	3750 "
14.	Nutmeg seedlings	37 "
<b>Other Farm Produces</b>		
15.	Coconut	28586 Nos.
16.	Coconut Steril	621 "
17.	Colocacia	57 Kg.
18.	Tapioca chips	...

19.	Dried pepper	...
20.	Plantain	24 Kg.
21.	Tapioca	1566.5 "
22.	Gingelly bulk	1260.250
23.	Nutmeg mace	300 gm.
24.	Ginger	...
25.	Turmeric	...
26.	Paddy bulk	21727.00 Kg.
27.	Paddy Half filled grain	1787.00 Kg.
28.	Paddy straw	22250.00 Kg.
29.	Jack fruit	1933.00 "
30.	Bread fruit	10.5 "
31.	Mango	106.5 "
32.	Cowpea bulk	210.0 "
33.	De-husked arecanut	270.0 "
34.	Gooseburry	39.5 "
35.	Gingelly bulk	340.0 "
36.	Ciba cotton pods	3700 Nos.
37.	Banana (Nendran)	6162.950 Kg.
38.	Banana (Robusta)	45.5 Kg.
39.	Banana (Variety)	297.3 Kg.
40.	Ashgourd (vegetable)	186.0 "
41.	Cucumber (do)	432.5 "
42.	Amaranthus (do)	72.450 "
43.	Cowpea green (do)	512.4 "
44.	Bhindi (do)	404.750 "
45.	Bittergourd (do)	147.3 "
46.	Brinjal (do)	34.0 "
47.	Tender coconut	28 Nos.

#### Miscellaneous

48.	Cadjans	3035 Nos.
49.	Unplanted coconut leaves	1581 "
50.	Planting leaves	925 "
51.	Gingelly stalk	640 Kg.
52.	Firewood	3675 "
53.	Fish	12 "

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## CHAPTER III

# RESEARCH

The Research programmes undertaken by the Kerala Agricultural University in the fields of Agriculture and Animal Husbandry are mainly conducted in the 23 research stations spread out in almost all the districts in the State and in the constituent Colleges of the University like the College of Agriculture, Vellayani, College of Horticulture, Vellanikkara and the College of Veterinary & Animal Sciences, Mannuthy. During the year, more emphasis was given in conducting research on Rice, Coconut, Pepper, Cardamom, Cashew, Pineapple, Sugarcane and essential oils. Research on poultry and better varieties of Goat production were the main task of the veterinarians during the period under report.

Dr. V. S. S. Potti, Director of Extension Education was in full additional charge of the post of Director of Research till Dr. U. P. Bhaskaran assumed charge of the post on 31-5-1978 and continued as such.

The salient features of the research work undertaken have been given in part II (Technical) of the annual report.

A summary of the administrative aspects of the Research Stations/Farms under the University where major schemes are implemented is detailed below;

A list of research stations/farms and the details of staff working there is given as appendix XII. A list of publications by the Research staff has also been given as appendix XIII.

### 1. RICE RESEARCH STATION, PATTAMBI

This is a major research station engaged in various research studies on rice. Though the major objective of the station is to evolve high yielding rice varieties suited to different agroclimatic conditions of the State, the station is actively participating in intensive research with multidisciplinary approach on production and protection technology in rice cultivation.

A part from continuing research on rice, a sub centre of the All India Co-ordinated pulses improvement project functions at the station to conduct intensive research on pulse crops. The State Seed Testing Laboratory is also attached to the station. Under the All India Co-ordinated Agronomic Research Project, ECF & M A E Experiments have also been conducted at selected centers of the State.

During the year nine rice cultures with multiple resistance and high yield potential have been located. A total No. of 124 local rice varieties were collected from Trichur district under the programme for the rice germplasm collection.

Trials with "Suvarnamodan" in Palghat, Trichur, Malappuram and Cannanore districts have recorded an yield increase of 13.6% over the local check.

Studies on soil fertility and crop productivity under continuous rice culture at moderate levels of fertilization have revealed that nitrogen plays a significant role in increasing grain yield while phosphorus and potash have no significant effect. However the combination of the three elements, N, P and K recorded the highest yield.

Nitrogen management trials have indicated that the dose of nitrogen could be reduced by one fourth if it is applied in the form of sulphur coated urea or in mud balls.

Preliminary studies on biofertilisers have revealed that about 25 Kg. N could be substituted by applying blue green algae @ 10 kg algal crust per ha. or azolla @ 5 tonnes/ha.

Studies on the physiological maturity of rice grains and the correct time of harvest to get the highest yield have proved that Jyothi and Jaya varieties give the highest yield when harvested 30 days after flowering during first crop and 20 and 25 days after



flowering respectively during second crop season. Harvesting 40 days after flowering recorded the highest yield in the case of IR-5 during both crop seasons.

Experiments with herbicides have revealed that application of the herbicides viz. Thiobencarb, Butachlor + 2, 4-D, C. G-26423; piperophos, MT 101/Thiobencarb, Molinate/symetryne/MCPA is as effective as hand weeding in direct sown rice under puddled condition. Penoxaline; Benthiocarb, nitrogen and C. 288 are found to be effective for weed control in direct sown rice under semi dry condition.

Sowing paddy seeds in flowlines is found to reduce the cost of weeding by about 50% under dry sown condition. Maize is found to be the most promising in uplands as a relay crop after modan rice

Results of permanent manurial trials have further confirmed that a combination of organic manures and inorganic fertilizers is superior to either of them alone irrespective of the variety being tall or dwarf.

In controlling the pests of rice crop, trials, with new granular insecticides have shown that Furadan 3. G. is the most effective in controlling the important pests of rice. Among the spray formulations, Sumicidin 20 E. C. is found to be better than the others against the paddy pest complex.

Studies on insect pest control have revealed that spray formulations are more effective than granules and that insecticides need be applied only on need basis.

Rootzone application of Furadan is found to be the most effective method for the control of leaf folder in rice.

Studies on the chemical control of sheath blight disease in rice have indicated that Bayistin is the best chemical for control of this disease. Spraying the chemical at vegetative and earhead stages is found to be effective against rice blast disease also.

Yield trials with cowpea varieties/cultures have identified two promising cultures of cowpea; viz. P. 118 and V 16, having short flowering duration and synchronised pod maturity.

Experiments on intercropping have proved that cowpea, blackgram and greengram could be successfully intercropped with tapioca, during kharif season.

A total number of 58 research projects have been undertaken on rice, pulses, vegetables and tapioca.

A one day seminar on "Production Technology of Pulses" was conducted at this station on 21st December 1978.

During the year under report a total of 115234 kgs of paddy seeds were produced at the station.

Shri. K. I. James, Associate Professor took charge of the station on 1-3-1979 consequent on the retirement of Sri. N. Gopalan, Associate Professor.

The total expenditure incurred during the year under report was Rs. 14,09,465.51 against the receipt of Rs. 2,65,605.97.

## 2. RICE RESEARCH STATION, MONCOMPU

The station started functioning in 1940 with the object of evolving high yielding paddy strains suitable to Kuttanad region. The station was upgraded to the status of a full fledged Rice Research Station in 1976 with a view to provide research facilities on all important disciplines. During the year under report, the station was in its take off stage and measures were being taken to equip it with facilities and personnel for bringing it to the level of a good rice research institute. An operational research project on integrated control of rice pests in Kuttanad was also functioning at the station in collaboration with the State Department of Agriculture. A partly financed I.C.A.R. scheme on pests and disease survey have also been started to study the incidence of pests and disease in different varieties under changing agroclimatic conditions.

The research activities undertaken at the station during the year showed that a fungus *penicillium oxalicum* was found to cause mentality of rice earhead cutworms. This has opened up a way for the biological control of this pest. A total of 47 research projects have been undertaken during the year.

An amount of Rs. 3,94,497.27 was incurred as expenditure during the period under report against the total receipt of Rs. 52,318.71.

## 3. RICE RESEARCH STATION, KAYAMKULM

The main objective of the station is to evolve suitable rice and sesamum varieties suited to the sandy tract and to formulate improved cultivation practices in Onattukara region. Production and distribution of quality paddy seeds are the important

items of work carried out at the station. 38 experiments were laid out in various crops like rice, sesamum, groundnut, blackgram, coconut and tapioca.

Cul. 31-1 of the cross Kottarakkara-ix poduri a high yielding photosensitive variety, resistant to lodging, has proved to be significantly superior in the district trials and is suitable for the eastern lateritic region, as well as the sandy tracts of Onattukara and is in the pre-release stage. Screening trials revealed that varieties blue bonnet, jagannath pankaj, mashoori and Hr are the best high yielding varieties suited for the second crop season in Onattukara. Cul. No. 1026-a promising culture having intermediate height is found to be suited for dry sown conditions in the first crop in Onattukara

The results of the crop sequence trial indicate that in the Onattukara region during third crop season (January-April) groundnut blackgram and cowpea can be successfully cultivated in rice fallows, besides sesamum.

Three high yielding hybrid cultures of sesamum (cul. No. 8, 7-1 and 14-1) cross Pt. 58-35 x Kayamkulam-1 having multipoded nature and profuse branching proved to be superior and can be advanced to district trials.

The station was under the direct control of an Associate Professor. Shri. A. E. Sreedhara Kurup was in charge of the station during the period under review.

The total receipts and expenditure of the station during the year 1978-79 was Rs. 59,839/87 and 2,44,925/94 respectively.

#### 4 RICE RESEARCH STATION VYTTILA.

The main objective of the station is to evolve varieties and agronomic practices suitable for cultivation in the coastal saline marshes locally known as Pokkali or Kaipodu lands. The station is situated in the Corporation area of Cochin, 7 kilometers east of Ernakulam Junction and 15 kms of Cochin Air Port. A fishery unit also started functioning there from 1976 February. It is now under the direct supervision of an Associate Professor.

Among the pesticides tried in Pokkali field Ekalux was found to be toxic to fishes under different level of water irrespective of the method of spraying Hence Ekalux cannot be recommended to control the insect pests in pokkali fields as it is very much toxic to fishes.

In the laboratory screening of rice varieties and cultures entry Nos. 349, 350, 545, 546 & 553 were found to be moderately resistant at 1.0% salinity both at germination and tillering stages.

Tiger prawn seed resource had been located for the first time from the Kerala backwaters during the report period.

Two exotic species Cyprinus Carpio and Osphraenemus goramy have registered appreciable growth in culturing along with rice in Pokkali fields.

Out of the 17 research projects undertaken during the period of report, 9 was on rice, 1 in Coconut and 7 on fisheries.

An All India Workshop on the Co-ordinated Project on Brackish water Fish Farming was conducted on 9th & 10th November 1978 under the joint auspices of the K. A. U. and the Central Inland Fisheries Research Institute,

A total expenditure of Rs. 2,56,907.81 was incurred during the year against the total receipt of Rs. 12,796/-.

Shri. P. J. Tomy, Associate Professor was incharge of the station during the period.

#### 5. MODEL AGRONOMIC RESEARCH STATION, KARAMANA

The station is situated in Trivandrum city at a distance of 3 km. from the Trivandrum Central Railway Station in the South East direction. Established in 1955. its main objective is to conduct manurial, cultural and rotational experiments in rice. Three projects viz. (1) Model Agronomic Experiments to conduct experiments suggested by the Project Co-ordinator (AICARP) sponsored by I. C. A. R., (2) Simple fertilizer trial to conduct Uty. trials and (3) Scheme for standardization of experimental plots and for multiplication and distribution of quality seeds are implemented at the station.

During the year under report 9 experiments during Khariff season, six during Rabi season and 5 experiments in summer were laid out. Out of these 20 experiments, 14 were under A. I. C. A. R. P. and the remaining six were University schemes. During the Rabi season, all the experimental fields were submerged in flood water and most of the plots of the two University experiments and one A. I. C. A. R. P were washed away completely.

Shri. V. Ramachandran Nair, Associate Professor was in-charge of the station during the year of report.

The total receipts and expenditure of the station during the period was Rs.25,485/19 and Rs.1, 59, 081/-respectively.

#### **6. AGRONOMIC RESEARCH STATION, CHALAKUDY.**

The station started functioning during the year 1972 with a view to develop suitable cropping pattern for varying water management and fertility situation in the command areas of Chalakkudy Irrigation Project by observing the effects of water management and soil salinity of the area under different conditions. Testing of new crops and varieties for the adaptability and performance under different moisture constraints, to estimate the water requirements of rice and various farms of water losses to evolve suitable practices to increase water use efficiency in field crops etc. are also undertaken at the station.

During summer about 25% more area can be commanded with the same resources of water by adopting 'phasic stress irrigation practice'.

The magnitude of loss of water due to deep percolation is as high as 76% in the sandy loam soil. Compacting the sub soil at 30 cm depth reduces this unproductive loss of water by 40%

Two irrigation (3 cm. water per irrigation) are at the vegetative phase and the other at the reproductive phase result in higher net returns of Sesumum.

irrigation (5cm) once in 19 or 21 days at the IW/CPE ratio of 0.5 boosts tuber production. It also facilitates earlier harvesting of tapioca by two months.

A total number of 13 research projects have been undertaken during the report period.

Shri. N. N. Ramankutty, Associate Professor continued to be in charge of the station during the year.

An expenditure of Rs.3,01,267/90 was incurred against an income of Rs.45,443/-.

#### **7. RICE RESEARCH STATION & INSTRUCTIONAL FARM, MANNUTHY.**

This station functioning as a part of the College of Horticulture was developed to study the various problems confronting rice cultivation

in the central tracts of middle laterite regions comprising areas of Trichur and Ernakulam district with special emphasis in solving high yielding strains resistant to pests and diseases. Practical training and planting materials for the staff of the College of Horticulture and Research Stations were also provided here.

The station is under the administrative control of an Associate Professor. Dr. V. K. Sasidhar continued in the post during the report period also

In an experiment to find out the best suited variety of groundnut in coconut garden, the variety pollachi-1 was found to be superior for intercropping in Coconut garden.

Amruthapani Kottapetta followed by Chayapa-subha were found to be the high yielding varieties of turmeric for cultivating under partially shaded conditions in coconut gardens,

Maximum yield of bittergourd was obtained when N P. K. was applied at the rate of 50 : 25 : 50 kg/ha.

Maximum yield of brinjal was obtained from the NPK combination of 50 : 0 : 25 and 25 : 25 : 50.

In total 14 research projects were undertaken during the report period on various crops.

Several schemes under the All India Co-ordinated Rice Improvement Project have also been started at the station to study the adaptability and comparative performance of different cultures/ varieties.

A total expenditure of Rs.3, 94, 654/61 was incurred during the year against the total receipt of Rs. 1,63, 955/98.

#### **8. COCONUT RESEARCH STATION, PILICODE/NILESHWAR**

The station was established in the year 1916. The station at Pilicode comprises an area of 27.65 hectares and that at Nileshwar an area of 17.20 hectares. Both the two stations have now been brought under the administrative control of an Associate Professor and the headquarters is being functioned at Pilicode. Shri. K. Kannan, Associate Professor was in-charge of the station till 31-5-1978 and subsequently Dr. P. K. Narayanan Nambiar, Associate Professor took over charge and continued except during the period from 7-7-1978 to 31-7-1978 when Shri. K. P. Narayanan Nambiar, Deputy Director of Agri. took over charge and retired on 31-7-1978.

The Research activities of the station were conducted under 5 disciplines ie. Agronomy, Botany, Chemistry, Entomology and Plant Pathology. The two All India Co-ordinated Projects, ie. All India Co-ordinated Coconut and Arecanut Improvement Project and All India Co-ordinated Project for Improvement of Tuber Crops (other than Potato) continued to be in operation at the Station during the year,

The major objectives of the station was to study the cultural, manurial and other Agronomic practices of coconut cultivation and to formulate best agronomic practices of red sandy loam and gravelly laterite soils. The study of crop behaviour and adaptability of exotic varieties to ensure their economic characters based on their performance were also undertaken at this station.

There were 29 exotic and 35 indigenous cultivars in the germ plasm collection of coconut at this station. The varietal description of plant and nut characters of 52 cultures were completed,

In the study of off types of different dwarf varieties, all the three natural cross dwarf green palms flowered by the fifth year after planting.

In the trial to study the response of D×T hybrid coconut to common salt application from seedling stage onwards vegetative growth was found to be more during the first and second years in the seedlings getting one third and two third dose of 250 g of soda and 750 gm. of potash per palm per year in the first and second year respectively. The seedling which received neither potash nor soda continued to be stunted in growth.

A total expenditure of Rs. 5,90,191/46 was incurred against the total receipt of Rs. 3,57,512/63 during the year under report.

### 9. COCONUT RESEARCH STATION, KUMARAKOM

The main objective of the station is to conduct varietal, cultural, manurial and plant protection trials on coconut crops under the Agroclimatic conditions prevailing in the back water area of Kuttanad tracts with special reference to root wilt disease.

A total of 21 research projects, 20 in coconut and one in mixed farming have been undertaken during the period under report. All these projects are at different stages of implementation and therefore no conclusive results have been drawn up so far.

The integrated research project on mixed farming of coconut, Livestock and fish which underline the

principle of organic recycling to maximise agricultural production started functioning during the previous year has been continued during the year under report.

The station was under the administrative control of Sri P. K.Sathiarajan, Associate Professor and Shri G. Mathai, Assistant Professor during the period from 1-4-78 to 8-5-78 and from 9-5-1978 to 31-3-1979 respectively.

An amount of Rs. 2,52,026/31 has been expended during the year as against an amount of Rs. 1,46,768/33 collected as receipts.

### 10 COCONUT RESEARCH STATION, BALARAMAPURAM

Varietal, manurial, cultural and organic trials were conducted at this station to find out suitable cultivation practices for coconut on red loamy soils in Kerala.

Four Research projects on coconut were under operation in the farm.

The results from the fertilizer experiments revealed that nut bearing palms respond remarkably to NPK fertilizers, the yield enhancing progressively with the increasing doses of fertilizers.

Spacing-cum-manurial trial revealed that for every additional rupees spent highest return of Rs. 7.46 was derived from the treatment M<sub>1</sub>S<sub>1</sub>, which was closely followed by M<sub>2</sub> S<sub>2</sub> by Rs. 6.46, MIS<sub>2</sub> by Rs. 6/- and M<sub>2</sub>S<sub>1</sub> by Rs. 5.61.

	M1 (gm/tree)	M2 (gm/tree)		
N	340	680	S0	—5.0 x 5.50 ms.
P	225	450	S1	—7.5 x 7.5 "
K	450	900	S2	—10 x 10 "

5662 Nos. of T×YD and 300 nos. of other variety coconut seedlings were distributed during the year.

Dr. K. M. Sukumaran, Associate Professor was in-charge of the station during the report period.

As against the total expenditure of Rs.1,51,453/36 an amount of Rs. 1,98,641/41 was collected as receipts during the report period.

### 11. CARDAMOM RESEARCH STATION, PAMPADUMPARA

Established in 1956, the farm is comprised in 46.44 ha of the hilly tracts of the Idukki district.

Problems confronting the cardamom cultivation are analysed at this station from its agronomical, botanical, entomological and plant pathological, divisions. This station is one of the co-ordinating centres for Research on cardamom under All India

Co-ordinated Spices and Cashewnut Improvement Project of the I.C.A.R.

During the year under report, a total quantity of 2244 kg (dry weight) of cardamom to the value of at Rs. 3,70,000/- has been produced. Out of the total area of 46.44 ha, 20 ha have been brought under cultivation in different crops.

A total number of 14 research projects were under operation during the report year.

Eventhough, most of the projects are under various stages of operation, a study of the Azhukal disease of cardamom showed that the fungicides Cuman, Bayer 5072, Difolatan and Bordeaux Mixture were effective in controlling the above disease.

Out of the eleven insecticides tried, Endosulfan was found to be effective against cardamom shoot and capsule borer.

Dr. S. Baiakrishnan, Associate Professor continued to be incharge of the station during the year of report

A total expenditure of Rs. 3,51,703/- was incurred against an income of Rs. 3,40,403/- during the report period.

## 12 HORTICULTURAL RESEARCH STATION, AMBALAVAYAL

In addition to the production and distribution of quality seedlings, rooted cuttings and seeds of various crops suitable for cultivators in high elevation, intensive research on paddy, fruits, spices and essential oils are being carried out at this station.

Twenty seven research projects on different crops like rice, citrus, ginger, turmeric, tapioca and eucalyptus were under operation during the year of report. Besides, 8 other new schemes have also been started functioning in collaboration with some outside agencies.

In controlling udbatta disease of rice, Bavistan 0.1% was found to be more effective in reducing the disease intensity in the variety IET 1444.

In the inter-cropping trial in eucalyptus, citriodora plantation with the inter crops like ginger, turmeric, tapioca, chillies and lemongrass, the result indicated that ginger, turmeric and lemongrass could be successfully interplanted for greater production of leaf and oil and for enhancing income from unit area.

Trial on the germplasm evaluation on turmeric revealed that the variety T. Sunder outyielded all other 43 varieties,

Sri. A. Padmanabhan Thampi, Associate Professor was in-charge of the station during the report period.

A total amount of Rs. 8,72,926/32 has been expended against a total income of Rs. 3,35,838/98

## 13 LEMONGRASS RESEARCH STATION, ODAKKALI

The objectives of the station are mainly to conduct Research and carry out investigation in botanical, agronomical and bio-chemical aspects of aromatic plants like lemongrass, palmarosa, eucalyptus, cinnamon and vetiver.

A total of eight experiments have been conducted on various essential oil yielding crops during the year. Out of these 8 experiments, the comparative yield trial on lemongrass and spacing on palmarosa have been concluded. Data for 3 years of comparative yield trial showed that the type collection OD-408, a collection from Idukki district has out yielded in oil production and percentage of recovery of oil over OD-19. But the citral percentage is found to be lower than in OD-19. Spacing trial showed that there was not much difference in oil yield due to the spacing trial in palmarosa.

Sri. E. V. G. Nair, Associate Professor continued to be in-charge of the station during the period under report. He is also a scientist member in the executive council of Essential Oil Association of India.

During the report period, an amount of Rs. 2,85,832/20 was spent as expenditure as against an income of Rs. 54,113/75.

## 14. PEPPER RESEARCH STATION, TALIPARAMBA

The station situated in Panniyur village of the Taliparamba Taluk in Cannanore district comprises an area of 14.50 ha. The main objective of the station is to evolve high yielding varieties of pepper, to control insect pests and diseases and to estimate the manurial requirements of the crop for optimum production.

During the year under report, 25 research projects have been carried out on the main crop pepper.

Nutritional studies on different varieties of pepper under different agroclimatic conditions indicated that higher levels of nitrogen have a depressing effect on the yield of Panniyur-1 variety of pepper. A nutrient ratio of 1:2:3 (NPK) could be the optimum for economic yields in the Panniyur-1 variety.

The occurrence of abortive spikes in pepper was detected and reported for the first time. It was also found that there is a definite period of overlapping of the male and female phases in a spike.

Studies on the control of quick wilt disease of pepper revealed that pasting the lower stem portion with 1% Bordeaux mixture can effectively control the incidence of the disease.

A scheme for the establishment of a progeny orchard and Central nursery for Panniyur-1 variety of pepper was started at the station during the year. The scheme is financed by the Directorate of Cocoa, arecanut and spices development under the Ministry of Food and Agriculture, Government of India.

The silver jubilee of the station was celebrated on the 15th of December 1978. The Hon'ble Ministers of Agriculture and Health, the Vice-Chancellor, Kerala Agricultural University, Director of SADU, District Collector, Cannanore, members of Legislative Assembly, Scientists from outside bodies, manufacturers and exporters were participated. A large number of progressive farmers attended the seminar conducted in connection with the celebration. A souvenir was also published to suit the occasion.

Sri. P. K. Venugopalan Nambiar, Associate Professor continued to be in-charge of the station during the report period.

An amount of Rs. 2,55,416/76 was expended during the year against the total receipt of Rs. 78,500/93.

## **15. BANANA AND PINEAPPLE RESEARCH STATION, KANNARA**

The Station was established during the year 1962. The Pineapple Research Centre at Vellaniakkara which was started during 1974 has also been brought under its administrative control. Besides, the All India Co-ordinated Fruit Improvement Project in Banana & Pineapple are also functioning here.

The objectives of the station are to evaluate and select superior varieties of banana and pineapple by introduction from within the countries and abroad for different purposes and to standardise their cultural and manurial practices, time and method of planting, pest and disease control measures, dose and method of application of hormones and growth regulators etc.

Under Kerala conditions, Mansmari variety, a cultivar of Dwarf cavendish banana is highly

productive, producing bigger fruits, possessing higher sugar content and lesser acidity.

For controlling weeds in banana plantation, a post emergence application of a combination of gramaxone 1.5 lit/ha and diuron 3 kg/ha at six monthly intervals or combination of gramaxone 1.5 litres and 2,4 DNa salt 3 kg/ha were found to be very effective under Trichur condition.

Higher plant population (5,000 suckers/ha) in the case of Robusta variety has given more yield than the local practice of planting 2310 suckers/ha.

The banana varieties, Kanchikela and Karpooravally were found to be highly tolerant to bunchy top disease of banana. Kanchikela is used for culinary purpose and Karpooravally for dessert purpose.

A combination of Ethrel 25 ppm, Urea 2% and CaCo<sub>3</sub> 0.04% was found to be effective in inducing uniform flowering in pineapple.

Among the herbicides trial to control the weeds in pineapple plantations, application of Diuron 3kg/ha as pre-emergence spray and repeated at half dose five months after first application was found to be effective.

A total number of 44 research projects have been carried out during the report year. 2634 banana suckers and 9250 pineapple suckers were distributed to the farmers for cultivation.

Dr. P. C. Jose, Associate Professor (PP) was in-charge of the station during the year.

Receipt and expenditure of the station for the year 1978-79 was Rs.1,07,566/37 and 3,54,960/05 respectively.

## **16 CASHEW RESEARCH STATION, ANAKKAYAM**

Established in 1963, the station is located at Anakkayam, 9 kms. away from Malappuram on the Manjeri road.

Superior varieties of cashew production are tried in all its aspects in this station with the aim to augment cashew production in the State.

Eleven research projects on cashew are under operation during the year. As these projects have not been completed during the period, no conclusion have been drawn so far on the achievements of the station.

The station is under the administrative control of an Associate Professor. Consequent to the relief of Sri. P. G. Veeraraghavan, Associate Professor on

3—2—1979, Sri. M. G. Vasavan, Assistant Professor took charge of the station and continued as such.

An amount of Rs. 95,989/- has been expended during the year of report as against a total receipt of Rs. 25,510/-

## **17 SUGARCANE RESEARCH STATION, THIRUVALLA**

The station was established during the year 1976 with a total area of 10.26 hectares with the main objective to conduct fertilizer varietal and zonal trials as approved by the ICAR with a view to formulating fertilizer recommendations for the crops in the State and for releasing promising cane varieties.

During the year under report, 15 research projects on Sugarcane and 2 on jute have been operated and all of them were in their progressive stage. Therefore, no valid conclusion could be drawn on the achievements of the projects laid out.

Dr. P. K. Chellappan Nair, Associate Professor continued to be in-charge of the station during the period under report,

Rs. 1,06,507/53 has been expended as against the income of Rs. 32,797/80.

## **SCHEMES**

### **1. All India Co-ordinated Spices & Cashew Improvement Project, Madakkathara**

This scheme covers an area of 24.7 hectares in the Madakkathara Panchayat in Trichur district. This is a unit of All India Co-ordinated Spices & Cashew Improvement Project started with the main objective of developing high yielding varieties of cashew by screening the germplasm collections,

Besides, the type of seedlings maintained at Cashew Research Station, Anakkayam, this station has got 69 types of all seedling progenies collected mainly from Kasargod, Nilambur and Panniyur area of Cannanore District during March, 1975 and 18 types added mainly from Kottapuram, Kannara Kottarakkara and Malappuram as seedlings and 5 from Kottarakkara as air layers during 1978.

in the seedling progenies BLA-139-1 continued to maintain the lead with a yield of 37.785 kgs of nuts per tree. Among the hybrids R. 3-19 with 38.79 kg. recorded the maximum yield. A total of 10 research projects have been carried out during the year.

Sri. K. K. Vidyadharan, Associate Professor continued to be in-charge of the scheme during the period under report.

Total receipt and expenditure during the year is Rs. 16,404/04 and Rs. 78,917/90 respectively.

### **2. Pepper Research Scheme, Vellanikkara**

A total number of 7 research projects have been undertaken under this scheme on pepper. Dr. Abi Cheeran, Associate Professor of Plant Pathology continued to be in-charge of the scheme during the period under report.

Fertilizer-cum-standard trial on pepper indicated that split application of fertilizers is better than applying fertilizer in a single dose. Also the vines trained on dead wood standards showed better growth and produced higher yields.

From the central nursery for hybrid pepper, 25,000 cuttings were planted this year for rooting.

An Amount of Rs. 77,322/36 has been spent during the year against the receipt of Rs. 79/50.

### **3. Floriculture Improvement Project, Vellanikkara**

A total of 16 projects have been undertaken in this scheme during the year. Dr. P. K. Vijayan, Associate Professor was in-charge of the scheme during the period under report.

A total expenditure of Rs. 46,966/82 has been spent during the year against the receipt of Rs. Nil.

### **4. Scheme for Research on the integrated use of surface water, Sub-surface water and rainfall for crop production**

The scheme started functioning during 1978-79 in the command area of the Ponnani river basin, Palghat district. 16 research projects have been operated during the year.

Water, irrigation and drainage requirements of rice in the Ponnani basin during the virippu and mundakan seasons have been found out based on experiments conducted at Kunnanur, Erimayur and Wandazhi.

A field study to find out the irrigation requirement of cocoa has also been laid out. This is the first attempt of its kind in Kerala.

Sri. R. Ravindran Nair, Assistant Professor was in-charge of the scheme. Total expenditure during the year was Rs. 1,54,135/23 against a nil receipt.

### **5. Scheme for intensification of sugarcane research in Kerala**

The scheme started functioning at Punaloor, Idukki and Chittoor under the administrative control of the professor of Agricultural Botany, College of Horticulture, Vellanikkara.

The main objective of the scheme is to conduct expts. to study the botanical and cultural aspects of the crop and to screen out suitable varieties for the tract in the State.

The programme is a joint venture among state farming corporation, co-operative Sugars Ltd., Chittur and the KAU.

All the Res. projects taken up at the above three centres are in progress.

#### 6. A. I. C. A. R. P. — E. C. F. Kottayam and Kozhikode districts

The objective of the scheme is to study the comparative performance of pre-released and standard crop varieties of rice and their nitrogen requirements under irrigated and assured water supply conditions. The headquarters of the Kottayam Unit is functioning at Changanacherry and that of Kozhikode unit at Karaparamba.

Experiments were also conducted at cultivators fields to study (1) the response of crops to different fertilizers and manures on farmer's fields and (2) to work out the fertilizer recommendations for different agroclimatic zones in a District or State.

During the year 120 experiments at Kottayam district and 91 experiments at Kozhikode district had been conducted.

Sri. M. R. Chsidanandan Pillai, R. Raveendran Nair and Madhusudhanan Nair, Asst. Professors were i/c. of the Kozhikode unit and Sri. K. Sankara Panicker, Asst. Professor was incharge of the Kottayam unit during the report period.

Rs. 1,28,150/75 was expended as against a receipt of Rs. 2713/30 at Kottayam unit and an amount of Rs. 1,35,260/50 had been incurred as expenditure at Kozhikode against the nil receipt.

### VETERINARY RESEARCH

#### 1. University Livestock Farm, Mannuthy

This farm was started by the old Cochin State in 1921 and it was taken over by the University in 1972.

The station provides facilities for research work both at graduate and under-graduate level. It serves the needs of the farmers for their requirements of meat, draught and milch animals.

The farm is under the administrative control of an Associate Professor; and Dr. M. Sthanumalayan Nair was holding the post during the report period.

#### 2. Livestock Research Station, Thiruvazhamkundu

This farm situated in the Mannarghat taluk of the Palghat district comprises an area of 163.3 ha. The main objective of the station is the breeding of buffaloes and cattle. 5 research projects have been carried out during the report year and all of them are in progress. This farm has been lifted to the status of a research station recently. The farm is self sufficient in fodder production. There is enough grass during rainy season. Demand during summer is met as the para grass produced from the wet land, the carigated Napier fodder silage and spear grass hay.

Dr. P. A. Devassia, Associate Professor was in-charge of the station from 1-4-1978 to 14-2-1979. From 15-2-1979 onwards Dr. K. S. Sebastian, Assistant Professor held the charge of the farm.

The herd average and lactation average of the farm was as detailed below.

	<i>Cattle</i>	<i>Buffalo</i>
Herd average	4.1 kg	1.5 kg
Lactation average	6.1 kg	3.4 kg

An expenditure of Rs. 8,27,526/69 has been incurred during the year against the total income of Rs. 2,86,956/21.

#### 3. Cattle Breeding Farm, Thumburmuzhi

This farm is situated in Pariyaram village, Mukundapuram taluk on the road side 15 kms. east of Chalakudy on the Chalakudy Sholayar route. It was originally established to investigate the value of grading of cattle with red sindhi bulls and subsequently for cross breeding with Jersey bulls. The present policy is to get this as a young stock farm and transfer the animals to Mannuthy at the time of calving.

Different varieties of grass were also grown to meet the bulk roughage requirement of calves maintained.

Dr. K. Parameswaran Nair, Associate Professor was in-charge of the station during the report period.

#### 4. University Poultry Farm, Mannuthy

This farm was established by the Government of Travancore-Cochin in 1952 as a District Poultry farm and it was transferred to the University in 1972.

It was reorganised with stress on stepping up production and facilitating various research projects in the Veterinary College.

As a part of the Poultry farm, a duck farm was also established during the year 76-77, with the



objective of imparting training to students, to evolve a suitable germplasm by crossing desidubucks with exotic ones and to find out the nutritional and managerial requirements of ducks.

#### 5. University Pig Breeding Farm, Mannuthy

The farm is located within the Mannuthy campus of the Kerala Agricultural University about 5 kms. outside Trichur town on National Highway 47. It has a neatly enclosed area of 4 hectares of well drained land.

It functions as a breeding centre for multiplication of improved varieties of exotic stock of pigs for supply to the interested pig breeders as to develop swine industry in the State. In this farm practical training were given to the under-graduate and post graduate students of the College of Veterinary & Animal Sciences.

#### 6. University Veterinary Hospital, Kokkalai; Trichur

All kinds of veterinary aid to the public were provided at this hospital situated at the heart of the Trichur town. Preventive measures are also undertaken to protect the animals and birds from different kinds of infectious diseases.

Clinical training to the students of Veterinary and Animal Sciences, Mannuthy were also given at this hospital. Dr. K. Ramadas, Assistant Professor continued to be in-charge of the hospital during the report period.

#### OTHER SCHEMES/PROJECTS

##### i) University Veterinary Hospital, Mannuthy

The main objective of this hospital is to give clinical training for the under-graduate and post-graduate students of the College of Veterinary and Animal sciences, Mannuthy.

Dr. K. M. Alikutty, Associate Professor was in-charge of the hospital during the period under report.

##### ii) Fodder Research & Development Scheme, Mannuthy

This scheme started functioning during 1975. Technical guidance on fodder production is given by this scheme to the Livestock Research Station, Thiruvazhamkunnu and Cattle Breeding Farm, Thumburmuzhi.

A total quantity of 3119.132 tons of fodder has been produced during the period under report out of which a quantity of 690 tones of green fodder was ensiled. Considering the price of fodder at Rs. 150/- per tonne, the scheme has made a net profit of

Rs. 71,231/47, even the establishment charges were also accounted.

Five research projects have been undertaken during the period of which three were completed.

As against an expenditure of Rs. 4,29,699/02 a total receipt of Rs. 5,00,930/49 has been accounted.

Dr. M. S. Nair, Associate Professor was in-charge of the scheme during the period under report.

##### iii) All India Co-ordinated Research Project for Investigation on Agril. by-products and Industrial waste materials for evolving economic rations for Livestock, Trichur Centre

The main objectives of the scheme are the following.

- 1) To study agricultural waste, forest products and by-products of agricultural based industries as a possible source for livestock feed and thereby augment feed resources and improve nutritional status of livestock by utilising these materials.
- 2) To explore the possibilities of improving the nutritive value of such by-products and waste materials by appropriate treatments.
- 3) To evolve noncereal economic rations for feeding of cattle, buffaloes, sheep, goat and pigs.
- 4) To demonstrate to farmers the feeding of by-products that are found useful, through sub-centres.

During the year under report, the feeding value of rubber seed cake for reproduction and lactation were assessed. The feeding value of tea waste for milk production, nutritive value of deoiled coconut meal, coconut pith and spent anutto seeds were also undertaken. The feeding value of some of the agricultural by-products as tree leaves for elephants were also assessed. Dr. C. R. Ananthasubramaniam, Associate Professor continued to be in-charge of the scheme during the period under report.

An amount of Rs. 1,38,771/71 has been expended during the year as against a Nil receipt.

##### iv) All India Co-ordinated Research Project on Goats, Mannuthy

During this year, 14 research projects were undertaken under this scheme of which 2 was in nutrition, 6 in Pathology and the remaining in breeding and genetics.

This scheme focusses effort on producing different crosses of the local Malabari breed of goats with exotic breeds, Saanen and Alpine and to test the

performance in respect of production, reproduction and growth.

Dr. B. R. Krishnan Nair, Associate Professor continued to be in-charge of the station during the report year.

An expenditure of Rs. 4,27,550/86 has been incurred as against a total receipt of Rs. 23,808/-

v) **AICRP on Poultry for Eggs, Mannuthy**

Established in the year 1977, with a total area of 2.39 ha. in the Veterinary College Campus, Mannuthy.

Three strains of white leghorns viz. IWN, IWP and F were identified by the ICAR for research work at this centre. The IWN and IWP strains were received during June '78 from Hyderabad centre of the project. The 'F' strain was received during July-August from the Kerala Agricultural University. The research work is in progress during the year.

Dr. C. K. Venugopalan, Senior Scientist (Professor) continued to be in-charge of the scheme during the period of report.

Besides research and extension activities, the staff of the scheme has been engaged in teaching and guiding graduate research.

A total sum of Rs. 10,86,656/08 has been spent during the year against the receipt of Rs. 30,674/36.

#### **RESEARCH ON FISHERIES**

Research on Fisheries are mainly undertaken through the Department of Fisheries attached to the

College of Veterinary and Animal Sciences, Mannuthy. It is expected that the attempts to develop it as a full fledged faculty and to lift the department as a constituent college of the University will be fruitful during the next financial year.

During the year under report, 18 research projects were undertaken by the department.

New resources of tiger prawn seed in the Cochin backwater which is being exploited on a large scale, were found out.

Culture of tiger prawn on an intensive scale has been demonstrated in the Vyttila farm.

The intensive farming of the *Microbrachium rosenbergii* in Kuttanad paddy fields was shown to be economically viable and most encouraging.

The techniques of paddy cum-fish culture by including the Indian major carps was successfully demonstrated in Kuttanad during the year.

A new scheme financed by the International foundation for Sciences, Sweeden entitled 'Induced breeding of the Grey Mulletts of India' has been started recently.

Co-sponsored the conduct of the III Annual Workshop Meeting of the All India Co-ordinated Research Project on Brackish Water fish farming. Dr. M. J. Sebastian, Professor of Fisheries continued to be in-charge of the Department.

An expenditure of Rs. 4,33,153/38 has been incurred against the total receipt of Rs. 42/60.

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## CHAPTER IV

# EXTENSION EDUCATION

Dr. V. S. S. Potti continued as the Director of Extension Education during the period under report.

The extension activities of the Directorate of Extension Education was expanded considerably during the year under report. Sri. V. K. Moideen koya, District Information Officer on deputation from the Department of Public Relations continued as Public Relations Officer.

The details of other Extension personnel are given in appendix-XIV.

### Training Programmes

Training programmes have been organised by the University for the technical personnel of the Department of Agriculture, Animal Husbandry, Dairy Development, Cardamom Board, as well as School Teachers, Farmers, Bank Officers etc.

A training Service was constituted during 1975-76 with one unit comprising of one training officer and supporting staff directly under the Extension Wing and another unit with one training officer and supporting officer at the College of Agriculture, Vellayani. Smt. S. Sumangalakutty Amma, Assistant Professor and Sri. M. Muhammed Hussain, Assistant Professor were in-charge of the training at the above two centres respectively. The following training programmes have been conducted during 1978-79.

#### 1. Inservice training course for Junior Agrl. Officers

The object of this training is to properly equip the Junior Agricultural Officers with upto date knowledge in the subjects for executing their work efficiently and effectively. The course was for a duration of four weeks and conducted at the College of Agriculture, Vellayani. During 1978-79, 95 Junior Agricultural Officers of the Department of Agriculture and 12 Agricultural Officers of the Land Mortgage Bank were trained in four batches.

#### 2. Inservice Training Course for Agricultural Demonstrators (1 month)

The training course was organised to equip the Agricultural Demonstrators working in the Agricultural Department and to provide them opportunities to discuss with experts field problems faced by them. The training was for a duration of one month. 250 Agricultural Demonstrators have been given training during 1978-79 in six batches:

#### 3. Inservice Training Course for Agricultural Demonstrators (6 months)

The training course for a period of 6 months started at the Institute of Agrl. Technology, Tavanur during the year. 203 Agricultural Demonstrators have been trained in batches. The object of the training is to make the newly recruited Agricultural Demonstrators technically competent by providing theoretical as well as practical experience

#### 4. Training on Pest and Disease Surveillance

A six days training programme in pest and disease surveillance was conducted at the Rice Research Station, Moncompu. 57 Junior Agricultural Officers of the Department of Agriculture were given training in four batches.

#### 5. Training on Rice Minikit Trials

One State level training on Rice Minikit trials for a duration of four days each had been conducted at Kerala Agrl. University, Mannuthy during 1978-79 with the object of keeping the extension personnel upto-date with latest techniques of crop production and laying out of the proper minikit demonstrations. 29 technical personnel of the Department of Agriculture attended the training.

#### 6 Training for School Teachers

The work experience training programmes in Agriculture for three batches of Upper Primary

School Teachers had been organised during the year. A total of 100 teachers were trained.

#### **7. Training for Gardeners**

The training for Gardeners was organised to create opportunities for self employment. The course provided practical training in budding, grafting, plant propagation methods, nursery practices layout and maintenance of garden, cultivation of vegetables and fruits etc. Thirty trainees participated in this twelve week course in two batches at the College of Horticulture, Vellanikkara.

#### **8. Training for skilled workers in vegetative propagation of crop plants.**

A training programme of five days duration for skilled workers in vegetative propagation of crop plants was conducted in the College of Agriculture, Vellayani during the year. 24 personnel attended the training.

#### **9. Training in tree plantation and management for Railway staff.**

This programme was taken up to give training to Railway staff in tree plantation and after care, garden management etc. for the proper utilization of railway land. The training was conducted at the Kerala Agricultural University Inservice Training Centre during the year. The officers from the Railway Department participated.

#### **10 Agricultural Mechanic Training course.**

A training course for the operation, repair and maintenance of tractors, power tillers, pumpsets and plant protection equipments started at the Institute of Agrl. Technology, Tavanur during December 1978 is in progress. Seventy trainees are attending.

#### **11. Diploma Course in Agriculture**

The course was started at the IAT, Tavanur with the object of providing sufficient trained man-power requirement of field staff of KAU and Department of Agriculture. 49 students were admitted during 1977 and 50 students were admitted during 1978 for the Diploma Course in Agriculture. The above courses are in progress.

#### **12. Training for the managerial staff of the Co-operative Institutions**

The objective of the programme was to impart training to the managerial personnel of the Co-operative Societies in the fields of Agricultural Technology, Farm Management, Animal Husbandry practices etc.

Two training programmes of two weeks duration have been conducted at the College of Agriculture, Vellayani during 1977-78.

#### **13. Training for the Field Extension Officers in Cardamom Board**

The Field Extension Assistants/Officers of the Cardamom Board were given a two weeks training in Agriculture. Forty candidates attended the training in two batches. The training was conducted at the College of Horticulture, Vellanikkara.

#### **14 Training for the Supervisors attached to the Primary Land Mortgage Bank**

A training programme for the Supervisors attached to the Primary Land Mortgage Banks was organised during the year. A total of 34 personnel were trained in two batches.

#### **15 Training for the workers of the Voluntary organisation in Agriculture.**

A training programme was organised in the College of Agriculture, Vellayani for a period of 2 weeks for the workers of the Voluntary organisations. 13 candidates participated in the training.

#### **16 Training in Mushroom Cultivation**

A Training programme in Mushroom cultivation for a duration of 3 days was organised in the College of Horticulture, Vellanikkara for the selected farmers from the adopted villages. Twelve candidates attended the training.

#### **17 Training for the Managerial staff of Co-operative Societies**

The training was conducted at the College of Agriculture, Vellayani. Duration of training was two weeks. 27 candidates were trained.

#### **18 Training in Agriculture for the Field Officers of the Union Bank of India.**

A training programme for a duration of one week was organised at the Communication Centre, Mannuthy for the Field Officers of the Union Bank of India. 34 Officers attended this training.

#### **19 Training in Fruit and Vegetable preservation**

A training programme for a duration of 5 days each was organised at the College of Agriculture, Vellayani during the year. A total of 224 Farm women were trained in 6 batches.

**20 Training in soil testing for the staff of Soil Testing Laboratories**

A training programme in soil testing was organised in the College of Agriculture, Vellayani. Twelve candidates were trained in two batches for a duration of one month each.

**21 Livestock Assistants' Training**

The training course started during January 1978 at the Institute of Agrl. Technology, Tavanur is being continued. A total number of 69 candidates have undergone the training. The candidates selected by the Public Service Commission and Kerala Agrl. University for appointment as Livestock Assistants were admitted to this course.

**22 Training in Pregnancy Diagnosis and Artificial insemination**

Eight persons were trained during the year in one batch. The training was conducted at the College of Veterinary and Animal Sciences, Mannuthy.

**23 Training in Dairy Husbandry and Management sponsored by AFPRO**

A training course in Dairy Management, Fodder Production, Artificial Insemination Techniques and other related aspects of successful dairy farming was organised for 23 candidates sponsored by AFPRO. The training was conducted at the College of Vety. & Animal Sciences, Mannuthy.

**24 Refresher Training course for Senior Officers of the Department of Animal Husbandry**

The object of the training was to provide training to Senior Officers of the Department of Animal Husbandry in latest advances in Veterinary Medicine and Animal Husbandry. The duration of the training was nine months. The training was conducted at the College of Vety. & Animal Sciences, Mannuthy.

The course started during January 1978 continued. Another batch with 10 candidates joined the course in February 1979 also continued during the period under report.

**25. Training in Poultry Management**

The programme was envisaged to give practical training in all aspects of poultry farm management to interested farmers to equip them. Three persons were given training in one batch. The duration of the training course was four weeks.

**26. Short term Course for Vety, Surgeons (Problems of Infertility and sterility in domestic animals)**

A training course of 6 weeks duration for the Veterinary Surgeons of Department of Animal Husbandry on problems of infertility and sterility in domestic animals was conducted in the College of Veterinary and Animal Sciences. The course started during March 1978 with five candidates continued. Another batch of 5 candidates joined during June 1978.

**27. Training for Dairy Farm Instructors**

A training programme of two weeks duration was organized for the Dairy Farm Instructors at the College of Veterinary and Animal Sciences. 100 candidates have undergone training during the period in four batches.

**28. Short term course in Gynaecology for the Veterinary Surgeons of the Department of Animal Husbandry**

A training programme of 3 months duration was conducted at the College of Veterinary and Animal Sciences for the Veterinary Surgeons of the Department of Animal Husbandry. 10 candidates attended the training in one batch.

**29. Orientation Training in Cattle Infertility**

A training programme of 2 days duration for the Officers of the Department of Animal Husbandry was organised at the College of Vety. & Animal Sciences during December, 1978. 87 Officers participated in the training.

**30. Training in Chick Sexing**

A training of 3 months duration for chick sexing for the research staff of Kerala Agri. University was organised at the University Poultry Farm, Mannuthy. Two candidates have successfully completed the training.

**31. Orientation training for Agricultural Research Service Trainees**

One day training programme for a batch of 19 Agrl. Research Service trainees was organised on 31-10-1978.

**32. Training for pre-release personnel in Dairying**

The training for pre-release personnel in Dairying was conducted. 10 candidates were trained.

### 33. Inservice training in Horticulture for Railway staff

The training for the Railway staff in Horticulture was conducted. 10 Railway Officers have undergone the training.

#### Seminars

To evaluate the present studies of the production disease of Dairy Cattle and to formulate adequate control measures, a workshop on production diseases of Dairy Cattle was conducted at the College of Vety. & Animal Sciences, Mannuthy. The Officers from the Department of Animal Husbandry and Kerala Agricultural University participated in the workshop.

#### Workshop on popular writing for farmers - problems and perspectives

A workshop on the above subject was conducted on 31st May 1978 at the College of Agriculture, Vellayani for improving the competence of University Officers in popular writing for farmers in Malayalam. Officers of the State Institute of Language, Kerala Agricultural University, Department of Agriculture and representatives of the leading Malayalam Dailies participated in the workshop.

Sri. A. I. Thomas, Associate Professor, National Demonstration Scheme, KAU, Vellanikkara attended the symposium on Inter-cropping of pulses in India at New Delhi and presented a paper on groundnut, cowpea and horsegram as companion crop with tapioca.

Dr. V. S. S. Potti, Director of Extension Education attended the Seminar at Irinjalkuda, sponsored by CPCRI, during October 1978.

Dr. V. S. S. Potti, Sri. A. I. Thomas and Sri. P. Ramachandran Nair, participated in the symposium for appropriate technology for rural development at T. K. M. Engineering College, Quilon, presented papers and also participated in the workshop for fertilizer use at Karunagappally sponsored by FACT.

The Silver Jubilee celebration at Peppér Research Station, Panniyur was also celebrated.

Experts of the University have participated in the Poultry Seminar at Kottayam on 17-2-1979.

University has conducted two district level Agricultural Seminars at Malappuram (Parappanangadi) and Idukki (Arakulam) districts on 21-2-1979 and 24-2-1979 respectively.

One workshop on pulse Production was conducted during December 1978 at Rice Research Station, Pattambi.

### Exhibitions

The University participated in the Trichur Pooram Exhibition and All India Exhibition at Quilon in connection with the S. N. D. P. Silver Jubilee Celebrations.

The University has participated in the Cashew Exhibition at Ernakulam conducted in connection with the International Cashew Symposium from 12th to 18th March 1979.

An exhibition was arranged at Kottayam in connection with Poultry Seminar on 17-2-1979.

An exhibition was arranged at Manalur in connection with the Farm and Home Anniversary.

### Publications

#### 1. K. A. U- News letter

KAU News letter is a monthly publication providing information on the activities of the University in various spheres such as resident instruction, training, research, extension education and public relations. Eight issues of the KAU News letter were brought out during the period.

#### 2. Kalpadhenu

This is a bi-monthly farm magazine meant for farmers and extension personnel. Six issues were published during the year, covering titles on Agriculture, Animal Husbandry, Horticulture, Fisheries, Co-operation etc. Features, research notes and activities of the research stations of the University were also documented in these issues of the Magazine.

#### 3. Research Journals

Issues of Kerala Journal of Veterinary Sciences, Agricultural Research Journal of Kerala were published during the year under report.

#### 4. Abstracts

Abstracts such as "Agri. Abstract", "Hort Abstract", "Anivet Abstracts" containing technical information for the use of the technical personnel of the Kerala Agricultural University and staff of the Department of Agriculture, Animal Husbandry etc. were brought out regularly during the the year under report.

#### 5. Agres News

This is a quarterly publication published as a supplement to Kerala Agril. University News letter. Results of research conducted in the University and other Institutions in India and abroad were collected, processed and published for the use of the extension staff of the Department of Agriculture, Animal Husbandry and Dairy Development. Three issues have been brought out during the period.

### Serialised Lessons

Serialised lessons, a new venture in the field of information communication was started with its publication in news papers. Topics of interest to farming community were selected for this serialised lessons, provided in detail all the available technical information on the topic selected.

The selected topic divided in to a number of small lessons and the lessons were published serially in the newspaper, so that all those connected with the topics were able to follow and utilise technical know-how imparted through such lessons in their field of activity.

Serialised lessons on "Cocoa" was published in Malayala Manorama Daily during the year.

Fifteen lessons on dairy cattle management have been published in Deepika during the year under report.

### Publication of Articles in Karshikarangam

The Karshikarangam Columns of the dailies were regularly attended to, by subscribing Scientific articles for publication at the appropriate time to enable the farming community to step up the production by following the timely Instructions and details contained therein. The articles dealt with a wide variety of subjects both from the Agriculture and Animal Husbandry side to satisfy the scientific information requirements of all those engaged in the above fields.

The following dailies collaborated in publishing the articles:

#### Name of Daily

1. Mathrubhoomi
2. Malayala Manorama
3. Deepika
4. Veekshanam
5. Kerala Bhooshanam
6. Kerala times

A total number of 144 articles were published during the period under report.

### Answering questions of Farmers

Questions on Scientific technical points raised by farmers engaged in Agriculture and Animal production were regularly answered to clear their doubts and to guide them properly in their venture. Direct detailed replies were sent to those farmers who have contacted directly through letters for getting their doubts cleared. Through the questions and answer column of the Daily "Malayala Manorama", questions of farmers were answered.

### Participation in Farm and Home Programme of AIR

The Kerala Agricultural University has actively participated in the Farm and Home Programme of All India Radio by regularly broadcasting talks of the experts, interviews with the experts etc. to the farming community.

### Weekly Broadcast-Instructions to Farmers & Extension workers

This is a 5 minutes programme on all Fridays. This programme was started during January 1979 and 13 broadcasts were done till 31.3.79.

### Fortnightly Broadcast-Sastriavarthakal

This is a 5-8 minutes programme on alternate Wednesdays. This was also started in January 1979. Six broadcasts were given during the period under report.

### Karshikasarvakalasila Varthapathrika on A.I.R.

Varthapathrika containing important events in the University during every month is broadcast from the Trivandrum Station of All India Radio in their rural programme. This monthly broadcast is for a duration of 5 to 7 minutes.

### Press Release

Two hundred ninety six news items were released to the Press for publication and for All India Radio for broadcast during the year under report.

## UNIVERSITY ACTIVITIES

### Village Adoption Programmes

Village adoption programme started by the University in the previous year with a view to developing closer relations and contacts between the scientists and farmers and to provide technical assistance for agricultural development.

Activities in the following 11 villages adopted by the University adjacent to the different University Campuses and Research Stations continued.

- |  |                |
|--|----------------|
| 1. Main Campus                                 | 1. Oilukkara   |
|  | 2. Pannenchery |
|  | 3. Kuriachira  |
|  | 4. Nadathara   |
| 2. College of Agriculture, Veliyani            | 1. Muttakkad   |
|  | 2. Kalliyur    |
| 3. Rice Research Station, Pattambi             | 1. Kezhayoor   |
|  | 2. Thrithala   |
| 4. Horticultural Research Station, Ambalavayal | 1. Ambalavayal |
| 5. Lemongrass Research Station, Odakkali       | 1. Asamannoor  |

6. Institute of Agricultural Technology, Tavanur
7. Rice Research Station, 1. Nedumudi Moncompu

Six large scale demonstrations having 2 hectare area each were conducted at the following six adopted villages—Pannencherry, Madakkathara, Nadathara, Ollukkara, Thrithala and Tavanur. The average yield obtained in this rice fallow cultivation was 810 kg. groundnut pods as well as 1300 kg green fodder per hectare. In the adopted village Ollukkara the following works were done: Three, one day training camps conducted. A total of 275 farmers attended these camps.

A special training course in Mushroom production was conducted. A village Samithy was formed in the adopted village. Discussion on the topic related to crop products was conducted.

Seeds of high yielding varieties of paddy, tapioca stems, vegetable seeds, TxD coconut seedlings, banana suckers, Cocoa seedlings and fruit plants were distributed to farmers of the village. Twenty five young birds have been supplied to the Mahila Samajam under Poultry development programme.

In the Nedumudy village of the Champakulam Block, the following agricultural activities were undertaken.

The academic staff of the Moncompu Rice Research Station conducted weekly visits and discussed problems of the cultivators. The farmers were informed on the possibility of pests and diseases outbreak and helped them to meet the situations.

A trial to test the yield potential of 3 pre-released advanced cultures was laid out in the village during the additional crop season of 1978.

During the additional crop season of 1978 there was a heavy incidence of bacterial leaf blight paddy. The timely demonstration conducted by the station in a 50 acre plot of affected crop helped the farmers to meet this situation.

In the Village Keezhayoor adopted by the Rice Research Station, Pattambi, the following developmental activities were undertaken.

300 kg of Kolingi seeds were distributed on the subsidised rate and a quantity of 400 kg of kolingi and daincha seeds were procured from open market and were distributed. A total number of 2000 glyricidia and other shrubs were planted during the year.

The local cultivators were advised to grow higher yield varieties of paddy and a total area of 100 acres were newly brought under high yielding varieties.

Five demonstration plots of 2000 sq. m. area were laid out to demonstrate intercrops of groundnut in tapioca.

Three discussion group meetings on pulses, plant protection and banana were conducted.

Homestead survey was conducted and production plans were prepared for 30 holdings.

Thrithala Village was selected as an additional unit for the village adoption scheme.

In the village adopted by the Lemongrass Research Station, Odakkali the following works were done.

50 Mango grafts, 25 jack seedlings, 20 cinnamon seedlings and 10 sapota grafts were distributed.

123 soil samples were collected from farmers fields and tested. Manure schedule was recommended on the basis of test results.

Five group meetings were held.

In Madakkathara Village the following activities were undertaken. 3000 tapioca cuttings and 350 cashew seedlings of improved varieties were distributed to cultivators. 50 kg. of groundnut seed was distributed.

Five demonstrations of groundnut & tapioca intercropping were laid out.

Operational research on pineapple was conducted.

Regular visits of the project leader to the farmer's house holds on every thursdays has created an awareness in the minds of farmers on modern agricultural technology.

Two agricultural seminars and one camping on bunchy top eradication was conducted.

Two sterility camps for livestock were conducted.

Alongwith sterility camps animal health care day was also celebrated.

Film shows were arranged in the L. P. School, Madakkathara. Farmers and school children were taken to College of Veterinary and Animal Sciences on tour. In Panancherry Village the following works were carried out.

200 Nos. of TxD coconut seedlings, 150 nos. of cocoa seedlings and 20 kg cowpea seeds were distributed.

Three groundnut tapioca demonstrations were conducted. The project leaders and joint project leaders used to visit the households every Tuesday.

20 group discussions were arranged. One Agricultural seminar was conducted. Three sterility camps were organised.



Vaccination of cattle and poultry were arranged through Veterinary dispensary at Pannancherry.

Artificial insemination in cattles was arranged with the help of the cattle improvement Assistant of Panancherry. Every Tuesday, Pregnancy diagnosis in animals were arranged.

#### Staff Sanctioned & in Position

1. Director of Extension  
Education : Dr. V. S. S. Potti
2. Public Relation  
Officer : Sri. V. K. Moideen  
Koya
3. Assistant Registrar  
(Tehcnical) : Dr. T. R. Sankunny
4. National Demonstration  
Project : Sri. A. I. Thomas,  
Associate Professor.
5. Comunication Centre : Sri. K. C. Varghese,  
Assistant Professor
6. Institute of Agricultural  
Technology, Tavanur : Special Officer,  
Sri. P. K. G. Menon,  
Associate Professor

#### NEW PROGRAMMES

##### Strengthening of Communication Centre

The University has initiated an Agricultural Information Communication programme as part of its extension education activities for the furtherence of agricultural development in the State. The centre has been strengthened with three sub units viz,, publication Unit, Information Unit, and Exhibition and Graphic Service.

##### 1. National Demonstration Project

Twenty-five demonstrations were conducted during the year under report. Of these, six plots

were under groundnut and tapioca, one plot on horse gram as companion crop with tapioca. Other plots were on paddy. In the third crop season groundnut as pure crop in rice fallows were also conducted successfully. Average yield of groundnut as pure crop was 894 kg pods & 1486 kg haulms.

Average paddy yield was 4812 kg and 4402.5 kg during 1st and 2nd crop season respectively.

During the period 62 field days were conducted in which 3577 farmers participated. The Vice-Chancellor of KAU presided at Mukkattukara harvest festival of groundnut grown as a companion crop with tapioca.

Fourteen, one acre groundnut demonstration plots have been laid out in rice fallows during the period.

The Advisory Committee for the National Demonstration Project was held on 21-3-1979. The report and the Technical programme for 1978-79 have been approved by the Committee.

##### 2. Dry Farming Scheme, Eruthempathy

Experiments to find out new suitable cropping pattern were tried. The results revealed that sowing of groundnut during May is not profitable due to delay in monsoon and early attack of tikka disease. Tapioca as a pure crop or as relay crop in groundnut has been found to be highly economical.

##### N. S. S. & NAEP Activities

Dr. V. S. S. Potty, Director of Extension Education continued to be the Programme Co-ordinator of NSS and NAEP activities during the year. The 300 students allotted to the KAU for regular NSS activities were sub allocated among the constituent colleges as detailed below:-

Name of College	Name of Programme Officer	Students		Total
		Men	Women	
1. College of Agriculture Vellayani	Dr. Skariah Ommen, Asst. Professor	92	58	150
2. College of Horticulture Vellanikkara	Dr. P. Balakrishna Pillai Assoc. Professor	25	25	50
3. College of Vety & Animal Sciences, Mannuthy	Dr. K. Radhakrishnan, Professor	69	31	100
	Grand Total	186	114	300

(a) *College of Agriculture, Vellayani*

Volunteers have frequently visited the houses in adopted villages and rendered them advice on improved methods of cultivation and given suggestions for improvement of their conditions. The female volunteers have contacted the housewives and discussed the problems of child care, health and sanitation and given advices for a better life.

NSS Unit helped the Grama Vikasana Samithy, Kalliyoor in arranging loans and purchasing milking animals and gave suggestions for better management of livestock.

This unit is running a community Centre at Keezhoor where news papers, weeklies, magazines leaflets and information pamphlets in various aspects are available for reading. Here facilities are provided for sports and games; cultural activities and competition on these programmes were also conducted. Film shows were arranged for the people in adopted villages. Fifty vegetable gardens were arranged in adopted villages. Seeds and fertilizers were distributed free of cost for these gardens. The volunteers visited the gardens very often and gave them all required advices.

Blood groups of 90 volunteers were ascertained and a list of blood donors was prepared. 10 volunteers donated blood for operation at Medical College Hospital and Sri. Ramakrishna Mission Hospital, Trivandrum.

International Literacy Day has been celebrated on 8-9-78 by giving wide publicity to the importance of eradication of illiteracy. An exhibition of books for the neoliterates was arranged at the Community Centre of NSS for one week.

October, 2nd, the Gandhi Jayanthi day was celebrated in a befitting manner by conducting cleaning campaign of the Government Hospital, Vellayani and the hostel premises and also the main road.

The United Nations day was celebrated on 24-10-1978 by arranging an All Kerala Inter-Collegiate Debate Competition on "World Peace".

During the flood in November 1978, 38 flood affected families were provided temporary shelter during the time and food was supplied to them. They have also collected Rs.1215/- from the staff and students and paid to the Chief Minister's Flood Relief Fund. A seminar on National Audit Education Programme was conducted on 11-1-1979 in which the N. S. S. volunteers, students and staff members and members of Prathibha Arts Club, Keezhoor were participated. Dr. K. Sivadasan Pillai, Reader, Department of Education, Kerala

University, Sri. P. N. Panickar, KANFED, Sri. P. T. Bhaskara Panicker, Director, State Resource Centre, and Dr. M. Haridas, Field Advisor, NCERT have delivered speeches in the session. The NSS Unit is taking classes for 30 illiterates in the adopted villages.

15 farmers were given 3 days training in Mushroom cultivation from 12-2-1979 to 14-2-1979 with the help of Plant Pathology Department.

(b) *College of Horticulture, Vellanikkara*

Three kitchen gardens were laid out and maintained by NSS volunteers at (1) M. T. M. Orphanage, Kalathode (2) Infant Jesus H. S., Arana-ttukara and (3) Don Bosco School, Mannuthy.

Spraying of insecticides and fungicides were done whenever necessary.

15 Coconut seedlings (TxD), 200 cocoa seedlings and 100 miscellaneous fruit plants were distributed among the cultivators of the adopted villages.

Four demonstration plots in pulses, five demonstration plots in groundnut as an intercrop in tapioca garden and 3 small scale demonstration plots and one large scale demonstration in groundnut were laid out during the period.

There were three Adult Education Centres during the period at the following places.

1. Harijan Colony, Pattalakunnu
2. Harijan Colony, Mullakkara.
3. Instructional Farm, Mannuthy.

Classes were taken for seventy five Harijans and twenty labourers working in the farm. Three camps were arranged in these centres to popularise the importance of adult education

Village samithies started functioning from 3/79 onwards at the adopted villages.

18 NSS volunteers donated blood for a Major Operation in Government Hospital, Trichur.

A training for 5 days in mushroom cultivation was organised for the members of the Mahila samajam Mullakkara. 25 Adult female birds were supplied to the Mahilasamajam, Mullakkara under Poultry Development Scheme.

An Agricultural Seminar was conducted on 17-3-1979 at Holy Family Convent, Mannuthy.

Volunteers were in close contact with the farmers in adopted villages and suggestions were given to improve economic conditions of the people.

(c) *College of Veterinary and Animal Sciences, Mannuthy*

Cool drink supply was organised on 26-4-1978 during Trichur pooram on no loss no profit basis to about 5000 people. The NSS volunteers donated blood to the victims of fireworks accident during Pooram.

On 5-5-1978 an adult education camp was inaugurated at Thanikudam. Alongwith that an A. H. Seminar and a film show was conducted.

On 6-6-1978 donated blood to patients at Civil Hospital, Trichur. On 15-6-1978 a mosquito eradication campaign was conducted at Mannuthy campus and film 'Manthan' was exhibited at Jaya Theatre, Mannuthy on no profit no loss basis.

The volunteers also rendered help in conducting Inter Varsity Basket Ball Tournament.

Volunteers periodically visited farmers in the adopted Villages and discussed their problems.

Poultry vaccination was conducted in selected areas.

Cleaning the hostel premises and badminton courts were done by the volunteers,

On 11-1-1979 they attended a sterility camp at Vellanikkara. 35 cases of sterility examined 25 cases of helminthic infection and 175 birds were vaccinated against R. D. Poultry and calf protection day was celebrated.

Adult education classes were organised by the volunteers for the illiterate labourers of the University Farm.

### **3. Special Camping Programme**

No special camping programme was undertaken during the year because there was not enough holidays in the trimester breaks.

### **4. Expenditure for 1978-79**

Rs. 7262.73

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## CHAPTER V

# WORKS

The engineering wing of the Kerala Agricultural University consists of the Directorate of Physical Plant with five sub divisions located two at Vellanikkara, two at Mannuthy and one at Vellayani. Sri. N. Sivathanu Pillai (on deputation) held the post of the Director of Physical Plant from 2-6-1978. Control and maintenance of buildings, procurement of equipments, vehicles and machinery, designing and constructing buildings for the University etc. are vested with this directorate.

Major works taken up, completed and works in progress during the year 1978-79 are furnished below:—

### I. Works proposed to be taken up during the year 1978-79.

Sl. No.	Name of work
1	Constructing a Lab and Library building at Agricultural College, Vellayani.
2	Constructing a new building to house the branch of State Bank of Travancore at Vellayani.
3	Constructing a lab building at R. R. S. Moncompu.
4	Damages due to flood at M. A. R. S. Karamana.
5	Constructing Farmers' Hostel, Main Campus, Vellanikkara.
6	Constructing a Library building in the main campus.
7	Constructing Radio Isotope Laboratory at Main Campus.
8	Constructing a glass house at Vellanikkara.
9	Constructing a green house at Vellanikkara.
10	Constructing a lecture theatre at Vellanikkara.
11	Constructing a compound wall at A.R.S., Chalakudy.
12	Construction of fish ponds at R. R. S., Vyttila.
13	Providing water supply arrangements at C. R. S., Pampadumpara,

- 14 Constructing fencing to the fish ponds at Puduvelyppin.
- 15 Constructing ladies hostel at Vellanikkara Main Campus.
- 16 Formation of 'C' road main campus, Vellanikkara.
- 17 Semi grouting A roads main campus, Vellanikkara

### II. Works in progress

- 1 Constructing a main gate on 'A' road for the KAU main campus, Vellanikkara and forming A road to 30 M.
- 2 Soling and metalling 'A' road in the University Main Campus Vellanikkara.
- 3 Formation of 'C' road in Main Campus, Vellanikkara
- 4 Semi grouting 'A' road Main Campus, Vellanikkara.
- 5 Drilling 3 nos. bore wells for academic blocks at Main Campus, Vellanikkara.
- 6 Constructing a laboratory and library building at Vellayani.
- 7 Constructing a building for Meat Technology at Mannuthy.
- 8 Constructing dining block near the Hostel Block for boys at the University Main Campus, Vellanikkara (Balance work).
- 9 Constructing type VI residential quarters at Mannuthy-5 nos.
- 10 R.R.S.. Vyttila—construction of laboratory office building.
- 11 Constructing clinical pathology laboratory in Veterinary Hospital, Kokkalai—construction of additional floor to the store shed.
- 12 Construction of a building for dairy technology at Mannuthy.
- 13 Construction of an inpatient ward to Veterinary Hospital, Mannuthy.
- 14 Constructing Teachers Hostel, Vellayani.

- 15 Providing water supply arrangements to L. S. Farm, Thiruvazhamkunnu.
  - 16 Providing fencing around Instructional Farm, Main Campus, Vellanikkara (Balance work)
  - 17 Constructing a bore well—pump house—installation of pump—Instructional Farm, Vellanikkara.
  - 18 Improvements to Glass house at C. R. S. Pampadumpara.
  - 19 Instructional Farm—construction of farm building and workshop building for students at Vellanikkara.
  - 20 Constructing a stage for the open air theatre at Vellanikkara.
  - 21 Providing irrigation facilities at P. R. S. Panniyur
  - 22 Black topping roads leading to Goat shed at Mannuthy.
  - 23 K. A. U. Main Campus, Vellanikkara constructing staff quarters duplex (25 blocks)
  - 24 Construction of laboratory office-cum-store building at A.R.S., Chalakudy.
- III. Works completed during the year 1978-79.
- 1 Constructing Men's Hostel kitchen block
  - 2 Constructing Teachers Hostel, R.R.S. Pattambi.
  - 3 Metalling the existing roads in Main Campus.
  - 4 Forming Main Campus Roads, Vellanikkara.
  - 5 Soling and metalling semi grouting of 'B' road.
  - 6 Formation of main campus 'A' road and constructing a culvert at L. S. 110 M of road, Vellanikkara,
  - 7 Soling and metalling—construction of an approach road to Hostel Block, Vellanikkara.
  - 8 Exploration of U. G. water drilling of 3 additional bores.
  - 9 Constructing G.L. tank, pump house and water supply in Main Campus.
  - 10 Additions and alteration to nutrition laboratory.
  - 11 Constructing an extension to Veterinary College
  - 12 Providing fixtures to conference hall.
  - 13 Constructing a dining block and connecting corridor to Hostel Block No. I and II.
  - 14 Construction of poultry turkey house at Mannuthy.
  - 15 Construction of Brooder House at Mannuthy.
  - 16 Construction of Deans Quarters at Mannuthy.
  - 17 Constructing Silo at Mannuthy.
  - 18 Supply and erection of reagent shelf and cupboards to R.C.C. laboratory tables to Animal Science Blocks.
  - 19 Providing irrigation facilities to Instructional Farm, Vellanikkara.
  - 20 Digging an exploratory bore well 13.5cm. dia. in the Instructional Farm, Vellanikkara.
  - 21 Digging tanks in various parts of Instructional Farm for providing water supply arrangements—Vellanikkara—digging a well.
  - 22 Improvements to open styes in P. B F. Mannuthy.
  - 23 Providing drainage inside veterinary campus and constructing—approach roads to new buildings.
  - 24 Constructing ladies hostel for 100 students at Vellayani.
  - 25 A.I.C.R.P. on poultry constructing two cage house at Mannuthy.
  - 26 Providing drainage facilities to teachers quarters type V, VI and VII at Agricultural College, Vellayani.
  - 27 Black topping approach road and extension of culvert at Agricultural College, Vellayani.
  - 28 Constructing Hostel Block No. II, Main Campus Vellanikkara.
- IV Sanctioned amount for works expenditure during the year Rs. 72,00,000/-
- V Expenditure incurred on works during the year Rs. 59,34,680/-

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## CHAPTER VI

# FINANCE

The budget estimates for the year 1978-79 was approved anticipating an income of Rs. 525.28 lakhs on the receipt side against an expenditure of Rs. 558.59 lakhs disclosing a deficit of Rs. 33.31 lakhs.

At the close of the financial year 1978-79, the actual receipt was Rs. 479,90,994.44 and the actual expenditure was Rs. 441,88,099.88 having a cash balance of Rs. 38,02,895.36.

During the year, the State Government have sanctioned and released a sum of Rs. 2,87,11,216.49 under statutory grant ie. Rs. 159,11,216.49 under non-plan Rs. 130,00,000.00 under plan. The total grant received from the I. C. A. R. was Rs. 68,09,291.34.

A statement showing the details of receipts and expenditure is appended (Appendix XVI)

## AUDIT

Shri. V. R. Ramakrishnan Ezhuthassan in the cadre of Deputy Examiner of Local Fund Accounts was the Government Auditor upto 30-4-78 subsequently Shri. P. Murugankutty took charge as Government Auditor on 10-5-1978 and continued as such till 31-3-1979.

Audit of accounts for the year 1975-76, has been completed and Audit Reports issued. Audit of accounts for the year 1976-77 was taken up and was in progress. Audit of I. C. A. R. schemes and Central assistance was given priority in order to issue audit certificate in respect of grants from I. C. A. R. A total No. of 15 audit certificates in respect of grants received from various schemes for the years 1979-76 and 1976-77 covering a total expenditure of Rs. 69,65,431.20 were issued during the year under report.

## CHAPTER VII

### ESTATE

An area of 379-5615 hectares was acquired by the Government of Kerala for the Kerala Agricultural University and handed over to the University on 1-5-1973. The research activities of the University were being carried out in the main campus of the University. An additional area of 2.7119 hectares have been acquired on 8-1-1977. The schemes under the cashew, pineapple, pepper floriculture and instructional farm, for Horticultural College, have already been started functioning in the campus. A total area of 149.3 hectares have been earmarked for the above schemes and farm. An area of 8.4 hectares have been allotted to the plant introduction scheme of the Indian Council of Agricultural Research (I. C. A. R.) and an area of 14 hectares have been allotted for K A. D. P. which scheme is implemented by the beginning of 1978-79. An area of 60 hectares have been earmarked for the Botanical Garden, the planting of the trees in the garden will be carried out in a phased programme. An area of about 12.00 hectares have been utilised for buildings

and roads. About 150 hectares are covered with tapping trees. This 150 hectares include the area earmarked for Instructional Farm, Pepper Scheme and Botanical Garden.

During the year 1978-79, a quantity of 65,22,400 kgs. of finished rubber lace has been produced in the factory attached to the Estate. An amount of Rs. 8,50,168.00 has been received being the cost of rubber lace sold. 11,383 trees have been cut and removed fetching an amount of Rs. 3,88,027.69.

During the period under report, the expenditure was Rs. 6,98,033.65 and receipt was Rs. 11,79,900.20. A stock balance of rubber 8592.400 kgs of finished rubber lace was in hand as on 31-3-1979

During the year an area of 2 hectares have been replanted with good quality rubber in RBIM 623 and RRIM 628 obtained from the Rubber Board. It is proposed to replant 6 hectares rubber during 1979-80 with improved variety.

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PART II

TECHNICAL



# CROP SCIENCES

## Rice

Research on rice is conducted mainly at the Rice Research Stations at Pattambi, Moncompu, Kayamkulam and Vyttila. Some work is also carried out at other stations such as the Agronomic Research Stations at Chalakudy and Karamana, the Instructional Farms at Vellayani and Mannuthy and the Horticultural Research Station, Ambalavayal. The results of the experiments carried out under the different disciplines are summarised below.

### BOTANY

#### 1. Breeding for lodging resistant, fertilizer responsive, semi-tall varieties (Pattambi & Moncompu)

One rice culture, viz., Cul. 1907 which is a cross involving Bhavani/Triveni has been identified to be promising with medium height, short duration and high yielding ability. This culture is being subjected to yield trials in the State Seed Farms.

At Moncompu some selections of promising semi-tall varieties have been made from the second and fourth generation crosses for further trials.

#### 2 Breeding for non-shattering in the rice, variety Jyothy (Pattambi)

Experiments are in progress to obtain strains of *Jyothy* with less shattering by following the irradiation and re-selection methods. Two lines, one each of these methods, were identified with reduced shattering of grains. These will be put to yield trials along with the parent, *Jyothy*, next year.

#### 3 Breeding for deep water areas (Pattambi)

The seeds of the rice culture having tolerance to deep water conditions identified during the last year were multiplied for further trials. A few fresh crosses were also made for deep water resistance. The progenies are in different stages of selection.

#### 4 Breeding for cold resistance (Pattambi and Ambalavayal)

The entries in the International Rice Cold Tolerance Nursery (IRCTN) were evaluated at the Horticultural Research Station, Ambalavayal and 97 entries were identified to be tolerant of cold weather conditions. The third generation progenies of a cross involving a cold tolerant donor viz., CH 1039 were also raised.

#### 5 Breeding and screening for salinity resistance in Pokkali areas (vyttila).

In order to evolve high yielding varieties suitable for the Pokkali area crosses were effected between the present Pokkali varieties and high yielding varieties such as Jaya, IR8 and TN-1. From 42 cultures obtained from the cross Pokkali x Jaya, 23 selections have been made for further studies. In an observational trial with 6 cultures from the cross Pokkali x TN-1 and one culture from the cross Pokkali x IR8, two cultures (Cul. 5-1 and Cul. 4-4) have been found to be very promising.

In a screening trial for salinity tolerance, 47 promising entries were selected from among 144 entries. They were subjected to laboratory screening and five of them have been found to be moderately resistant.

Work is in progress for evolving a better yielding strain from the popular Pokkali variety, *Cheruvirippu*. Two observational trials were conducted with seven *Cheruvirippu* cultures and two of them, (Nos. 74 and 174) were found to be promising

#### 6 Breeding for pest and disease resistance

During the additional crop season at Moncompu 403 single plants from the F4 generation and 71 single plants from the F2 generation of different crosses were selected on the basis of plant type. BPH resistance, disease resistance etc. These were grown during the Punched season and further sele-

ctions have been made from the F5 and F3 generations.

At Mannuthy 44 high yielding cultures having moderate resistance to all pests and diseases were grown and from these a further selection of 26 cultures has been made.

At Pattambi further progress was made in the breeding work for resistance against sheath blight and stackburn. Eighteen promising cultures selected last year were put under yield trials and nine of them were finally isolated based on disease tolerance and yield. These will be put under yield trial along with local checks next year.

#### **7 Evolution of high yielding, photo sensitive varieties (Moncompu and Kayamkulam)**

The second and third generation cultures of different cross combinations were raised for the selection of photo-sensitive, high yielding, disease resistant cultures suited to the different agro-climatic zones of Kerala. A total number of 21 selections were made from the F2 population and 163 selections from the F3 population for further trials.

In a comparative yield trial conducted with six promising cultures the highest yield of 4933 kg/ha was recorded for Cul. 10-4-2 as against 4778 kg/ha for Ptb. 20.

#### **8 Screening for dry sown Virippu crop (Pattambi)**

In a yield trial conducted during the first crop season at Pattambi Cul 1907 out yielded four other varieties including the local check. Eighteen other promising cultures have been isolated in a screening trial with entries from the International Rainfed Low land Rice Observation Nursery.

#### **9 Screening of varieties suited to Onattukara conditions (Kayamkulam)**

During the first crop season at Kayamkulam 76 varieties were screened for yield and disease resistance and 14 of them were selected for further trials. In a comparative yield trial conducted during the second season the highest yield was recorded by variety Blue Bonnet (7330 kg/ha) followed by the varieties Pankaj (6666 kg/ha), Mashoori (5099 kg/ha) and H4 (4979 kg/ha).

#### **10 Rice varieties for the Wynad area (Ambalavayal)**

In the comparative yield study of 56 Wynad varieties 37 varieties recorded a yield of more than

3000 kg/ha. Variety *Chomale* gave the highest yield of 4250 kg/ha.

In the hybridization work involving varieties WND II and Rohini five lines of the cross were put under a comparative yield trial and the line WR-010 out-yielded all the others, followed by the two parents. But the differences in yield were not statistically significant.

Similarly in the experiment to evolve an improved strain from the variety *Adakan* by pure line selection, the culture AD 74 was found to be the highest yielder, but there was no statistically significant difference between the lines tested.

In the work on pure line selection in variety *Jeerakasala* the bulk crop gave a higher yield than the three cultures tested in the Research Station. But in one farmer's field culture JS 179 out-yielded the other cultures and the bulk crop.

#### **11 Comparative yield trials with short and medium duration cultures**

At Mannuthy two comparative yield trials were conducted, one with 13 varieties having flowering duration less than 94 days and the other with 12 varieties having flowering duration more than 94 days. In the first trial the highest yield was obtained for Cul. 747-2-1 (4576 kg/ha) followed by *Jyothy* (4515 kg/ha). In the second trial the highest yield was given by IR-8, closely followed by the Cultures Nos. 2260, 1866-1 and 79-60.

#### **12. High protein strains through induced mutation (Mannuthy)**

The object of this project is to produce high protein strains from variety *Jyothy* by subjecting it to irradiation with gamma rays. A total number of 872 lines of the fourth generation from the last year's experiments were grown this year and 265 plants were selected from among them for further trials.

#### **13. Germ plasm collection**

At Pattambi a total number of 124 local rice varieties were collected from Trichur District for the Germ plasm bank. At Vyttila nine new varieties were collected and added on to the existing 21 saline resistant varieties. At Mannuthy 378 varieties have been collected and added on to the existing 21 saline resistant varieties. At Mannuthy 378 varieties have been collected and are maintained.

#### **YIELD EVALUATION TRIALS**

The cultures and varieties found promising in earlier studies were subjected to evaluation trials

under field conditions. The results obtained are given below:-

**1. Evaluation of the selected cultures from the cross M 24. (Moncompu).**

The yield potential of 5 cultures selected from the cross M24 (Kochuvithu x IR-8/MO-1 x IR-8) was studied in a comparative yield trial. The culture M 24-76-4 recorded the highest yield, but the increase in yield over that of the standard was not statistically significant.

**2. Evaluation of the selected cultures from the cross Jaya x MO-1 (Moncompu).**

The yield potential of 9 advanced cultures selected from the cross Jaya x MO-1 was assessed in a preliminary trial during the additional crop season. Culture M-22-65-2-3-1 recorded the highest yield of 4791 kg/ha as against 3681 kg/ha for the best standard.

**3. Evaluation of advanced cultures of different crosses (Moncompu).**

The performance of three advanced cultures found promising in the earlier trials was compared with that of two standards. Culture M 15-36-2 recorded the highest yield in all the trials, two in cultivators' fields and one in the research station.

**4. Final evaluation of BPH resistant cultures (Moncompu)**

Eight promising cultures were compared in a preliminary yield trial. Cul. 1544-2 recorded the highest yield during the additional crop season. During the Punched season Cul. 1539-1 out yielded all the other cultures and the standards. Cul. 1544-2 had the third rank.

**5. Evaluation of cultures suited to Onattukara conditions (Kayamkulam)**

In order to evolve high yielding, short duration, resistant varieties suited to the first crop season in Onattukara trials were conducted with cultures from the cross Thadukkan x Jaya and Culture 16 x Triveni. On the basis of the results so far obtained one culture of the cross Thadukkan x Jaya (No.26-1-1) and four cultures of the cross Cul. 16 x Triveni (Nos. 43-1-4, 43-1-6, 52-3-6 and 54-1-3) which were found to be more promising have been selected for further experiments.

To obtain suitable high yielding photo-sensitive varieties for the second season the performance of selected cultures of the cross Kottarakkara 1 x Poduvil was studied in a comparative yield trial in the Research Station. Trials were also conducted in the State Seed Farms at Kadakkal and Kottarakkara and a cultivator's field at Jalachira. Culture 31-1 recorded the highest yield of 3825 kg/ha at Kayamkulam, 5611 kg/ha at Kadakkal and 6722 kg/ha at Jalachira. At Kottarakkara Cul. 36-5 yielded 5200 kg/ha while Cul. 31-1 yielded 4700 kg/ha.

A comparative yield trial was conducted to study the performance of 13 promising cultures of intermediate height under broadcast conditions. The highest yield of 7916 kg/ha was recorded by Cul. 1026 followed by Cul. 1017 (5555 kg/ha), Cul. 1023 (5416 kg/ha) and Cul. 1004 (5277 kg/ha). The check variety Ptb. 23 recorded a yield of 4722 kg/ha only.

**6. Agronomic evaluation of new promising pre-release varieties (Karamana)**

The response of two new promising varieties viz., IR 36 and Cul.1907 to different levels of nitrogen (0, 40, 80 and 120 kg/ha and different dates of planting (normal date, i. e. last week of June and 15 and 30 days after the normal date) was studied in comparison to variety Triveni. Cul. 1907 and variety Triveni responded to nitrogen upto 40 kg/ha and IR-36 responded to nitrogen upto 80 kg/ha. Beyond these levels there was a gradual decrease in yield. As regards the date of planting all varieties performed better when planted during the last week of June as compared to the later dates. Both varieties, IR 36 and Cul. 1907, gave higher yields than variety Triveni.

**7. Varietal trials under the All India Co-ordinated Rice Improvement Project (Pattambi and Mannuthy)**

In a preliminary variety trial (PVT 2) conducted at Pattambi Cul. IET5642 recorded the highest yield of 5794 kg/ha as compared to 4230 kg/ha and 4365 kg/ha respectively for the check varieties Cauvery and Ratna. In another trial (PVT 3) Cul. IET 5912 gave the highest yield of 6887 kg/ha followed by IET 5105 (6829 kg/ha). The check variety Jaya yielded only 5498 kg/ha.

In the uniform variety trials conducted at Pattambi, Cultures IET 2707, IET 3305, IET 2815, IET 2729, IET 2730 and IR-28 were found to be promising. Of these cultures Nos. IET 2729 and IET 2730 are the same as the culture Nos. 6473 and

6475 evolved at Pattambi. Cul. 6473 has already been released as the variety Sabari.

At Mannuthy, in one of the uniform variety trials (UVT-1) with 19 entries, the highest yield was recorded by entry No. 117 (Bala) followed by No. 118 (Cauvery). In another trial (UVT II) with 16 entries the highest yield was given by entry No. 205 (BG 34-8) followed by No. 204 (BG, 33-2). In a third trial (UVT III) with 21 entries none of the cultures out-yielded the local variety Jyothy.

## AGRONOMY

### 1. Nitrogen management for rice

In one experiment at Pattambi it was seen that the highest grain yield in rice was recorded in the treatment where urea was applied in the form of mud balls at the rate of 56 kg N/ha followed by the treatment in which sulphur coated urea was applied at the same rate. There was no significant difference between the above two treatments and 80 kg N/ha applied otherwise in two splits at the planting and panicle initiation stages. This indicates that the dose of nitrogen can be reduced to 56 kg N/ha (from 80 kg/ha) by applying it in the form of sulphur coated urea or as mud balls.

At Karamana one experiment was conducted to compare the relative efficacies of urea briquettes of different sizes and sulphur coated urea applied at 3 levels (40, 80 and 120 kg N/ha) at the time of planting in comparison with urea applied at the same rates at planting as well as in splits. The highest yield was obtained from plots where split application of urea was given. Nitrogen at 80 kg/ha produced highly significant increase in yield over 40 kg/ha, the response being 13 kg grain per kg of applied nitrogen. Beyond 80 kg N/ha the response was uneconomical and not significant.

### 2. Phosphate source for rice

The efficacy of 'Phosmak', a cheap phosphatic fertilizer of marine origin was compared with that of other forms of phosphatic fertilizers in a field experiment conducted at Pattambi. During the first crop season there was no significant difference in grain yield between the different sources and levels of applied phosphorus. During the second crop season however, the highest grain yield was obtained in the treatment where  $P_2O_5$  was applied at the rate of 60 kg/ha in the form of Phosmak.

A similar experiment conducted at Moncompu during two seasons did not reveal any significant difference between the treatments.

### 3. Optimum level of NPK in sandy tract (Kayamkulam)

The highest yield of 3899 kg/ha of paddy was obtained for the NPK treatment of 90+67.5 + 67.5 kg/ha. The next best result (3579 kg/ha.) was recorded for the NPK treatment of 90+45+45 kg/ha.

### 4. Monitoring soil fertility and crop productivity (Pattambi)

In this experiment to monitor the changes in soil fertility and crop productivity the highest grain yield was recorded by the treatment receiving NPK at the rate of 60+30+30 kg/ha. Nitrogen played a significant role in increasing the grain yield, while phosphorus and potash showed no significant effect.

### 5. Long range effect of continuous cropping (Karamana)

The object of this experiment was to study the effect of continuous cropping with NPK fertilizers at different levels. The variety used was Jaya. The response to nitrogen at 80 and 120 kg/ha was highly significant, the response being 15.7 kg grain per kg of applied N upto 80 kg/ha and 13.3 kg grain per kg of applied N from 80-120 kg/ha. Phosphorus and Potassium did not have any effect on the grain yield individually.

### 6. Response to micronutrient application (Mannuthy)

No response to micronutrient application was noted in an experiment conducted at Mannuthy. However the highest yield was obtained for the application of Copper sulphate at the rate of 50 kg/ha along with the NPK fertilizers.

### 7. Permanent Manurial Trial

The results of experiments conducted at Kayamkulam were in conformity with the earlier findings that a combination of organic manures with inorganic fertilizers is superior to the application of either of these alone. Similar results were obtained in the experiments conducted at Pattambi also.

### 8. Flow line seeding in rainfed uplands (Pattambi)

Flowline seeding in the rainfed uplands will make manual weeding easier and less expensive. The experiment conducted at Pattambi has shown that the cost of weeding can be reduced by 50% by sowing in flowlines. However, with variety Ptb-28 the highest yield was obtained in broadcasting followed by dibbling. For variety Jyothy the highest yield was recorded in dibbling (15x 15 cm) followed by 30 cm flow lines.

## 9. Dates of planting and harvesting (Karamana and Pattambi)

One experiment on the date of planting conducted at Karamana has shown that for summer crop the planting of rice by the middle of December is necessary for normal yields and the further delays in planting may lead to appreciable yield reduction. Similarly for the Kharif season crop, planting by the middle of May was found to be necessary for the maximisation of yield. Delay in planting resulted in a gradual reduction in the yield of grain.

The date of harvesting is also found to have a significant influence on the grain yield of rice. At Pattambi it was observed that harvesting the varieties Jyothy and Jaya 30 days after flowering recorded the highest grain yield whereas the long duration variety IR-5 recorded the maximum yield when harvested 40 days after flowering during the first crop season. During the second crop season Jyothy and Jaya gave the highest yields when harvested 20 and 25 days after flowering respectively. Variety IR-5 required the same number of days as in the first crop.

## 10. Water management (Chalakkudy)

In a study of the tolerance of different varieties of rice to flooding variety, H4 was found to be more tolerant to flooded conditions than IR-8.

In another experiment on the methods of minimising percolation losses in paddy fields sub-soil compaction at 30 cm depth was found to reduce percolation losses appreciably, but the results were not statistically significant.

The possibility of channelling percolation water through sub surface tile drains was investigated. The rate of flow of water through the drains ranged from 0.261 l/sec. to 1.768 l/sec.

In an experiment on the response of medium duration rice to different water management practices the highest grain yield was obtained when the crop was irrigated at saturation point followed by 5 cm of continuous submergence.

## 11. Agronomic practices for BPH control (Moncompu)

The effect of applying nitrogen and potash in different proportions on the incidence of Brown Plant Hopper was studied in a field experiment at Moncompu. The BPH count was found to decrease with increasing proportions of potash. In another experiment the influence of nitrogen levels and spacing on BPH population was studied. The incidence of BPH was found to increase with closer spacing and higher levels of nitrogen application.

## 12. Weed control

In a study on weed growth in a crop of Triveni at Vellayani it was noted that the critical period of weed infestation was between 21 and 30 days after transplanting.

In an experiment conducted at Pattambi to study the effectiveness of different methods of weed control in direct sown rice in puddled soil the hand weeding treatment (weed free check) recorded the highest grain yield of about 60% more than the unweeded control. The herbicides Thiobencarb, Butachlor + 2, 4-D, CGA-26423, Piperophos, MT 101 thiobencarb, Molinate/symetryne/MCPA were statistically on par with hand weeding. In another study on weed control in upland rice the highest yield was obtained in the treatment in which Propanil at 1.5 kg ai/ha was applied. However, there was no significant difference between the treatments, hand weeding, C-288, Benthicarb and Nitrogen.

At Moncompu also the least weed infestation was noted in the hand weeded plot followed by the plots treated with stam F-34 at 1 kg/ha plus MCPA at 0.5kg/ha mixed with 3% urea. The application of 2-4, D mixed with urea was found to be as effective as its spraying on the 20th day after sowing. In an experiment to study the effect of burning the stubbles with flame throwers it was noted that the maximum weed growth was in the plots in which the stubbles were burned immediately after the harvest of the Punched crop or just before the additional crop. The minimum weed growth was noted in the plots in which Paraquat was sprayed two weeks before the additional crop.

## 13. Cropping patterns

Experiments were conducted at Moncompu to evolve a suitable cropping pattern under the changed conditions after the construction of the Thanneermukkom barrier. Various crops were tried during the summer period preceding the additional crop season. The yield data of the additional crop did not reveal any significant difference between the treatments. But the highest yield was obtained from the plot in which black gram was grown during summer and the lowest yield was got from the plot which was kept fallow during summer. During the Punched season the best yields were obtained from the plots in which cowpea or black gram had been grown earlier.

In the relay cropping tried in the uplands at Pattambi, maize was found to be the most

Promising crop to be grown before the first crop of rice starts to mature.

At Kayamkulam one experiment was conducted in which rice, variety Triveni, was planted in a plot after growing and incorporating a green manure crop of Daincha. A yield of 2850 kg/ha was obtained as against 2100 kg/ha for a dibbled crop.

The results of two years' experiments at Vellayani showed that the maximum yield in an year and per day was for the rice-rice- sweet potato pattern. However the maximum net profit was obtained for the cropping pattern of rice-rice-groundnut followed by rice-rice-sweet potato.

#### 14. The AICARP Experiments

Under the All India Co-ordinated Agronomic Research Project (AICARP) a large number of agronomic field experiments were conducted in farmers' fields at two centres, Kozhikode and Changanacherry. The experiments were of three types, A, B and C. The A type experiments were intended to evaluate the fertilizer requirements of high yielding varieties of rice for formulating the fertilizer recommendations. The objective of the B type experiments was to evaluate the comparative performance of dwarf and semi-tall varieties of rice in relation to low and medium levels of fertilizer application. The G type experiments were meant to study the fertilizer requirements of a fixed annual two crop sequence under resource constraints. The details of the experiments conducted at the two centres were as follows.

Centre and season	Number of experiments			
	A	B	G	Total
1. Kozhikode				
Kharif	34	33	24	91
Rabi	39	35	11	85
2. Changanacherry				
Kharif	37	34	24	95
Rabi	45	29	24	98

In the A type experiments conducted in the Kozhikode area the effect of N was found to be significant in all the blocks of Malappuram District in both the seasons except at Mankada and Perinthalmanna. When N alone was applied its influence was not marked beyond the level of 60 kg/ha. But a significant increase in grain yield due to an increase in the application of N from 60 to 120 kg/ha was observed in the presence of 60 kg  $P_2O_5$ /ha during the Kharif season. But this effect was not seen during the Rabi season. The effect of  $P_2O_5$  applications at 30 and 60 kg/ha along with N at 60 and 120 kg/ha was significant during both the

seasons. There was no significant yield response to application of Potassium. Application of lime had beneficial effects only in the Ponnani and Tirurangady blocks.

In the B type experiments conducted at Kozhikode increase in grain yield was noticed for N application at 40 and 80 kg/ha as compared to the control. The increase in grain yield for increase in level of N from 40 to 80 kg/ha was significant in Kharif season only. The application of  $P_2O_5$  at 40 kg/ha contributed to higher grain yield at both 40 and 80 kg/ha (varieties Jaya and QTP-8) in Kharif. During Rabi season response to P application was noticed only at the level of 80 kg/ha. Response to Potash was noticed at Mankada and Perinthalmanna during kharif and at Ponnani and Tirurangady during Rabi for the variety Jaya,

In the G type experiments conducted at Kozhikode the highest grain yield was recorded for the NPK application of 120+60+60 kg/ha during both the seasons. However, no significant reduction in yield was noticed on reducing the above rates of application to 90+45+45 kg/ha. The data have also revealed the possibility of skipping P during the Kharif and K during the Rabi seasons.

The results of experiments conducted in the Changanacherry area are being analysed statistically.

#### ENTOMOLOGY

##### 1. Insect infestation pattern on rice crop in the Onattukara area (Kayamkulam)

The object of this project was to find out the exact periods of infestation of the rice crop by the different pests and to study the factors responsible for their population fluctuations.

Stem-borer attack was found to be maximum during the first crop season. The occurrence of white ear heads was 17% in the first crop, variety Jaya, while in the second crop varieties, PtB-20 and Jaya, its occurrence was only 10% and 7.25% respectively.

Silver shoot incidence varied from 0.5 - 14% during the first crop season. The peak incidence occurred during the second half of July. But during the second crop season the incidence was only 2% and the maximum incidence was observed during the second fortnight of November.

Leaf roller infestation varied from 0.6-40.5% during the first crop season, the peak period being the first fortnight of August. During the second crop season the incidence ranged from 4 - 60%.

The maximum infestation occurred during the tillering and reproductive phases.

Eight per cent dead heart and 17% white earheads were observed during the second crop season. Leaf roller was observed to be the most important insect pest, the extent of infestation being 20 - 24%.

## 2. Brown Plant Hopper and its Control (Moncompu)

Significant reduction in the population build up of BPH was noticed when the moisture in the field was limited to field capacity level. The application of mineral oils was also found to be effective in controlling the BPH population.

Experiments conducted last year had shown that BPH does not develop resistance against Carbofuran. The experiment was repeated with Phorate this year and the result revealed that no resistance is developed in the subsequent generations as well.

3. Disease causing organisms of insect pests with a view to utilizing them for controlling the pests. A fungus pathogen, *Penicillium oxalicum* causing mortality of the earhead cut worm Caterpillar was isolated and its pathogenicity confirmed in the laboratory. Field studies are in progress.

## 4. Storage pests of Paddy (Moncompu)

Studies are in progress in respect of the infestation pattern of different storage pests of paddy in the Kuttanad area. A preliminary survey has shown that the maximum damage by grain moth is in variety RP. 4-14. Varieties Bhadra, MO3, Jaya and T(N)-1 appear to be the least susceptible.

## 5. Chemical control of pests (Pattambi)

In one experiment to evaluate the effectiveness of newly available granular insecticides against the paddy pest complex, Agronule P-54 and Carlin 4G were found to be more effective against gall midge. Furadan 3G was effective against Stem borer, leaf folder and whorl maggot, while Oftanol gave good protection against stemborer and gall midge.

In a similar experiment with spray formulations Oftanol 50 EC, Azinphos 40 EC, Sumithion 50 EC, Fundal 50 EC and Paramore 50 EC were found to be effective against stem borer while Ficam 80 WP, Valatan 50 EC and Hildan 35 EC were seen to be effective against Gall midge.

In another experiment to evaluate the efficacy of selected pesticides against leaf folder, Azinphos 40 EC, Nuvacron 40 EC, Phendal 50 EC and Sevin

50 WP were found to be very effective against this pest. The highest yield was recorded in the plots treated with Azodrin followed by those treated with Nuvacron.

In a project to evolve economic methods of insecticide application for controlling rice pests, the root Zone application of Cytrolane 5G and Furadan were found to be more effective against stem border. Zolone 35 EC and Ekalux 25 EC were outstanding against Gall midge. Furadan rootzone application was the most effective against leaf folder, as judged by the highest grain yield, followed by the Ekalux treatment.

## PLANT PATHOLOGY

### 1. Sheath blight and its control

From the Research conducted at Vellayani it has been found that the sheath blight organism has a wide host range. The same organism infects Cowpea grown as a summer fallow crop in rice fields and causes the collar rot disease. *Rhizoctonia solani* isolated from rice is found to infect Cassava which is recorded as new host for the pathogen.

The results of experiments conducted at Moncompu indicate that sheath blight incidence can be minimised by applying relatively more of potassic fertilizers and less of nitrogenous fertilizers. The disease can be controlled by the application of Bavistin, Benlate or Vitavax to the soil at the panicle initiation stage. Organic amendments such as neem cake, marotti cake, rubber seed cake, coconut pith, saw dust and rice husk also help to reduce the intensity of the disease.

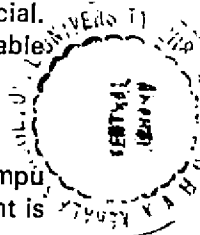
At Pattambi Bavistin was found to be the best fungicide for controlling sheath blight, followed by MBC. Twenty selected cultures were tested for resistance of which two were found to be highly resistant to the disease.

The continuous occurrence of sheath blight in the Seed Farm, Adoor was investigated by conducting a few field experiments in which various fungicides, nematicides and micronutrients were applied. The results of the experiments indicated that the application of zinc alone resulted in significant increase in the yield of grain. The application of nematicides and fungicides were also found to be beneficial. The experiments are being repeated with suitable modifications.

### 2. The Bacterial leaf blight and its control

Epidemiological studies conducted at Moncompu have shown that the spread of bacterial leaf blight is

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strongly dependent on weather factors. Of the different varieties of rice studied, T (N) I and Jyothy were more susceptible to bacterial leaf blight than Jaya or Cul. 57-5-1. Wider spacing and low nitrogen levels helped to reduce the incidence of the disease.

The organism which causes the leaf blight disease was subjected to detailed studies at Vellayani. It was found to have the ability to survive for 2 months under room temperatures and for 5 months under refrigerator conditions. The pathogen was found to be both externally and internally seed borne. Various antibiotics were tried against this bacterium and Terramycin was found to be the most effective.

### 3. Blast disease and its control

At Pattambi four fungicides viz., MBC, Derosal, Bavistin and Hinosan were tried against blast disease in two concentrations and they were all found to be effective in controlling the disease. Experimental plots treated with Bavistin at 0.5 kg ai/ha recorded the maximum grain yield followed by Derosal, Bavistin and Hinosan. In another project on the integrated use of systemic and non-systemic fungicides also Bavistin treatment, both at the vegetative and earhead stages, gave good control of the disease with significant increase in grain yield. The next best combination was Hinosan in the vegetative phase followed by Bavistin at the earhead stage.

In the International Rice Blast Nursery at Pattambi a total number of 527 entries were tested for blast resistance of which 184 entries were found to be highly resistant. In the National screening nursery 683 entries were tested for resistance against various diseases and 69 entries were found to be highly resistant to blast.

### 4. Earhead complex

Experiments were conducted at Moncompu to sort out the various organisms associated with the earhead complex of rice and to find out the relative efficacies of different fungicides in controlling the disease. *Helminthosporium (Bipolaris) Oryzae* and *Trichoconis (Alternaria) padwickii* were found to be the chief etiological agents in causing glume discoloration and the blackening of the grain. Sheath rot was found to be caused by *Acro cylindium (Sarocladium) oryzae*. All treatments with furadan gave better grain and straw yields. Sheath rot incidence was less in the treatments in which Furadan was applied along with Bavistin or Hinosan.

At Kayamkulam also the minimum disease score, maximum grain:chaff ratio and the highest yield of straw were recorded for the treatment involving Fura-

dan-Hinosan combination. The highest grain yield was, however, given by the combination of Furadan, Ekalux and Bavistin.

### 5. Helminthosporium blight

The effect of silica, manganese and magnesium on the incidence of Helminthosporium blight was studied at Pattambi. During the first crop season plots receiving silica, manganese and magnesium as soil application showed low disease intensity and increased grain yield. During the second crop season plots receiving manganese alone as soil application gave maximum decrease in disease intensity with corresponding increase in yield followed by the treatment involving silica manganese and magnesium.

### 6. Yellowing disease

At Kayamkulam experiments were conducted to find out the cause of, and remedy for, the yellowing disease of rice. No correlation was obtained between the time of planting and the incidence of the disease. However, continuous rainfall during the crop season was found to have a minimising effect on its incidence. Different manurial and micronutrient treatments were tried in a field experiment, but no symptom of yellowing was observed during the season.

### 7. Udbatta disease and its control

At Ambalavayal one experiment was conducted on the control of Udbatta disease using different rice varieties and fungicides. The rice varieties used were Annapoorna, IET-1444 and Kalinga-1 on which the incidence of the disease was very high during the first crop season. The fungicides tried were Bavistin 0.1%, Kitazin 0.2%, Aureofungin 50 ppm, Benlate 0.1% and Dithane M 45 0.3%. The results indicated that Bavistin was the most effective for reducing the disease intensity, followed by Aureofungin, Kitazin and Dithane M 45.

In a pot culture experiment with 24 rice varieties attempts were made to induce the disease by inoculation with the spore suspension of the pathogen. None of the varieties developed the disease symptoms indicating that the pathogen is internally seed borne.

## Coconut

Research on coconut is carried out mainly at the Coconut Research Stations at Pilicode/Nilehwar, Balaramapuram and Kumarakom.



## BOTANY

### 1. Prepotency studies in West Coast Tall (Nileshwar)

The object of this experiment is to identify prepotent (high yielding) parent palms for seednut collection and to work out the standards for the selection of such pre-potent parents and their progenies. Twenty seedlings from each of the fifteen mother palms originally selected as best transmitters at Kuttiadi are utilized for this study. The planting was done in 1961. The progenies of tree No. 19 recorded the maximum yield followed by the progenies of tree Nos. 36 and 78. The progenies of parent trees No. 78. and 54 maintain superiority as high yielders and so these parents appear to be the best transmitters. The study is being continued.

### 2. Study of "Off Types" of different dwarf varieties (Nileshwar)

The "Off types" of dwarf varieties may be natural cross seedlings with the Tall variety and may, therefore, turn out to be high yielders. Hence the object of this project is to study the performance of the "Off types" of some dwarf varieties such as the Laccadeive Dwarf, Chowghat Dwarf Yellow, Strait Settlement, Nyiur Gading, Chowghat Dwarf Green and Chowghat Dwarf Orange. The experiment was started in 1973. The progenies of the variety Strait Settlement showed the maximum collar girth followed by Chowghat Dwarf Green. In respect of the number of leaves produced during the year and the number of functioning leaves on the crown, Nyiur Gading stood first followed by Chowghat Dwarf Green. Two seedlings in Chowghat Dwarf Green and one seedling in Nyiur Gading flowered for the first time during the year.

### 3. Selection Criteria for hybrid Coconut seedlings (Vellanikkara)

A total number of 389 T x Chowghat Dwarf Orange and 357 T x Gangabondam seedlings were planted at Vellanikkara during August 1978 for detailed studies on the criteria to be adopted for the selection of hybrid seedlings. The hybridization had been done at Pilicode in 1976. Details such as the number of days taken for germination, collar girth, height and number of leaves produced by each seedling were recorded before planting.

### 4. Assessment of combining ability of selected Coconut cultivars (Pilicode and Vellanikkara)

Hybridization work on 16 selected West Coast Tall Palms utilizing pollen from different dwarf palms

on each bunch was started at the Coconut Research Station, Pilicode. A total number of 1370 flowers were pollinated with the pollen collected from dwarf varieties such as Chowghat Dwarf Yellow, Chowghat Dwarf Green, Chowghat Dwarf Orange, Malayan Dwarf Yellow etc. The resultant seednuts will be collected and sown for further studies.

### 5. Cross progenies of Exotic Tall x Indigenous varieties (Nileshwar)

The progenies of the crosses between different Exotic Tall and indigenous varieties are studied in this experiment which was started in 1967. The maximum leaf production was noted in the progenies of the cross between the varieties Philippines x Dwarf. Flowering has not been completed in all the palms. As the palms are only in their early flowering or bearing stages it is too early to assess their performance.

### 6. Second generation selfed and sibmatic progenies (Nileshwar)

The selfed and sibmatic progenies of 6 grand parents were planted in 1961 and the yield of nuts from each group is being recorded. In all cases except the grand parent 1/109 B the sibmatic progenies showed increased yield over selfed progenies.

### 7. Evaluation of Tall x different Dwarfs (Nileshwar)

In this experiment which was started in 1972, the annual growth measurements showed that West Coast Tall x Green Dwarf, N. C. D., Yellow Dwarf x West Coast Tall and West Coast Tall x Andaman Dwarf are superior in that order in respect of Collar girth. As regards leaf production West Coast Tall x Malayan Dwarf and West Coast Tall x Gangabondam produced the maximum number of leaves during the year followed by West Coast Tall x Green Dwarf.

In another experiment (AICCAIP) started in 1973 the number of leaves produced during the year was maximum in West Coast Tall x Nyiur Gading while West Coast Tall x Chowghat Dwarf Green ranked first in respect of the total number of leaves on the crown.

### 8. Production of new cross combinations (AICCAIP, Nileshwar)

The object of this project is to increase the per unit productivity of coconut by isolating the most compatible and productive hybrids through trials. Crosses have been made with West Coast

Tall as the mother palm using pollen from Leccadive Dwarf, Chowghat Dwarf Orange, Gangabondam and Malayan Dwarf Yellow. The nuts from 1976-77 crossings were harvested in 1977-78, sown in the nursery and the seedlings distributed. Nuts from the 1977-78 crossings were harvested in 1978-79 and sown in the nursery.

#### 9. Trial of promising seed material

In the experiment under the AICCAIP at Nileshtar the planting was done in July 1976. The growth measurements recorded during the year have shown that Tall x Gangabondam was superior in respect of height, Collar girth and number of leaves produced during the year. The next best was Java in respect of height, West Coast Tall in respect of collar girth and Philippines in respect of number of leaves produced.

In the progeny raw trial with TxD and TxGB seedlings at Balaramapuram the TxGB palms recorded an average collar girth of 89.2 cm. whereas TxD palms recorded only 70.4 cm. The yield was more from the TxD palms (69.8 nuts/tree/year) as compared to TxGB (49.4 nuts/tree/year).

#### 10. Germ Plasm Collection (Nileshtar)

The details and description of the morphological characters of 52 cultivars has been completed.

### AGRONOMY

#### 1. Simple fertilizer trials in Cultivators fields

The object of these trials is to obtain necessary data for fixing the economic level of fertilizers for coconut in the different agro-climatic regions of the State.

At Kayamkulam a 75% increase in nut production was registered in the case of palms receiving NPK at the rates of 0.5+0.32+1.2 kg/tree along with cowdung at the rate of 25 kg/tree. There was an increase in the yield of nuts in all the treatments when compared to the pre-treatment data.

At Nileshtar/Pilicode a trial was started in 1976 in sixteen gardens. The trees were given the scheduled treatments and the necessary data collected.

For the trials under the Kerala Agricultural Development Project the selection of plots in the Cannanore, Kozhikode and Malappuram Districts is in progress. The selection of plots will be completed shortly and the trials will be laid out during the ensuing season.

#### 2. NPK Experiments

In this experiment which is in progress at Balaramapuram NPK fertilizers at three levels in all

combinations are given to the palms starting from the seedling stage. The highest yield of 52 nuts/tree/year was recorded for treatment  $N_2P_1K_2$  followed by the treatments  $N_2P_2K_2$  (51.3) and  $N_1P_1K_2$  (48.6). In the absence of Potash the palms have either not started bearing even after a period of 15 years, or the yield of nuts is extremely low. Progressive increase in yield has been noted with increased levels of K application.

At Nileshtar one NPK experiment is in progress to study whether the yield potential of TxD palms can be increased further and the alternate year bearing tendency reduced by heavy and split doses of fertilizer application. The results of 3 years' experiments (1973-76) showed that NPK at the higher levels (1.0 + 0.64 + 2.4 kg/tree/year) in two split applications was superior. The yield data during 1978-79 also showed that the highest yield of nuts (49.4 nuts/tree/year) was given by trees receiving NPK at the higher level.

Another experiment was started under the AICCAIP on West Coast Tall trees in the laterite soils at Pilicode/Nileshtar in 1976. Seedlings receiving NPK at 0.5 + 0.5 + 1.25 kg/tree/year recorded the maximum collar girth, height and number of functioning leaves.

In the projects for management practices for Coconut in the newly reclaimed sandy soils at Kayamkulam the application of NPK at 0.5 + 0.32 + 1.2kg/palm/year along with 25kg cattle manure resulted in a 30% increase in the yield of nuts.

#### 3 Intercropping in Coconut gardens (Pilicode Nileshtar and Vellayani)

In an experiment at Pilicode/Nileshtar to spot out the most suitable Pepper variety for adoption in a multi-storied cropping programme six varieties were tried viz., Panniyur-1, Karimunda and Balamkotta. Kalluvally, Kottanadan and Narayakodi. Flowering was noted in Panniyur-1, Karimunda and Balamkotta for the first time during this year. Considering the growth characteristics and flowering habits Panniyur-1 and Karimunda appear to be the better varieties.

In the experiment with banana as an intercrop four varieties, viz., Robusta, Nendran, Njalipoovan and Palayamkoda were tried as an irrigated crop at Pilicode. The highest fruit weight of 90 kg per bunch was obtained for Robusta followed by 8.0 kg per bunch for Palayamkoda. The same trend had been noted in the experiment under rainfed conditions conducted during the last year.

A similar experiment was conducted under irrigated conditions at Nileshtar using five varieties of banana viz., Robusta, Dwarf, Cavendish, Palayamkodan, Njalipoovan and Nendran, Nendran failed to establish to give any yield. Palayamkodan recorded the maximum bunch weight of 11.6 kg followed by Njalipoovan. During the last year Dwarf Cavendish had recorded the highest bunch weight followed by Palayamkodan.

In another experiment with six annual crops, intercropping with tapioca, ginger, elephant foot yam and turmeric were found to be remunerative.

The possibility of multiple cropping including rice in unirrigated coconut gardens using water harvesting was investigated in another experiment. In this case the land was laid out into raised beds and trenches. Rice was sown in trenches during the first crop season and rice and sweet potato during the second crop season. Groundnut, cowpea, sweet potato and green gram were raised on the beds in the first crop season and sesamum in the second crop season. Due to the unusually high rainfall during June-July without any pre-monsoon showers and the exceptionally low rainfall in the post monsoon period the general performance of all the crops was poor. But the result indicate that the system offers possibility of increasing the intensity of cropping in unirrigated Coconut gardens.

At Veliyani six varieties of rice were tried as an intercrop in Coconut gardens, The highest yield was given by *Chennellu*, followed by Pt. 28.

#### **4 Effect of tapping on the yield of uneconomic palms (Pilicode/Nileshtar).**

The object of this experiment is to find out whether tapping will improve the yield of nuts from uneconomic palms. The experiment was started in 1976 and tapping was continued during 1978-79. The results obtained so far show that the yield of toddy is more for irrigated palms than for unirrigated palms.

### **CHEMISTRY**

#### **1. Forms of Nitrogen in Coconut growing soils before and after the Monsoons (Nileshtar)**

The object of this study was to find out whether the level and form of nitrogen in the soil before and after the monsoons will yield any clue to the occurrence of non-lethal yellowing in Coconut palms. No significant difference in the quantity; proportion

or mode of fluctuation in the ammoniacal and nitrate forms of nitrogen in the soil was noted. Hence it is concluded that the non-lethal yellowing sometimes observed in coconut palms cannot be attributed to the nitrogen status of the soil.

#### **2. Nutrition through the leaf axil (Pilicode/Nileshtar and Kumarakom)**

The objective of this experiment started in 1976 is to assess the relative efficiency of soil Vs. leaf axil application of the major nutrients on the yield and performance of adult palms in the healthy and diseased areas. The application of fertilizers through leaf axil is found to cause premature drooping and shedding of leaves as a result of the scorching and decay of leaf base. No significant improvement in terms of yield has been noticed due to the effect of the treatments.

#### **3 Response to common salt application (Pilicode/Nileshtar)**

The objectives of this experiment are to find out the effect of applying common salt on the performance of coconut palms and also to find out whether common salt can act as a substitute for potassium in the nutrition of Coconut,

In the trial with adult Coconut palms the setting percentage and yield of nuts were found to have improved appreciably due to treatment with common salt, either alone or in combination with Muriate of Potash in different proportions.

In another experiment with D x T hybrids started in 1976 the application of 250 g. of  $\text{Na}_2\text{O}$  and 750 g of  $\text{K}_2\text{O}$  per palm per year was found to be the best among the various treatment combinations for producing the maximum vegetative growth. The seedlings which did not receive either sodium or Potassium are stunted in growth.

### **ENTOMOLOGY**

#### **1 Effect of sodium chloride application in the leaf axil for the control of Rhinoceros beetle (Pilicode/ Nileshtar)**

In this experiment sodium chloride was applied at two levels, viz., 500 and 1000 g, per palm, on the innermost 3-4 whorl of Coconut palms of variety West Cost Tail. The observations made so far reveal that the treatments are not effective in controlling the beetle attack on the leaves and bunches.

## 2 Chemical control of cock chafer grubs (Pilicode/Nileshwar)

In this project to find out an effective chemical method for the control of Cock chafer grubs of Cocouut, Chlordane (10 p.c) at 60 kg/ha in two equal splits at 45 days' interval was found to be the best for controlling this pest followed by the same chemical at 60 kg/ha in one application.

## 3 Rodent Control (Pilicode/Nileshwar)

The preliminary trial on bait acceptance by rats started in 1977 was continued. It was found that rats accept the baits Ratobar and Ratafin concentrate mixed with rice flour in gingelly oil completely.

## PLANT PATHOLOGY

### 1 Root (wilt) disease and its control (Kumarakom)

In the disease resistance trial on Coconut at Kumarakom none of the varieties/hybrids was found to be completely resistant to root (wilt) disease. Even 2 year old young seedlings were found to be affected by root (wilt) as well as leaf rot. Some preliminary studies have shown that the incidence of root (wilt) is accompanied by a decrease in the yield of nuts and the number of female flowers. The disease could not be controlled by the various treatments tried.

### 2 Stem bleeding and its control (Pilicode/Nileshwar)

Studies on the symptomatology of the disease have shown that under lateritic soil conditions the disease symptoms increase from September to December and under sandy conditions the symptoms increase from February to March. The pathogenicity was studied and the organisms isolated were species of *Penicillium*, *Aspergillus* and *Trichoderma*. Further work is in progress.

### 3 Immature button shedding (Pilicode/Nileshwar)

The exact cause of button shedding in Coconut is not known. It has been reported that *Phytophthora palmivora* may be the causative organism. The *Colletotrichum* sp. is also suspected to be involved. In the studies initiated in 1978 the isolation and examination of shed buttons from 39 trees during the period July-December have shown the presence of *Phytophthora Palmivora* in the culture except in three cases where *Colletotrichum* sp. were present. Further study is in progress.

# Cashew and Spices

## CASHEW

Research on Cashew is carried out mainly at the Cashew Research Station, Anakkayam, under the All India Co-ordinated Spices and Cashew Improvement Project, Madakkathara and under the Kerala Agricultural Development Project, Vellanikkara.

## BOTANY

### 1 Breeding improved varieties

The following four hybrids have been giving consistently high yields of nuts (above 15 kg/tree/year) at Anakkayam and can be recommended for large scale cultivation. H-3-19, H-3-17, H-3-7 and H-3-12.

At Madakkathara also the hybrids H-3-19 and H-3-12 have been giving high yields.

The first generation progenies of 10 parental combinations of selected types available at Anakkayam have been planted at Vellanikkara and some of them have been found to be very promising.

### 2 Study of promising clonal progenies

Among the trees planted at Anakkayam during 1967 the progenies of hybrid H-3-6 have recorded the maximum mean yield of 7765 g nuts per tree followed by the hybrid H-3-9 which yielded 7094g nuts per tree. Among the trees planted during 1968 the progenies of the hybrid H-3-17 recorded the maximum mean yield of 3977 g nuts per tree followed by K-22 which recorded a yield of 3700 g nuts per tree.

### 3 Standardisation of seedling selection

The object of this study at Madakkathara is to evolve a technique for the selection of seedlings to get high yields. The data shows that there is positive correlation between the weight of nuts and the height of the seedlings as well as the number of leaves. Further studies are in progress.

### 4 Comparative yield trial

At Anakkayam the progenies of BLA-139-1 have recorded the maximum mean yield of 3575 g/tree followed by BLA-39-4 which produced 3450 g/tree. At Madakkathara the highest yield of nuts was obtained from the hybrid H-4-7 followed by a Vridhachalam type M-6/1. The lowest mean yield was from K-10-2 which is a Kottarakkara type.

### 5 Germ plasm collection

At Anakkayam 43 seedling and 47 clonal types have been planted since 1963. Among the

seedling progenies the highest yields have been given by the types BLA-139-1, BLA-273-1 and BLA 39-4. The types NDR-2-1 closely followed by K-19-1 and K-25-2 gave the best yields among the clonal varieties.

## HORTICULTURE

### 1 Propagation studies (Madakkathara)

Of the different methods of propagation tried the highest percentage of establishment was obtained in the case of side grafting, veneer grafting and budding carried out during the Monsoon season. In the case of budding there was some establishment even during the summer months unlike in the case of the other two methods.

### 2 Pruning trial (Madakkathara)

In the experiment to find out whether systematic pruning will result in increased yields of nuts it was observed that the pruning of twigs did not induce the production of fresh bearing twigs.

### 3 Flowering and fruit-setting (Madakkathara)

A study of the sex ratios in the flowers indicated that there were wide variations in the sex ratios from year to year even in the same trees.

In an experiment to find out whether the introduction of honey bee colonies will increase the fruit set and yield of nuts it was noted that the introduction of the bee colonies did not increase the yield of nuts to any appreciable extent.

In another experiment on hormone application the results showed that the hormone treatment was not effective in controlling fruit-drop.

## AGRONOMY

### 1 Multilocational fertilizer trial (Anakkayam)

Fertilizer trials are in progress in cultivators' fields in two centres in the Malappuram and Cannanore Districts since 1976-77. The treatments consist of three levels of N, viz., 250 500 and 100 g/tree and two levels each of  $P_2O_5$  and  $K_2O$ , viz., 0 and 150 g/tree and their combinations. Pooled analysis of the yield data from 1976 to 1979 revealed that in the trial plot at Pilicode, Cannanore District there is significant difference in yield due to the application of N and P. Appreciable increases in yield were obtained by the application of nitrogenous and phosphatic fertilizers. But in the experiments conducted at Parappanangadi, Malappuram District, the treatment effects were not significant.

### 2 Effect of magnesium, copper and iron (Anakkayam)

In a study of the effect of the application of magnesium, copper and iron on the yield of cashew the treatment effects were not found to be significant.

## PLANT PATHOLOGY

### 1 Fungi associated with Cashew trees

At Anakkayam 16 high yielding types were screened for leaf blight caused by the fungus, *Colletotrichum gloeosporioides*. Types BLA-273-1 and H-3-17 were found to be susceptible, whereas the types H-4-7, K-25-2 and K-22-1 were found to be moderately resistant.

### 2. Die-back and its control

In the experiment conducted at Anakkayam the disease intensity was reduced considerably by treatment with Calixin. Bordeaux mixture and Difolatan were also found to be very effective in controlling the disease.

## CARDAMOM

The work on Cardamom is carried out mainly at the Cardamom Research Station, Pampadumpara.

## BOTANY

### 1. Varietal improvement

The plants in the Project on hybridization have not yet started yielding. In the comparative yield trial of eight promising selections the yield data have been collected and are being analysed. The 24 types of Cardamom in the Germplasm collection are being maintained for further studies and utilization.

### 2. Flower initiation by hormonal treatment

Three hundred cardamom plants belonging to 8 different varieties were brought from Pampadumpara and planted in the Coconut gardens at Vellayani. Ten plants have flowered and fruit-setting is being studied.

## ENTOMOLOGY

### 1. Insects and nematodes associated with Cardamom

The cardamom plants in the Research Station at Pampadumpara and the neighbouring estates were observed for the collection and identification of insect pests. The data collected from the field trial on the control of shoot flies are being analysed. The study on the effect of nematode infestation on the growth of seedlings was continued.

## 2. Shoot and capsule borer and its control

Eleven insecticides were tried against the shoot and capsule borer *Dichocrocis punctiferalis*. Only Endosulfan was found to be effective in reducing the infestation.

## 3. Cardamom thrips and their control

Statistical analysis of the pooled data obtained from field trials with nine insecticides has shown that the following are effective against thrips infestation on Cardamom capsules in the form of spray. Fenthion 0.05% & 0.03%, Phenthoate 0.03%, Quinalphos 0.03% and 0.05%, Fenitrothion, 0.03% and 0.05%, Methyl Parathion 0.03%.

Among the dust formulations the following were found to be effective:- Carbaryl 10%, B. H. C. 10%, Quinalphos 1.5%, Phosalone 4%, Malathion 5%, Toxaphene 10%, Phenthoate 2%, Methyl parathion 2%.

None of the granular systemic insecticides tried viz., Phorate, Solvirex, Furadan and Mipsin was found to be effective in reducing thrips infestation on Cardamom Capsules.

## 4. Control of nematodes

The work carried out Vellayani has shown that the attack of root-knot nematode in Cardamom nursery can be considerably reduced by treatment with Mythl bromide.

## PLANT PATHOLOGY

### 1. Katte disease and its control

In the project to identify the insects which may be responsible for the spread of the disease no new vector could be established. In the two Katte control cum-demonstration plots being maintained at Pampadumpara the percentage of infection could be reduced from 5% to 1.3% in the first plot and from 9% to 4% in the second plot,

Breeding work is in progress for evolving Katte resistant varieties.

### 2. Azhukal disease and its control

From a field trial conducted at Nedumkandam, the following fungicides were found to be effective in reducing the incidence of the disease:- Cuman; Bayer 5072; Difolatan; Bordeaux mixture.

### 3. Damping off disease and its control

The work done at Vellayani has shown that the damping off disease of Cardamom seedlings is caused by the fungus *Rhizoctonia solani*. Artificial inoculation studies revealed that the pathogen can infect

27 host plants. Of the 8 fungicides tried, Bavistin, Daconil, Difolatan, Dithane M45 and Thiride were found to be effective. Drenching the nursery beds with 0.3% Dithane M 45 was found to be the most effective treatment for the control of the disease.

## PEPPER

Research on Pepper is carried on mainly at the Pepper Research Station, Panniyur and under the Pepper Research Scheme at Vellanikkara.

## BOTANY

### 1. Hybridization and screening of varieties

At Panniyur 504 hybrid seeds, 400 selfed seeds and 2500 open pollinated seeds were sown in the nursery. Twenty three progeny seedlings planted in the main field during 1975 flowered during the year.

### 2. Morphological studies on Pepper varieties

The morphological characters, such as internodal length, leaf area percentage of normal and abortive spikes etc. in respect of ten important cultivars were studied at Panniyur. It was noted that the proportion of abortive spikes was more in the case of poor yielders while in good yielders it was relatively much less.

### 3. Comparative yield trial

In this experiment at Panniyur the yield potentials of four locally popular varieties and the hybrid variety Panniyur-1 were compared. The best results were obtained in the case of Panniyur-1 followed by the varieties Arakulam Munda and Kuthiravally. The performance of Kalluvally and Balankotta was very poor.

### 4. Varietal trial in coconut gardens

In this experiment to locate the most suitable variety to be grown as a companion crop in home-stead gardens, variety Karimunda was found to be superior in the yield of black pepper and other yield characters, followed by Panniyur-1. This indicates that under the shade conditions as existing in Coconut Gardens Karimunda may perform better than Panniyur-1.

### 5. Germ plasm collection

The pepper cultivars collected from different parts of Kerala and the wild varieties collected from the natural forests of the State are being maintained at Panniyur and Vellanikkara. The number of wild varieties that have established is 130. Among the cultivated varieties, Panniyur-1 has recorded a mean yield of 6.97 kg green pepper per plant. The varieties

Karivally, Kalluvally, Narayakodi, Veluthanamban and Karimunda have given a mean yield of 3-5 kg green pepper per plant. The yield from all other varieties were much lower.

## AGRONOMY

### 1. Planting material

In one experiment being conducted at Panniyur different types of planting material such as the basal, middle and top portions of basal runners, hanging shoots and lateral branches have been used for raising pepper plants. The studies in the nursery stage have been completed and the main field has been laid out and planted. The observations recorded so far show that the seedlings raised from the middle portion of the basal runners are the most vigorous in the growth characters such as the height of shoots, number of leaves produced etc. The next best results were given by the top one third portion of the basal runners.

### 2. Fertilizer trials

In the experiment on fertilizer-cum-standard trial at Vellanikkara, the data collected so far are being analysed.

The results of the NPK trial at Panniyur have indicated that a fertilizer dose of 50 g N, 100 g  $P_2O_5$  and 150 g  $K_2O$  per vine may be the optimum for the variety Panniyur-1.

Another fertilizer experiment was conducted at Panniyur in which the object was to study the effect of graded doses of N (60, 120 and 180 g/plant) without and with lime (0 and 500 g/plant) on the yield of variety Panniyur 1. Application of lime at 500g per plant did not have any effect on the yield or yield components of this variety. Application of N at all the three levels tried increased significantly the number of spikes and the yield of green pepper. The data indicate that N at 60 g/plant is the optimum and that with higher levels of this nutrient there may even be a decline in the yields.

One experiment to determine the fertilizer requirements of two local varieties, Karimunda and Arakulam Munda, was started in a cultivator's field at Alakode in 1977. There was a heavy incidence of *Phytophthora* attack and the casualties were more in the Arakulam Munda plot than in the Karimunda plot. The observations made so far indicate the necessity of fertilizer application for higher yields by these varieties.

### 3. Intercropping in Pepper gardens

In this experiment which was started at Panniyur in 1977 various intercrops such as banana, yams,

colocasia, ginger and turmeric are tried in pepper gardens. The results so far obtained indicate that all the crops tried can be grown successfully. Ginger is found to be the more profitable, presumably due to its higher market value.

### 4. Effect of mulching

The effect of different mulching materials such as saw dust, plastic sheet, coconut husk, arecanut husk, arecanut husk and dry leaves on the growth and yield of pepper is being studied in an experiment started at Panniyur in 1977. The soil moisture percentage was highest in the basins mulched with dry leaves, whereas the growth of weeds was markedly low in the basins covered with polythene sheets.

## PLANT PATHOLOGY

### 1. Spike shedding and its control

The observations made at Panniyur indicate wide variations in spike shedding between different varieties of pepper and between individuals in the same variety. Nutrients do not appear to have any influence on this phenomenon. Attack of certain fungi appears to cause abnormal spike shedding during certain years.

The effect of the plant hormones 2, 4-D, MH, IAA, NAA and Planofix in controlling spike shedding was studied in one experiment at Panniyur. None of these chemicals was found to be effective against this disease. But it was observed that the volume and the weight of the berries and the mean green weight of spikes were more in the case of the plants treated with NAA and Planofix.

### 2. Quick wilt and its control

Studies are in progress at Panniyur to find out whether the incidence of Quick wilt can be correlated to climatic factors such as the soil and atmospheric temperatures, relative humidity, rain fall, light intensity etc.

At Vellanikkara the symptoms of Quick wilt as caused by *Phytophthora palmivora* are being studied systematically. The first visible symptom on leaf, stem and root was noticed 24-48 hrs, 2-5 days and 24-48 hrs respectively after inoculation depending on the maturity of the plant part. The pathogen enters the plant mainly through the lower surface of the leaf. After infection defoliation took place within 5-10 days. On the stem, branches and roots the symptom usually develops as uniformly brown and dark coloured lesions.

The results of one experiment in a cultivators' field at Alakode have shown that the application of

Bordeaux paste in July-August together with two or three Bordeaux sprayings at monthly intervals from May-June to September-October can control the disease satisfactorily.

### 3. 'Pollu' and its control

Studies on the incidence of the disease at Panniyur have shown that the infection starts with the onset of rain and the formation of spikes, and becomes severe as the berries reach maturity. The maximum infection was on the southern part of the vine and the minimum on the northern side.

The work carried out at Vellanikkara has indicated that the pathogen *Collectotrichum gleosporioides* is a perennial organism on the pepper vine.

Two fungicides, viz., Bordeaux mixture and Bavistin were tried at Panniyur to control the disease. The application of Bavistin in June and July-August and Bordeaux mixture in June, July-August and September were found to be effective.

## GINGER

Most of the work on ginger is carried out at the Horticultural Station, Ambalavayal.

### BOTANY

#### 1 Biometric studies to standardise characters for classification and selection of ginger

The objective of this study is to standardise the important plant characters for the classification and selection of the most promising types. Significant positive correlations were obtained between the weight of rhizome on the hand and the highest of plants, number of tillers and the number of leaves on the other. The correlation between the dry ginger percentage and the crude fibre content was negative and significant. The study confirmed that the types Thingpuri, Rio-de-Janeiro and China were the most suited for green ginger and the types Tura, Nadia, Maran and Poona the most suitable for the production of dry ginger. The study also revealed that the types Rio-de-Janeiro, Thingpuri, Wynad Manatoddy and Karuppampady were the best for the extraction of oleoresin.

#### 2 Selection of varieties suitable for the second (irrigated) crop of ginger

The performance of six varieties of ginger viz., Rio-de-Janeiro, Ernad Chernad, Wynad Manantoddy, Thodupupha, Valluwanad and Kuruppampadi was studied in a statistically laid out experiment. Variety Rio-de-Janeiro was found to be significantly

superior in the matter of the green weight of rhizome, while all the other varieties were equal in respect of yield.

### 3 Germ plasm collection (Ambalavayal)

All the 30 varieties available in the germ plasm bank were planted in May and harvested in January, 1979. The crop was severely affected by a bacterial wilt disease and so the yield was very low in many of the varieties. The variety Rio-de-Janeiro continued to give the highest yield.

### AGRONOMY

#### 1 Cultural practices for the second crop of ginger

The cultural practices tried in this experiment were planting on ridges, in beds, on flat ground and in furrows, and also planting on different dates, viz., the middle of January, end of January and the middle of February. The data collected are being analysed.

### HORTICULTURE

In a study conducted at Veliayani on the effect of various growth regulators on the growth and yield of ginger, it was seen that Ethrel at 200 ppm enhanced the vegetative growth with a consequent reduction in the yield. However the application of Kinetin resulted in 20-72% increase in the yield of Ginger.

### ENTOMOLOGY

The extent of damage by the root knot nematode *M. incongnita* was estimated in a pot culture study at Vellayani. It was found that at population level of 5000 nematodes per plant there was a loss in yield of about 46% by weight. Phorate 2.5 ai/ha, Aldicarb 5.0 kg ai/ha and Phenamiphos 7.5 kg ai/ha gave good control of these nematodes.

## TURMERIC

#### 1 Germ plasm collection

The 44 varieties available at Ambalavayal were cultivated and the yield data recorded. The variety T. Sunder gave the highest yield.

#### 2 Variety suitable for partially shaded conditions

In an experiment conducted at Mannuthy with 14 varieties of turmeric the highest yield was obtained for the variety Amruthapanikottapetta followed by Chayappasubha.



## CINNAMON CLOVE AND NUTMEG

### Diseases and their control (Vellayani)

A leaf spot disease caused by the fungus (*Colletotrichum gloeosporioides*) was found to be prevalent throughout the state on Clove, nutmeg and cinnamon. Detailed studies on the symptomatology of the disease and the morphology and pathogenicity of the causative organism are in progress.

Similar studies are also in progress in respect of the leaf blight disease of clove caused by the *Cylindrocladium* sp. of fungus.

## CHILLIES

Botanical studies have been initiated at Vellayani for the selection of high yielding varieties of chillies by assessing the yield potential. Work is also in progress in respect of the process of gametogenesis, embryo development and embryo organisation in chillies.

## Fruit Crops

### BANANA

Research on banana is carried out mainly at the Banana and Pineapple Research Station, Kannara.

#### BOTANY

##### 1 Evolution of new varieties

Work is in progress at Kannara to evolve a high yielding variety of short duration. Nendran banana. One promising mutant with short stature has been isolated.

##### 2 Clonal variation studies

Attempts are being made to obtain better varieties of banana by clonal selection. On the basis of the studies conducted during the last year 40 promising clones with comparatively shorter duration have been selected and put under yield trial.

##### 3 Flower initiation studies

The object of this experiment is to obtain basic information on the flowering characteristics of banana varieties belonging to different maturity groups. Data on the exact length of time required for shooting, the frequency of hand opening and the number of days required for maturity are being gathered. Another experiment on bunch emergence in relation to obliqueness of planting is also in progress.

#### 4 Varietal Collection

Twenty five varieties were newly introduced from the Tamil Nadu Agricultural University, Coimbatore. The total number of varieties currently available in the Germ plasm bank is 181.

#### AGRONOMY

##### 1. Varietal trial

In this study to compare the performance of four varieties of banana under rainfed conditions, the varieties Poovan and Palayankodan were found to be better than Robusta and GrosMichel.

##### 2. Irrigation Schedule

The work conducted at Chalakudy has shown that 5 cm irrigation at intervals of 14 days (IW/CPE 0.9) was as effective as farmers' practice of shallow irrigation (1 cm) on alternate days. Mulching with straw was found to be beneficial for higher yields.

##### 3. Other experiments

The following experiments, most of which were started only during September-October, 1979 are in progress at Kannara.

- i) Effect of Crop protection on the growth and yield of banana, var, Nendran.
- ii) Effect of different ratios and levels of NPK on the growth, yield and quality of banana, Var, Nendran.
- iii) Nutritional requirements of rainfed banana, var. Palayankodan.
- iv) Moisture stress studies in banana, var. Nendran.
- v) Population density trial under rainfed conditions in varieties Palayankodan and Poovan.
- vi) Critical phase of irrigation for banana.
- vii) Monthly planting trial with varieties Palayankodan and Robusta under rainfed conditions.
- viii) Desuckering trial in var; Robusta.

#### PHYSIOLOGY

The following two experiments are in progress at Kannara.

##### 1 Physiological deterioration of seed material in banana, var. Nendran

The object of this study is to assess the yield potential of the rhizome of the same mother plant with continuous planting for a period of four years.

## 2 Physiological basis of variation in yield between two varieties of banana, Nendran and Zanzibar.

This study is meant to assess the various physiological parameters such as the Leaf Area Index which are associated with the productivity and to correlate these parameters with the biomass and economic yield.

### ENTOMOLOGY

#### 1 Population dynamics of banana nematodes

The object of this investigation which was undertaken at Vellayani was to study the build up of nematodes in the root zone of the banana plant from the time of planting to harvest. Monthly observations on the soil and root populations of 10 banana varieties showed that the populations of *Radolphus similis*, *Meloidogyne incognita* and *Helicotylenchus* sp. increased steadily as the plants advanced in growth.

#### 2 Persistence and dissipation of systemic insecticides in banana

The study was undertaken at Vellayani to find out the minimum number of applications of systemic insecticides required for the protection of the banana plant from aphid infestation and to find out the residues in the fruits. The insecticides Phorate, Carbofuran, Disulfoton and Aldicarb were applied as granules at two doses by three modes of application at the time of planting of the banana suckers. The persistence was assessed by bio-assay using banana aphids. It was observed that at the end of the third month Phorate and Disulfoton gave mortalities of aphid ranging from 36-76%, Carbofuran 6-70% and Aldicarb 0-6%.

#### 3 Other experiments

The following experiments are in progress at Kannara.

- i) Studies on the nematode parasites of banana with reference to their occurrence and distribution and their pathogenic effect.
- ii) Studies on the insect pests of banana and their control with special reference to the rhizome weevil.
- iii) Role of plant parasitic nematodes on the occurrence of Kokkan disease of banana.

### PLANT PATHOLOGY

#### 1 Bunchy top disease and its control

In the adaptive research project for the control of the Bunchy top disease of banana at Vellayani

the granular insecticides Thimet, Furadan and Solvirex were applied in the demonstration plots. The incidence of the disease was not observed in the treated plots at Kalliyoor, while in the control plots the disease incidence was estimated to be 40%.

At Kannara a similar experiment on the control of the vector by the application of granular insecticides is in progress. Attempts are also being made to isolate tolerant varieties by systematic screening.

#### 2 Leaf spot disease and its control

At Kannara one experiment is in progress on the effectiveness of different fungicides for the control of the leaf spot disease. In another project attempts are being made to isolate resistant or tolerant varieties by screening.

#### 3 Kokkan disease and its control

Experiments are in progress at Kannara to find out the actual cause of the disease and to know whether the incidence of the Kokkan disease can be controlled or reduced by the application of fungicides.

### PINEAPPLE

The work on Pineapple is carried out mainly at the Banana and Pineapple Research Station, Kannara.

### BOTANY

#### 1 Hybridization and selection

Experiments are in progress at Kannara to evolve new high yielding varieties of Pineapple with desirable fruit qualities by hybridization and selection.

#### 2 Varietal Collection

The 23 varieties of Pineapple available in the Germ plasm bank were maintained for further studies and utilization in the breeding programme.

### AGRONOMY

#### 1 Nutritional studies

In an experiment to find out the optimum dose and mode of application of urea it was found that the application of the nutrients in the soil is better than foliar application.

#### 2 Population density trial

In one experiment to find out the most optimum population density for Kew variety Pineapple

for maximising production the results showed that the average fruit weight was not affected by the increase in the number of plants per hectare. However, taking into consideration the crop management in the subsequent ratoons a population of 49,382 suckers per hectare, which allows for an interspace of 105 cm between trenches, 60 cm between rows and 25 cm between plants was found to be the optimum.

### 3 Weed control

Trials are in progress to find out the most suitable herbicide which would control the largest number of weeds and to study the effect of such herbicides on the quality of the fruits.

## HORTICULTURE

### 1 Optimum size of suckers for planting

In the experiment on the optimum sucker size (variety Kew) the size of sucker did not have any effect on the yield of fruits. However the small sized suckers showed an early establishment when compared to large sized ones. Taking into consideration the various aspects of cultivation practices in Pineapple, the suckers having 18-27 leaves were found to be the optimum.

### 2 Growth regulators and their application

In one experiment on the effect of growth regulators in inducing flowering in Pineapple, Ethrel (25 ppm) in combination with Urea (2%) and Calcium carbonate (0.04) were found to be the most economical for achieving uniform and regulated flowering in Pineapple. The results of another experiment indicated that the best results are obtained by applying the growth regulator during the 18th month after the planting of the suckers.

The effect of applying plant growth regulators on fruit size and maturity was studied in another experiment. It was observed that the application of Planofix (200 ppm) on the fruits two months after flowering resulted in the formation of superior fruits.

### 3 Adaptive trial and demonstration

In an adaptive trial using the improved techniques of pineapple cultivation by adopting high population density, chemical weed control and the application of a growth regulator (Ethrel 25 ppm, urea 2% and Calcium carbonate 0.04%) harvesting could be achieved to the extent of 90—95% as compared to the local method which resulted only in 10—20% harvest. Similar results were obtained in the demonstration plots in a neighbouring village.

## CITRUS

The work on Citrus is carried out at the Horticultural Research Station, Ambalavayal.

### AGRONOMY

A fertilizer experiment, a micronutrient experiment, cultural trial and a weedicidal trial are contemplated in Mandarin Orange. The plants for these experiments have been selected and the various treatments are to be given during 1979-80.

### ENTOMOLOGY

In an investigation of the nematodes associated with Citrus, soil and root samples were collected periodically from the Citrus experimental area and analysed for the presence of plant parasitic nematodes. The *Rotylenchus* sp was found to be present in numbers more than 100 per 100 ml of soil,

### PLANT PATHOLOGY

#### Die-back and its control

One experiment is in progress for solving the problem of the die-back disease by identifying a suitable root stock for grafting. Six different root stocks supplied by the Citrus Experiment Station, Gonicopal have been used in the experiment. The studies are in progress, and the relative merits of the different root stocks are being assessed.

## MANGO

The following three projects are in progress in the College of Horticulture, Vellanikkara.

1. Standardisation of mango root stock for commercial varieties
2. Survey and collection of pickle varieties of mango and propagation by vegetative means.
3. Regulation of flowering and fruiting in mango.

## JACK

Research on Jack is conducted mainly at the College of Horticulture, Vellanikkara under an ad-hoc scheme financed by the ICAR, and at the College of Agriculture, Vellayani.

### 1 Germ plasm Collection

A total number of 21 promising types having desirable qualities like early and off season bearing, red flesh, shy ripening nature and sweet taste were collected. Sixteen promising types collected during June 1978 were planted in the mainfield at Mannuthy. At Veliyani also a new

collection of superior Jack varieties has been planted in the field.

## 2 Chemical composition of flakes and seed

Analysis of the flakes of selected types gave the following results:—

Total sugars —5.66—12.80% (Mean 9.55%)

Reducing sugars—1.80—10.24%

Acid content —0.14— 0.57% (Mean 0.28%)

Total soluble solids 6.50—13.00%

Jack seed was found to have the following composition:—

Carbohydrates —17.53—32.79%

Crude protein — 5. 2— 7. 2%

Crude fat — 0.28— 0.52%

## PAPAYA

### Survey and Collection of Papaya varieties (Vellayani)

Four types of Papaya with desirable qualities have been isolated and are maintained through mound layering. Hybridization has been effected and seeds collected for further studies.

# Tuber Crops

## TAPIOCA

### 1 Fertilizer requirements

In one experiment conducted at Ambalavayal with different levels of NPK fertilizer the treatmental differences were not statistically significant.

At Pilicode/Nileshwar one fertilizer experiment was conducted with the combinations of three levels of Nitrogen and three levels of Potash (60, 120 and 180 kg/ha using two varieties of tapioca, viz., Thiruvella (local) and H. 1687 (hybrid). The fertilizer treatments resulted in significantly higher yields over control (no fertilizer). The hybrid variety H—1687 gave a mean tuber yield of 24.67 T/ha as compared to 1.751 T/ha for the local variety, Thiruvella. As regards the response to nitrogen the yields for 60,120 and 180 kg N/ha were on par in the hybrid variety whereas in the local variety 120 and 180 kg N/ha produced significantly higher yields over 60 kg N/ha. But in the case of Potash the hybrid variety produced the maximum yield at 120 kg/ha: while the local variety did not show any response beyond 60 kg/ha.

### 2 Irrigation schedules

In an experiment conducted at Chalakudy to study the growth and yield response of tapioca under different irrigation schedules the highest yields were obtained in the treatment which received the maximum number of irrigations. It was also noticed that an additional tuber yield of 5-8 MT/ha could be obtained without any extra input by merely retaining the crop in the field during the Monsoon months.

At Kayamkulam also irrigation of tapioca resulted in appreciable increase in the yield of tuber. The maximum tuber yield was obtained when pot watering was done at the rate of 9 litres per plant once in 10 days. The next best result was given by pot watering at the rate of 6 litres per plant once in 5 days followed by the rate of 3 litres per plant once in five days.

### 3 Intercropping tapioca with pulses and groundnut

At Vellayani it was observed that the size and quality of tapioca tubers were improved by intercropping with legumes. The contents of dry matter, starch and HCN in the tubers were also increased due to the growing of legumes in association with tapioca. Further the fertility of the soil was improved by legume intercropping, Groundnut can be recommended as the most suitable intercrop for getting the highest net returns.

In another experiment conducted at Pattambi it was shown that Cowpea, blackgram and greengram can be successfully intercropped with tapioca under the different methods of planting.

### 4 Optimum stage of harvest

In an experiment on the optimum stage of harvest of tapioca conducted at Pilicode the crop was harvested at the end of 7, 8, 9 and 10 months and the yield of tubers noted. During the first year of the trial (1977-'78) the yield differences were significant, the highest yield being obtained for the harvest after 9 months. During the second year the yield differences were not significant. The yields obtained were 15.8, 16.3, 16.8 and 16.7 T/ha at the end of 7, 8, 9 and 10 months respectively.

### 5 Cassava mosaic and the white fly population

In order to find out any correlation existing between the incidence of the mosaic disease of tapioca and the white fly population a survey of the white fly population was carried out at two plots at Vellayani. The population of the white fly was a

maximum during the months of February and September. The planting of infected setts played a significant role in the incidence of the disease, The role of white fly in the spread of the disease in the field was found to be negligible. Similar results were obtained at Kayamkulam also.

## SWEET POTATO

### 1 Evaluation of high yielding varieties (Vellayani)

During 1977-78 sixtyeight promising clones had been put to comparative yield trial along with their parents and local clones. From among these 68 clones 30 hybrid cultures have been selected and multilocational trials laid out at three centres, viz., Vellayani, Karamana and Kayamkulam. The evaluation of these hybrid cultures for yield is in progress.

### 2 Sweet potato weevil and its control

In a preliminary trial with various plant products conducted at Vellayani the use of lemongrass leaves, Cashew shell power and Punnai cake showed some beneficial effect in reducing infestation by the weevil. Another experiment is now in progress to determine the relative efficacies of the newer insecticides in controlling this pest.

## DIOSCOREA

### Multilocational trials (Pilicode)

The trial with five varieties of *Dioscorea alata* was continued for the third year. The highest yield of 8500 kg/ha was recorded by the variety DA-60 followed by DA-80 (8000 kg/ha), DA-42 (7850 kg/ha), DA-122 (7350 kg/ha) and DA-48 (6900 kg/ha). During the previous years DA-48 and DA-60 had given the maximum yields. Comparison of quality aspects such as dry matter content, starch, protein and ash showed that all varieties were on par except in the case of starch. The starch content of the variety D-80 was significantly lower. Considering all aspects the varieties that can be recommended for cultivation are DA-80, DA-122 and DA-41.

The trial with four varieties of *Dioscorea esculenta* was also continued for the third year with the addition of two new varieties, De-51 and De-52. The highest yield of 4421 kg/ha was given by variety De-11 followed by De-40 (4008 kg/ha), De-17 (2469 kg/ha) and De-23 (2469 kg/ha). Varieties De-51 and De-52 were comparatively poor yielders. The four varieties De-11, De-17, De-23 and De-40 can be recommended for cultivation

## COLOCASIA

### Uniform regional trial (Pilicode)

The trial with different varieties of Colocasia was repeated for a second time this year. But the crop failed due to unfavourable conditions which resulted in high mortality and poor performance. During the last year the highest yield have been given by the variety Kasibhunga (11.9 T/ha) followed by the variety Kovur. (10.2 T/ha)

## COLEUS

### 1 Manurial-cum-spacing trial (Pilicode)

A manurial-cum-spacing trial was conducted on Coleus with two levels of nitrogen (40 and 80 kg/ha) and three levels of Potash (40, 80 and 120 kg/ha) and with three spacings (60 x 15 cm, 60 x 30 cm and 60 x 45 cm). The highest yield was obtained at the fertilizer level of 80 kg N/ha and 120 kg P<sub>2</sub>O<sub>5</sub>/ha with a spacing of 60 x 30 cm.

### 2 Effect of growth regulators

In a study conducted at Vellayani, the application of Ethrel at 200 ppm resulted in a yield increase of 49% over control,

## Pulses, Oilseeds & Vegetables

### COWPEA

#### 1 Breeding for improved varieties (Pattambi)

In the breeding programme for long poded vegetable type of Cowpea a total number of 12 varieties were put under trial. Of these varieties No. 5269, Pusabarsathi and Calicut-78 were found to be the more promising.

Work is in progress for evolving a high yielding short duration grain type variety suitable for the rice follows.

#### 2 Yield evaluation trials (Pattambi)

In a screening trial with elite varieties of Cowpea, the variety S-488-9-1-1 from Bangalore was found to be the top yielder with short duration and synchronised maturity.

In another experiment with four varieties of improved Cowpea, viz., P-118, C-152, Ptb-1 and New Era, the highest yield of 1031 kg/ha was given by

P-118, compared to 762 kg/ha by C-152, 558 kg/ha by New Era and 441 kg/ha by Ptb-1. The variety P-118 is bushy in nature and the pods mature uniformly;

Twenty five varieties were compared in the All India Cowpea varietal trial at Pattambi. Variety V-16 recorded the highest yield of 1093 kg/ha, followed by variety No. 25-3-2 (1874 kg/ha) and Co-Pusa-1 (1720 kg/ha). Cul-1 had the shortest duration of 65 days, and New Era the longest longest duration of 93 days.

In a comparative yield trial conducted at Kayamkulam during the third crop season in the rice fallows, the highest yield was recorded by the variety New Era followed by the varieties, Kunnamkulam local and CLT-51,

### 3 Germ plasm collection (Pattambi)

One hundred and eight four Cowpea types and 24 black gram varieties were grown and their performance studied. Pusa-2 proved to be dual purpose variety with high yield potential. Variety E. C. 43721 was found to be a short duration type with synchronised maturity and high yield.

### 4. Fertilizer trials (Pattambi)

In an experiment to find out the optimum dose and the best source and method of application of phosphatic fertilizers for Cowpea, Positive response to P application up to 50 kg  $P_2O_5$ /ha was noted. Mussoorie rock phosphate was found to be better than superphosphate. Placement of the phosphatic fertilizer at seeding was found to be better than broadcasting before sowing.

In another experiment on the foliar nutrition of Cowpea it was observed that soil application of N and  $P_2O_5$  as basal dose at the rates of 20 and 30 kg/ha respectively was better than foliar application or combined soil and foliar applications.

## GREEN GRAM

### 1. Field evaluation trials

At Veliayani 11 varieties were screened and compared in the replicated trial. The results indicated that variety PLM-501 is the top yielder followed by the varieties NP-36, Philippines and PLM-242.

In the Co-ordinated varietal trial conducted at Pattambi a total number of 20 varieties were compared. The highest yielder was the variety PIMS-3 (592 kg/ha) followed by ML-5 (527 kg/ha). In

another experiment at Pattambi 12 varieties were compared and Co-2 gave the highest yield of 354 kg/ha followed by NP-40 which yielded 329 kg/ha.

### 2. Nutritional requirements

One experiment is in progress at Vellayani to assess the NPK requirements of green gram.

## HORSE GRAM

### 1. Breeding for improved varieties (Pattambi)

Work is in progress to evolve a high yielding, drought resistant, short duration variety of horsegram suited for Kerala conditions. One hundred single plants were selected during the Rabi season of 1978-79 from Pattambi and Kodalur villages for further studies.

### 2. Yield evaluation trial (Pattambi)

Of the 12 varieties compared in the co-ordinated varietal trial on horsegram, the varieties HG. 93, HG, 76 and Co 1 recorded the highest yields of 525, 476 and 496 kg ha respectively.

## BLACK GRAM

### 1. Breeding of improved varieties (Pattambi)

At Pattambi experiments are in progress to obtain a high yielding, short duration, drought tolerant black gram variety suitable for cultivation in the rice fallows after the second crop. In one experiment 18 cultures were tried in the summer of 1978-79.

The highest yield of 1308 kg/ha was given by M-3 followed by KMU-3 which yielded 1235 kg/ha

In another experiment conducted at Kayamkulam 5 varieties of black gram were compared. The highest yield of 2265 kg/ha was recorded by the variety Co-2 followed by Kayamkulam-1 (1912 kg/ha) and a local variety (194 kg/ha).

### 2. Nutritional requirements

A fertilizer experiment on black gram was conducted at Kayamkulam with three levels each of N, P and K in all combinations. The highest yield of 1847 kg/ha was obtained for the NPK treatment of 20+30+30 kg/ha.

Another similar experiment is in progress at Vellayani.

## SOYABEAN

Different Soya bean varieties were screened in an experiment conducted at Vellanikkara and two of them were found to be suitable for Kerala. The rhizobial cultures for seed inoculum obtained from the Tamil Nadu Agricultural University were found to be unsuitable under our soil conditions.

## SESAMUM

The work on Sesamum is centred at the Rice Research Station, Kayamkulam.

### 1. Varietal improvement

Seventy five varieties of Sesamum were raised under the germ plasm. Fifty five of the more promising types have been selected for further study.

Fifteen cultures of the Cross Pt. 58-35 x Kayamkulam-1 were subjected to further trials. The highest yield of 650 kg/ha was recorded by Cul. 8, followed by Cul-7-1 (604 kg/ha) and Cul. 14-1 (552 kg/ha). The proportion of multipoded plants was also more in these Cultures. The variety Kayamkulam-1 yielded only 470 kg ha.

A comparative yield trial was conducted with 8 selected varieties during the third crop season. The highest yield of 648 kg/ha was recorded by the variety GP-111-2, followed by No. 42 (592 kg/ha), IS-614 (585 kg/ha) and UT-43 (559 kg/ha). The check variety Kayamkulam-1 yielded only 515 kg/ha.

### 2. Agronomic experiments

In experiment conducted during the third crop season at Kayamkulam 3 dates and 5 methods of sowing sesamum (variety, Kayamkulam-1) were tried in factorial combinations. The highest yield (541 kg/ha) was obtained in the treatment of sowing followed by ploughing with power tiller when the moisture level of the soil is high. Under conditions of moisture stress dibbling in plough furrows was found to be the best (573 kg/ha).

In another experiment the Sesamum varieties Kayamkulam-1 and its multipoded mutant showed excellent response to fertilizer application. NPK fertilizers were applied at the rates of 40+30+40 kg/ha as basal and 20+0+20 kg/ha at the time of interculture. The mutant variety yielded 1067 kg/ha. and Kayamkulam 1- 972 kg/ha. The yields from the corresponding control plots were 749 kg/ha and 550 kg/ha only.

The effect of Potassic fertilizers on the oil content of sesamum was studied in another experiment.

The highest yield of sesamum (645 kg ha) was obtained in the case of the NPK treatment of 38+15+30 as basal followed by an additional dose of Potassium at 30 kg  $K_2O$ /ha at interculture. The oil contents under the different treatments are being estimated.

An observational trial with anti-transpirants did not reveal any beneficial effect for anti-transpirants on the yield of Sesamum.

### 3. Insect pests

A survey of insect pests of Sesamum showed that leaf roller was the most widely prevalent one at Kayamkulam. Thirty day old plants were found to be infested by aphids in colonies. A random sample survey showed that 60% of the plants were infested. Leaf and pod borer infestations were noted on 50 day old plants.

### 4. Diseases of Sesamum

During the third crop season powdery mildew and phyllody were noted at Kayamkulam. The disease appeared only towards the end of the life span and so the yield was not seriously affected.

## GROUND NUT

### 1. Varietal trial

In an experiment conducted at Kayamkulam seven varieties were tried in the rice fallows. The highest yield was recorded by variety TMV-2 followed by Gangapuri and Pollachi-2. The largest number of pods were given by TMV-2 followed by Pollachi-2. The number of pods was lower in the case of the three-kernelled variety, Gangapuri. In a trial conducted with four varieties of Groundnut in Coconut gardens at Mannuthy the highest yield was given by the variety Pollachi-1, followed by TMV-2.

### 2. Agronomic experiments

At Kayamkulam one fertilizer experiment was carried out with three levels each of N, P and K in 27 factorial combinations. The highest pod yield of 4424 kg/ha was obtained for the NPK level of 19+50+50 kg/ha.

Two varieties of Groundnut, viz., TMV-2 and TNV-9 were tried in a fertilizer experiment conducted at Vellayani. Variety TMV-9 was found to be superior to variety TMV-2. The highest yields were obtained for the NPK treatment of 10+75+75 kg/ha.

In another experiment at Kayamkulam on the cultural practices to be recommended, dibbling the groundnut seed in the stubbles of the previous rice crop was found to be as effective as dibbling the seed in the prepared land.

Dibbling in stubbles has the advantage of saving time in an annual three crop rotation,

### 3. Diseases of Groundnut

Observations at Kayamkulam on the incidence of various diseases showed that occasional occurrence of dry root knct. Tikka diseases was also noticed towards the later stages of the crop.

## OIL PALM

### Nutrient requirements

The nutrient requirements of the oil palm under Kerala conditions are being studied at Vellayani utilizing the palms available in the Oil Palm Plantation at Anchal. The biometric observations are recorded periodically and the chemical analysis of the leaf and soil samples is in progress.

## VEGETABLES

### 1. Bhindi

The hybrid culture, T5, evolved at Vellayani was put to multi-locational trials in the different Research Stations under the University. The yield data indicate that this culture is superior to other local varieties.

At Mannuthy a total number of 48 varieties of Bhindi are maintained in the Germ plasm bank.

### 2. Bitter gourd

Twenty five diverse types of bitter gourd available in the Germ plasm at Vellanikkara were subjected to detailed genetic variability studies and the more promising types have been identified. Comparative yield trials and multilocational trials have been laid out.

In fertilizer experiment conducted at Mannuthy the highest yield of bitter gourd was obtained for an NPK application of 50+25+50 kg/ha,

### 3. Snake gourd

Promising snake gourd varieties have been identified based on detailed genetic variability studies on 25 diverse types at Vellanikkara. Comparative yield and multilocational trials have been laid out for the evaluation of these varieties.

### 4. Brinjal

In the fertilizer experiment conducted at Mannuthy the highest yield of Brinjal was obtained for the NPK treatments of 50+0+25 and 25+25+50 kg/ha.

### 5. Tomato

In an attempt to evolve wilt resistant tomato suitable to Kerala conditions, nineteen different promising varieties were obtained from Hawaii, New Delhi and Coimbatore. The seed multiplication work was done at Vallayani and further work will be taken up at Vellanikkara. Another similar project for obtaining high yielding varieties of tomato suitable to Kerala is also in progress utilizing nine promising parents collected from all over the country.

### 6. Cauliflower

In order to evolve Cauliflower varieties which can be grown under the hot humid conditions of Kerala the seed of three promising varieties, viz., culture Nos, 295-2,327-14-8-3 and 351-4-1 were obtained from IARI, New Delhi. They have been tested under Vellayani conditions. Further work will be taken up at Vellanikkara.

## Confectionery and Beverage Crops

### SUGARCANE

The research work on sugarcane is carried out at the Sugarcane Research Station, Thiruvalla and at the sub-centres at Kanjikode and Kalanjoor.

#### 1 Varietal trial

In an experiment conducted at Thiruvalla to identify superior sugarcane varieties suitable to the area, the variety Co-62175 was found to be a better yielder than the currently popular variety Co-997.

#### 2. Fertilizer trials

In the first season trial conducted at Thiruvalla the effects of Nitrogen and Phosphorus were found to be significant. The optimum level of N was found to be 154 Kg/ha. The response to Potassium was not significant.

In another experiment on the response of early and midlate Cane varieties to N application the variety Co.62175 was found to be the best. The



optimum level of N being 164 kg/ha. The manurial levels and varietal differences did not have any effect on the percentage of sucrose.

Other experiments at the three stations have been only just started and the results are awaited.

## COCOA

Most of the work on cocoa is carried out at the College of Horticulture, Vellankkara under the Keral Agricultural Development Project.

### 1. Propagational studies

Plants with desirable qualities have been located in cultivators' fields and the data on the economic characters are being collected.

The criteria for seedling selection are being worked out using seedlings obtained from seeds extracted from different parts of the pod and taking into account their shoot and root growth characteristics.

The effect of different growth regulators for producing rooted cuttings of Cocoa was studied in one experiment. It was found that rooted cuttings could be produced with 100% success by treatment with IAA 6000 ppm for 60 sec. or NAA 4000 ppm for 60 sec. There was no rooting in the case of the control.

Different methods of buddings with Cocoa seedlings as the root stock were tried and the Forkert method gave 50% success.

### 2. Nutritional requirements

Eight plots have been selected in cultivators' fields in the Kozhikode, Trichur and Trivandrum Districts for starting fertilizer experiments. One experiment has been laid out at Mannuthy to study the effect of Zinc on the growth and production of Cocoa. Work is in progress for the standardisation of the methods of leaf analysis

### 3. Insect pests and their control

Preliminary investigations have shown the presence of nearly 20 pests of economic significance in Kerala. Of these, the red borer, *Zenusa coffea* and stem girdler, *Sthenias grisator* cause substantial damage by boring into the shoots and the main stem of the plant. Studies on the chemical control of these pests will be taken up.

### 4. Managements of squirrels

The striped squirrels attack the ripe pods and cause considerable damage. Preliminary studies

have shown that covering the pods with polythene bags and smearing the pods with bitumen or insecticidal soap afford good protection from squirrels. Smearing the pods with Cashew shell liquid was also found to be effective.

### 5. Charcoal pod rot and its control

Studies conducted at Veliyani have shown that the casual organism, *B. theobromae* infects a wide variety of fruits and vegetables on artificial inoculation. *In vitro* evaluation revealed that the growth of the organism could be inhibited by Difolatan, Revoral, Bavistin, Mildothane and Dithane M 45. Of these fungicides Difolatan had the maximum efficiency. But under field conditions Revoral was found to be the most effective.

## Essential Oil and Medicinal Plants

The research work on essential oil and medicinal plants is centred at the Lemongrass Research Station, Odakkali.

## LEMON GRASS

### 1. Varietal improvement

Attempts are being made to evolve superior strains of lemon grass by irradiation with Gamma rays. Studies with the irradiated clones are in progress at Odakkali and Vellayani. None of the selections at Odakkali was found to be superior to the popular variety OD-19 in the matter of oil yield. At Veliyani 22 promising clones have been selected for the estimation of grass yield and oil content.

### 2. Comparative yield trial

In the experiment to evolve a variety which is superior to OD-19 in the yield and quality of oil, variety OD-408 recorded the highest oil yield. But the citral content was highest in the oil extracted from the variety OD-440 (SD-68).

### 3. Varietal-cum-manurial trial

The performance of two new varieties, SD-68 and RRL-16 was compared with that of OD-19 at different levels of N application. The variety SD-68 recorded the highest yields of grass and oil at all levels of nitrogen. The citral content was also more in the oil extracted from this variety. The variety RRL-16 was inferior to both OD-19 and SD-68.

#### 4. Uptake of nutrients

In this experiment to find out the total amounts of NPK removed by Lemongrass in a cropping period six harvests were made during the year and the plant samples subjected to chemical analysis. The nutrient removed in the largest quantities was found to be Potassium.

### PALMAROSA

#### 1. Varietal improvement

In the experiment to evolve superior strains of Palmarosa by gamma irradiation 20 new lines were studied and seven of them were found to be promising.

#### 2. Varietal trial

The improved variety Haldwani (ODP-2) was compared with the popular, cultivated variety Amaravathi (ODP-1) in a varietal trial. The results indicated that Haldwani is superior to Amaravathi in oil yield and recovery. The geraniol content is also more in the oil extracted from the variety, Haldwani.

#### 3. Fertilizer trial

In the experiment to find out the optimum combination of NPK fertilizers for the maximum yield of grass and oil the application of N alone resulted in the lowest yield of oil. The application of N and  $P_2O_5$  at 44 kg/ha without K recorded the maximum oil yield. The treatments in which Potash alone was applied at 40 kg/ha and Potash was applied with phosphorus at the rate of 40 kg/ha also gave comparatively higher yields of oil.

#### 4. Spacing trial

Five spacings were tried in the experiment of finding out the optimum spacing for Palmarosa for the maximum yield of grass and oil. The spacing of 30x 40 cm recorded the highest oil yield during the year.

### FODDER CROPS

Most of the work on fodder crops is carried out mainly under the All India Co-ordinated Project on forage crops at the College of Agriculture, Vellayani. Some studies have also been started under the Fodder Research and Development Scheme, Mannuthy.

#### 1. Fodder Cowpea

In an initial evaluation trial with 10 varieties of Cowpea, the highest green and dry matter yields (7.56 and 2.37 T/ha respectively) were recorded by

the variety UPC-879. This was followed by the varieties S-972 and UPC-2201 in the matter of green matter yield and by S-985 and S-972 in the case of dry matter yield.

In a final evaluation trial with 15 Cowpea varieties no significant difference was noted between the varieties in the matter of the green fodder yield. However the highest yields were given by the varieties UPC-42, UPC-287 and UPC-5286.

#### 2. Dinanath grass

The fodder production potential of 14 varieties of Dinanath grass was studied under a uniform NPK level of 100+30+40 kg/ha. The highest green and dry matter yields (12.65 and 3.95 T/ha respectively) were given by the variety IGFR1-43-1. The highest leaf stem ratio of 1:32 was noted in the case of variety IGFR1-1321 and the lowest ratio of 0.63 was recorded by PP 5.

In another study on the performance of Dinanath grass as influenced by N and lime application, varieties PP-15 and JP 12 recorded green fodder yields 35T/ha. Both N and lime application increased the green matter yield, as well as the protein content of the fodder, considerably.

#### 3. Guinea grass

Experiments are in progress to evolve new high yielding varieties of Guinea grass by mutation breeding. Ten promising clones have been selected and put to a comparative yield trial.

In another study with 30 types of guinea grass 3 types, viz., FR-600, FR-599 and Mackuenii were found to be promising. The fodder production potential of these three types was studied under different levels of nitrogen. The variety Mackuenii gave the highest fodder yield of 36.01 T/ha, but the yield difference between the three varieties were not significant. Also, there was no significant difference in fodder yield due to graded doses of nitrogen, viz., 150, 200 and 250 kg/ha.

#### 4. Sesbania

One experiment was conducted to find out the effects of plant population and phosphorus levels on the fodder production capacity of *Sesbahai aegyptica*. The highest green and dry matter yields (676 and 281 kg/ha respectively) were recorded for the treatment combination of 50 cm row spacing and 60kg  $P_2O_5$ /ha.

#### 5. Hybrid Napier

Hybrid Napier, variety Pusa gaint, was grown under 3 spacings intercropped with legumes like

cowpea, velvet bean etc. The maximum green matter yield of 5.13 T/ha was obtained when hybrid Napier was given a spacing of 1.5 x 0.5 metres along with velvet bean as intercrop in Khariff, and berseem in in rabi.

## 6. Koobabool

In a study of the performance of Koobabool under varying plant densities the highest green matter yield was recorded for the spacing of 2 m x 30 cm. But this spacing gave the lowest leaf stem ratio whereas the spacing of 1.5m x 10cm resulted in the highest leaf:stem ratio.

## 7. Comparative performance of guinea grass and Hybrid Napier

A comparative study was made of the production potentials of Guinea grass and Hybrid Napier grown as intercrops in Coconut gardens as well as in the open. Varying levels of nitrogen and cutting intervals were also tried. The results of the experiment indicated that Guinea grass was superior to Hybrid Napier in the Coconut Gardens as well as in the open. But the yield was lower under the partial shade conditions of the Coconut gardens. There was a progressive increase in the yield of fodder with increasing levels of N application. As regards the cutting interval, the longer interval of 45 days was found to be superior to the 30 day interval.

The results of another experiment showed that the fibre content of the fodder was decreased by N application while it was increased by delay in cutting.

## 8. Silvicultural combinations

The object of this experiment was to evaluate the fodder production potential of different combinations of fodder trees, legumes and grass. Three fodder trees, (*Koobabool*, *Sesbania grandiflora*, and *Sesbania aegyptica*) three species of legumes (velvet bean, rice bean and Cowpea) and two grasses (Guinea grass and *Setaria*) were tried in different combinations. The maximum green fodder yield of 28.03 T/ha was recorded by the *Sesbania aegyptica*-*Setaria*- velvet bean combination.

## FLORICULTURE

The work on Floriculture is carried out under the All India Co-ordinated Floriculture Improvement Project at Vellanikkara.

### 1. Rose

Nine varieties of Rose were grown and their floral characteristics studied. In the matter of flower

production wild Rose stood first followed by Spartan and B. R. Kent. The variety Sensation was superior in respect of the number of petals per flower.

### 2. Marigold

The plant and floral characteristics of seven varieties of Marigold were assessed under Vellanikkara conditions. There was no significant difference in the height of the plants. The variety French Double Mixed came to flowering in the minimum number of days (56 days). The next early flowering variety was Tall African Yellow (61 days). Golden Climax produced the largest number of flowers per plant (44) followed by Climax Mixed (38). The largest flowers were produced by Tall African Yellow (dia. 5.5 cm) followed by Golden Climax (Dia. 5.2 cm).

### 3. Hibiscus

Pot culture studies with four varieties of Hibiscus have shown that flower production was maximum in the variety Mulakuchemparathy and lowest in Vellanikkara Beauty. The variety Aruna produced flowers with the largest size and weight.

### 4. Aster

The plant and floral characteristics of ten varieties of Aster were studied. Flower production was comparatively more in varieties such as Princess Pink California Mixed and Grego Giant Violet. There was no correlation between flower production and the number of leaves or plant height.

## MISCELLANEOUS STUDIES

In addition to the crop-oriented research being carried out in the different research stations a number of other projects of both fundamental and applied interest are also undertaken in the different disciplines, mainly at Vellayani and Vellanikkara. The results of these studies are summarised below:-

### AGRICULTURAL BOTANY (Vellayani)

#### 1. Weed flora of Kerala

Four hundred plant species were collected from Pampadumpara, Thekkady and other hilly tracts of the State. The plants have been identified and described.

#### 2. Reproductive mechanisms in crops

The study of the mechanism of anthesis in Lemon grass has been completed. The results indicate that the spikelets are either bisexual or staminate. The anthesis is between 7.00 and 8.30 a. m. The bisexual spikelets exhibit slight protogyny.

### 3. Cytological changes induced by insecticides and fungicides

Studies on the effect of Furadan and Thimet on the cytology, fertility and yield in rice were completed. The results indicated that Thimet reduced the plant height and number of tillers, whereas the application of Furadan resulted in an increase in these parameters. The number of productive tillers was significantly reduced in both the treatments. Both the insecticides caused significant pollen sterility which was correlated with the increase in chromosomal abnormalities and chaff: grain ratio.

### 4. Effect defoliation at panicle emergence and anthesis on grain yield in rice

The results of this study indicate that grain filling occurs by contribution from spike leaves and also from other parts of the plant. The top three leaves are the most important in grain filling.

### 5. Path analysis in Rice

The object of this study was to identify the more important and reliable morphological criteria for selecting rice varieties for high grain yield. Biometrical study was conducted with 40 indica varieties of rice. The results showed that plants with short stature, more number of effective tillers, and larger number of heavier grains, densel packed on short panicles are to be identified as the best types with a high grain yield potential.

## AGRICULTURAL CHEMISTRY (Veliayani and Moncompu)

### 1. Physical properties of Kuttanad soils

The physical properties of Kuttanad soils were systematically studied so as to trace the changes they may undergo as a result of the prevention of salt water entry by the construction of the Thanner-mukkom Barrier.

### 2. Physico-chemical properties of Poonthalpadam soils

A study of the Poonthalpadam soils of Chittoor area showed that they have a low organic matter status of 1-3 per cent, clay content of 15-40 per cent, pH ranging from 6.5 to 8.5 and cation exchange capacity of 9-20me/100 g soil. About 90 per cent of the soils studied had pH values above 7.0 and exchangeable sodium percentage varying from 5-14. The highly dispersed and slushy nature of these soils may be attributed to the presence of sodium in the clay.

### 3 Iron and aluminium in submerged soils

Laboratory incubation studies were carried out on the effect of different periods of submergence on the different forms of iron in six soil types. Exchangeable iron was found to be more than the water soluble form. Active iron content was much higher than both water soluble and exchangeable forms. The three forms of iron increased with the period of submergence and reached a maximum in about 14-21 days.

As in the case of iron, the exchangeable form of aluminium was found to be more than the water soluble form in the submerged soils. Solution culture studies indicated that the aluminium absorbed by the rice plant tends to get concentrated in the roots.

### 4 Pedologic studies on lateritic catenary formations

Twelve lateritic soil profiles were collected from Varkala, Sasthamcotta and Cannanore. The physical, chemical and mineralogical properties of these soils are studied in relation to the physiographic position from which they are collected.

### 5 Phosphorus and potassium fixing capacities of Kerala soils

The phosphorus fixing capacities of five different soils viz., laterite, coastal sandy, kayal, karapadam and kole, were determined and studied in relation to the various physical and chemical characters. The clay and sesquioxide contents appeared to be the dominant soil characteristics which influence the extent of fixation of applied phosphorus.

### 6 Response of rice to phosphorus

It has been reported from several places that rice does not show any response to phosphatic fertilizers. In order to investigate the possible reasons for this lack of response a field trial was conducted at Vellayani with 20 varieties of rice. Considerable varietal differences were observed in the response to Phosphorus. The varieties which responded to Phosphorus were Triveni, IR-8, IR-20 Mashoori, Bharathy, Aswathy and Rohini and the varieties which did not respond were Ptb. 9, Ptb 10, Ptb 23, Ptb 29 and Ptb 30.

### 7 Use of rock phosphates in the acid soils of Kerala

The results of experiments conducted at Veliayani have shown that priming Mussoorie rock

phosphate in moist aerobic soils prior to flooding results in the conversion of a major part of the insoluble phosphates to available forms. Hence this method of application helps to increase the efficiency of rock phosphates in the submerged acid soils of Kerala.

## 8 Soil testing methods

Research work is in progress at Vellayani to evolve soil testing methods that are more suitable for the soils of Kerala. Attempts are also being made to find out a single extractant which can be used for two or more nutrients. Some of the results so far obtained indicate that testing the soil in the wet condition may be a more reliable method of assessing the available nutrient status in relation to the rice crop.

## 9 Effect of potassium and magnesium on the yield, oil and protein content of sesamum

The yield data from a pot culture experiment have shown that significant increase in the yield of sesamum was obtained with highest level of Potash used, viz., 75 kg/ha. Additional use of magnesium at the rate of 100 kg/ha did not produce any significant increase in yield.

## 10 Persistence of Carbofuran in the soil

The object of this experiment was to study the interational effects of Carbofuran, urea, Muriate of Potash and lime as applied to the rice crop under field conditions. The results indicated that Carbofuran applied to unlimed soils dissipated to insignificant levels in about 3 weeks' time. The application of lime hastened the degradation process. Carbofuran applied to soils 3 or 7 days after liming persisted for longer periods than when applied together on the same day. Individual or combined application of urea and Muriate of Potash had no significant effect on the persistence of Carbofuran.

## 11 Quality of irrigation water

Studies were made at Moncompu on the diurnal variations in the pH and electrical conductivity of the river water surface water and soil slurry collected from the field. The pH of the river water was almost neutral and the electrical conductivity did not indicate any salinity. Irrespective of the pH of dry soil which indicates extreme acidity the pH of the soil slurry in the standing crop was always above 5.8. This result indicates that liming

recommendation should be based on the pH of the wet soil from the field; rather than that of the dried soil.

## 12 Utilization of Salvinia a Compost

At Momcompu different methods were tried for composting Salvinia (African payal) so as to obtain a product of high manurial value. Super-composting by incorporating the weed heaps with cowdung slurry, superphosphate and lime at the rate of 1 kg each per cubic metre of the material and plastering the surface with field clay yielded good compost of manurial value comparable to that of farm yard manure.

## AGRICULTURAL ENTOMOLOGY

(Vellayani and Vellanikkara)

### 1 Storage pests of gram seeds and their control

In a study of the methods of control of the storage pests of gram seeds it was observed that Beythion 0.3% and Oftanol 0.3% gave good control of the pulse beetle for 7 months after storage. Protection could be obtained for 5 months by using Baythion 0.3 per cent and 0.2 per cent, Otanol 0.3 per cent and 0.2 per cent, Fenthion 0.1 per cent and Quinalphos 0.1 per cent and 0.15 per cent.

### 2 Biological activity of plant extracts

The leaf extracts of *Mentha picta*, when tested against the grubs of *Epilachna* beetles and larvae of *Spodoptera litura* exhibited complete inhibition of feeding. There was also significant toxicity against *Epillachna* grubs. Water extracts of neem and eupatorium were found to have growth retarding properties against vinegar flies, *Prospila melanagaster*. Leaf extracts and chopped leaves of clerodendron, when mixed with cowdung were found to have deleterious effect on the development of the grubs of the Rhinoceros beetle of Coconut.

### 3 Pesticide residues in plants

In one experiment on the effect of application of systemic insecticide granules at the booting stage of paddy on grain setting and insecticidal residues it was found that grain setting was significantly affected by Phorate, Disulfoton and Mephospholan to the extent of 12-13 per cent over control. Phorate left residues above tolerance limit both in the grain and straw whereas Disulfoton left residues above tolerance limit only on the straw

When applied at the higher rate of 2.0 kg ai/ha. But in another experiment it was noted that when Phorate at 2.0 kg ai/ha was applied 20 days after transplantation there were only negligible quantities of the residues in the straw and grain.

In a study of the effect of different levels of irrigation on the uptake of systemic insecticides by rice it was found that more residues persisted under field capacity than under irrigated conditions, but the difference were not statistically significant.

#### 4 Insect Pathology

A systematic survey is being made of the virus disease of the crop pests of Kerala. The object of such studies is to try the possibility of pest control by utilizing disease causing organisms. Studies on the granulosis of *P. ricini* showed that the younger larvae were very susceptible to the virus and treatment of the egg masses with the virus resulted in complete mortality of the emerging larvae.

In a study of the life cycle and natural enemies of Rice Case Worm a nuclear polyhedrosis virus was found infecting the larvae. Field studies will be taken up to try the possibility of using these viruses for the control of the pests.

#### 5 Biological control of Salvinia

Attempts are being made for the biological control of Salvinia (African Payal) utilizing the grass hopper *Paulinia acuminata* which feeds on this weed. The grass hopper was bred in the laboratory at Vellayani and released in different places in the Trivandrum, Kottayam and Ernakulam Districts. Good establishment of the grass hopper was noted, but spiders, frogs and fishes were found to be its natural enemies.

The grass hopper reared at Vellanikkara was released in the districts of Trichur and Alleppey. But in these districts also the establishment of the released culture was interrupted by the natural enemies.

Studies are in progress both at Vellayani and Vellanikkara on the biology, economy, feeding potential, host range etc. of the grass hopper.

A survey of the indigenous insects associated with Salvinia conducted at Vellanikkara has shown that *Nymphula responsalis* is the important insect in Kerala. But the impact of this insect on Salvinia was found to be unsatisfactory.

The possibility of integrated control of salvinia by the use of comparatively non-hazardous chemicals was explored. Of the wide range of chemicals tried,

Copper sulphate (1% aq. solution) and Ammonia (1.5% aq. solution) were found to be relatively more effective.

#### 6 Nematodes and their control

A survey conducted in Trivandrum District has shown that the betel vine crop is infested by the nematodes, *M. incognita* and *Rotylenchulus sp.* The paddy crop in several parts of the district was found infested by *Heterodera sp.*

The work carried out under the All India Co-ordinated Research Project on nematode pests of crops and their control has revealed that the rice root nematode (*H. Oryzae*) is wide spread in all paddy growing areas in the State. Several species of wet land weeds were found to be the hosts of this nematode. A cyst nematode, *Heterodera oryzicola* was found infesting rice in certain localities (Anad, Vellayani and Adoor) in the State. Some other species were found to be present in the upland rice soils also.

Field trial on evaluation of yield loss due to rice root nematode indicated that 12-34 members of the nematode per 250 ml of soil at transplanting resulted in loss of grain to the extent of 4.3—219.2 by weight.

Experiments on the chemical control of rice root knot nematodes showed that the infection could be controlled and yield increases obtained by using seedlings raised in DBCP treated nursery and with root dips in phosphamidon and Aldicard sulfone.

#### PLANT PATHOLOGY AND MICROBIOLOGY (Vellayani)

##### 1 Fungal diseases of ornamental plants

At Vellayani the periodical collection and identification of important ornamental plants was carried out. Seven isolates of *Colletotrichum gloeosporoides* from seven different common ornamental plants were subjected to detailed morphological studies. Host range studies of the pathogen revealed that the isolates from ornamental plants could infect economically important crop plants like clove, cinnamon and mango.

A leaf spot disease of Hydrangia caused by *C. gloeosporoides* was studied in detail and the organism was found to produce a toxin which is involved in the pathogenesis.

##### 2 Mushroom Cultivation

Experiments were carried out to find out the optimum size of mushroom beds and it was found that rectangular beds of size 1.0 m x 0.5 m is the

most suitable for the cultivation of paddy straw mushroom. Different commonly available materials were tried as substrates for the production of the spawn and it was observed that wheat grain is the best substrate for this purpose.

A few collections of other species of edible mushroom were also made during the year. Work is in progress for the identification of species of *Pleurotus* suitable for Kerala conditions and for developing the technology for its large scale cultivation and processing.

### 3 Residual toxicity of Fungicides

Of the seven fungicides tested, Difolatan and Revoral caused complete inhibition of spore germination of *Botryodiplodia theobromae* up to 10 days when tested on glass slide. Dithane M 45 was also able to cause complete inhibition upto 10 days. The other fungicides viz., Bavistin, Blue Copper, Fytolan and Mildothane could not effect complete inhibition of spore germination even up to 5 days.

### 4 Microbial population of Kuttanad soils

Soil samples were collected at monthly intervals from the multiple cropping area of the Rice Research Station, Morcompu, and examined for fungal, bacterial and actinomycetes populations. The maximum microbial population was noticed in the samples collected during the months of March, April and May when the field was cultivated with crops other than paddy. The minimum microbial population was observed during the Monsoon months of June-October when the field was completely submerged under water.

### 5 Rhizobial cultures for legume inoculation

Efficient strains of Rhizobia isolated on the basis of pot culture experiments were tried under field conditions. Work is in progress to find out a suitable carrier substance for the preparation of cultures for distribution.

### WATER MANAGEMENT (Vellanikkara)

Fourteen experiments were laid out at Vellanikkara under the SIDA assisted scheme for research on integrated water use. The data are being collected. Some of the results obtained are given below:-

1. The total water requirements of the Virippu and Mundakan rice crops were estimated to be as follows
  - a) Virippu (direct sown, semi dry)-939 mm (123 days)
  - b) Virippu (transplanted, wet)-1461 mm (112 days)
  - c) Mundakan (transplanted, wet)-1273 mm. (96 days)

The rain fall contributions to these crops were estimated respectively as 688 mm, 584 mm and 92 mm

2. In the project on the agro-engineering measures for-increasing sub soil storage of moisture, run off was found to be maximum in plots planted with tapioca along the slope. Contour bunding at 3 metres vertical drops reduced run off of soil by 78 per cent. Planting tapioca across the slope was found to prevent run off completely.

### AGRICULTURAL ENGINEERING (Veliayani)

Eleven projects which were in operation in the Department of Agricultural Engineering were continued. The main objectives of these projects are to develop simple and cheap mechanical devices which will help to alleviate the drudgery of the agricultural operations. The progress achieved in some of these projects is indicated below:-

1. A 5 HP Lombardini diesel engine has been identified to be a suitable one for a garden tractor. One such engine has been purchased and the chassis to mount this engine is being fabricated.
2. Detailed designs for a model and prototype wind mill with water pump have been prepared. The object is to develop a wind mill that can be used along the west coast of Kerala for lifting water.
3. In the project for the development of a seed drill for the paddy crop the prototype of the IRRI designed seed drill has been fabricated for trials.
4. The fabrication work of an initial unit of a fertilizer placer equipment for paddy crop has been arranged.
5. For the mechanical control of salvinia weed a new fluidizing technique has been evolved and tested.
6. The fabrication work of an electrically heated paddy seed drier equipment has been completed. Work is in progress for the fabrication of a rice hull furnace operated drier already selected for further development.
7. In the project for the development of local innovations in agricultural engineering several innovators have been located who have either developed initial designs of fabricated working models of new equipment such as tree climbers, rice huller, Cassava puller, Cassava Chippers, Jet propelled boat etc.

## AGRICULTURAL ECONOMICS (Vellayani)

The work on the project "Marketing 'Agmark' projects in Trivandrum District" has been completed. The following two projects are in progress.

1. Price spread of banana in Trichur District.
2. Overdues of short and medium term credit of co-operative credit institutions in Trivandrum District.

## AGRICULTURAL STATISTICS (Vellayani)

### 1, Fertiliser response functions

Data from a large number of experiments were collected and response functions fitted. It is found that there is disparity in the optimum level between districts and also within districts. This points to the necessity for conducting adaptive research trials for making location specific recommendations.

### 2, Study of meteorological data

The rainfall data for the past 10 years have been collected from all reporting stations south of Ernakulam District. Percentages have been computed so that the probability of specified number of rainy days and rainfall can be computed.

### 3, Futurology studies

Under this scheme it is intended to build up a data bank and utilize the information for the prediction of population, requirement of agricultural inputs, production of crops and other allied aspects. Building up of the data bank is in progress. The prediction of population and requirement of cereals have been done. The estimation of the production of crops using the present trend has been carried out.

## AGRICULTURAL EXTENSION (Vellayani)

### 1. Adoption of agricultural practices as related to socio-economic factors

The study revealed that the size of the farm had significant effect on the acceptance of High yielding varieties. The adoption of different improved farm practices was also related significantly to knowledge economic status, attitude, farm size and social participation.

### 2. Role of agricultural labourers in the adoption of improved agricultural practices

The majority of the labourers felt that they had to act only as directed by the farmer. They did not feel the responsibility for production. They had a rather

negative attitude towards improved agricultural practices and their knowledge was rather poor.

### 3 Attitude of extension personnel towards Inservice Training

The Junior Agricultural Officers and officers of the same cadre were found to have a favourable attitude towards the Inservice Training Programme. The educational level of the Officers was not a discriminating factor. Age and length of experience in extension work were significantly related to their attitude.

### 4 Impact of farm broadcasts on the farmers of Kerala

The majority of the farmers contacted and listened to the farm broadcasts regularly with full comprehension. The retention, recall and influence of the broadcast on adoption was found to be partial. Farm news, Interviews and talks by specialists ranked high among the various types and methods of broadcast through the radio.

### 5 Factors affecting the adoption of selected agricultural practices

The majority of the small farmers were (either low adopters or medium adopters of improved rice technology. Wide variations were noticed in the adoption of individual improved practices, Eg. Chemical fertilizers, 80 per cent HYV seeds, 46 per cent; plant protection measures, 45 per cent, seed treatment, 9 per cent.

### 6 Farmers' functional literacy programme

Ninety six per cent of the farmer participants of literacy programmes were either high or medium adopters as against 54 per cent among the farmers of the control group. Functional literacy attainment was positively and significantly related to the adoption behaviour of farmers.

### 7 Communication behaviour of agricultural extension personnel

Communication skill, concept of communication self confidence, information seeking behaviour and attitude towards farmers were found to be significantly and positively related to communication efficiency.

### 8 Impact of institutional credit

In this study of credit utilization for adopting the package of practices for high yielding varieties of paddy it was found that the less progressive



high adopters required the highest credit as compared to the other farmer groups. The high adopters needed the least credit per acre. There was high correlation between progressiveness and the extent of adoption of HYV of paddy.

### **9 Impact of Intensive Paddy Development Programme in Kerala**

The study revealed that the farmers in the IPD areas were better adopters of improved agricultural practices. They have more knowledge about improved agricultural practices than the farmers in the non IPD areas.

### **Adoption of Soil Conservation measures by farmers in the scheme areas in Trivandrum District**

The study revealed that the adoption of agronomic and agro-biological measures was poor.

Ninety five per cent of the respondents perceived that there was an increase in yield of tapioca and Coconut because of adoption of soil conservation measures. The reasons for non adoption as perceived by the farmers were: (i) Lack of credit facilities, (ii) inadequate technical guidance, and (iii) lack of knowledge about the practices

### **11. Adoption of package of practices for tobacco by tobacco growers**

This study was undertaken by a Scientist of the Central Tobacco Research Institute, Rajahmundry who had his post graduate studies at Vellayani. Among the tobacco farmers selected 23.58% were found to be high adopters of the package of practices, while 41.51% were found to be over-adopters. Over adoption was found to be more in the case of practices like fertilizer application.

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# VETERINARY AND ANIMAL SCIENCES

## 1. CATTLE & BUFFALO

### 1. Relationship of blood constituents in heifers to their future milk producing ability

This project is intended to determine the correlation of blood picture of heifers to their milk producing ability.

The blood samples collected from selected animals (27 No.) were analysed. They have calved and data pertaining to the milk yield are being collected. Thirteen cows have completed the lactation periods. Work in progress.

### 2. Studies on cross-bred animals in relation to Plasma-protein Bound Iodine (PBI) and feeding of Iodized salt

To determine and evaluate the level of PBI as a means of predicting the production potential of dairy cattle.

Blood samples from selected calves have been collected for preliminary study and laboratory determinations of PBI were done.

### 3. Evaluation of feeding value of tea waste for Milk production

Tea waste was incorporated at 0,15 and 25% levels to replace mostly the wheat bran in the concentrate mixture of dairy cows. Work is in progress.

### 4. Studies on the microflora of boiled milk

To detect the bacteria that are present in boiled milk.

Seven different types of bacilli were identified from boiled milk.

### 5. Some aspects of physiology of lactation

To study the hormonal requirement for induction of lactation.

10 infertile cows were induced to lactate by injecting hormones.

### 6. Utilization of paddy straw treated with urea and molasses as Cattle feed

Part of the concentrate feed can be replaced by using paddy straw treated with urea and molasses. The data are being analysed.

### 7. Poultry litter as cattle feed

On analysis, poultry litter was found to contain reasonable quantities of crude protein (10 to 18%) to serve as feed for cattle.

### 8. Necrosis of extremities in cattle and buffaloes

The condition was found to be caused by consuming fungus infected paddy straw. Various treatment procedures were tried and a more or less satisfactory treatment was evolved.

### 9. The incidence, pathogenicity and control of parasitic diseases in cross-bred calves in Kerala

Cross-bred calves are found more liable for parasitic infection and hence the need to treat them periodically and regularly.

### 10. Reproductive failures in bovine due to infectious bovine rhinotracheitis (IBR) and infectious pustular vulvo vaginitis virus

Seventy samples have been collected from aborted cows and tested for viral abortion. The work is in progress.

### 11. Schistosoma spindalis infection with particular reference to buffaloes

Investigations revealed prevalence of schistosoma infection in buffaloes in and around Trichur.

## 2. GOAT

### 1. Establishment of feeding standards for goats

The object of study was to determine the nutrient requirement of goats for (1) maintenance (2) growth, and (3) lactation.

The nutrient requirement for maintenance was ascertained for adults goats and experiment is in progress with respect to kids. For female goats the Digestible Crude Protein (DCP) and Starch Equivalent (SE) were found to be 0.79 g/kg body weight and 8.4 g/kg body weight respectively.

For male goats DCP and SE requirements were 0.83 g and 9.9 g per kg. body weight respectively. These figures, except SE for male goats, are lower than the Mackenzie standard for foreign goats.

## **2] Experimental therapeutics of hydrocyanic acid poisoning in goat**

Thirty eight forage plants were screened for the presence of hydrocyanic acid (HCN) and among these, the plant "Cleonic Viscosa" was found to contain toxic levels of HCN.

## **3. Clinical investigation on the seasonally occurring respiratory disease in goats**

Trials were conducted on 65 clinical cases. Maximum response to treatment was obtained with chloramphenicol.

## **4. Bacterial species associated with pneumonia in goats**

Thirty three samples processed during the year revealed 12 species of Klebsiella and 3 species of Corynebacterium. Ampicillin was found to be the drug of choice against these infections.

## **5. Bacterial species associated with enteritis in goats**

Majority of cases (41%) of enteritis was found to be associated with E. coli infection. There were only 2 isolates of salmonella species.

## **6. Certain gastrointestinal nematodes with special reference to those found in goats**

The drug "Albendazole" was found effective against common round worms of goats, at the dose of 10 mg. per kg body weight.

## **7. Aflatoxicosis in goats**

Daily consumption of 20 parts per million of aflatoxin in feed was found to inflict pathological changes in liver, kidney and testis of bucks. It is therefore, likely to affect the productivity, weight gain and breeding performance. Further study is in progress.

Aflatoxin is a toxin liberated by common fungal infestation (moulds) of food stuffs like oil cake.

## **8. Incidence and nature of diseases of young stock (of goats) in Kerala**

To identify the causative organisms responsible for common fatal diseases in kids and also to study the immune mechanism in goats.

128 kids were subjected to the study. Two organisms were found associated with enteritis, namely (1) E. coli. and (2) Salmonella Sp. Work is in progress.

## **9. The lymphoid system and the immune response in the goat**

The development of thymus gland and spleen in foetal life was studied, being the main organs concerned in immune response.

The thymus gland in the Goat foetus was microscopically visible after 30 days of conception. The lobed appearance was also discernible. The thymus has the maximum size at about 120 days after conception and the spleen and lymphatics were visible at about 2 months post conception.

## **10. Studies on the correlation of post-natal development of stomach compartments and the incidence of gastrointestinal disorders in goats.**

The gross and histopathological studies made on the gastro-intestinal tracts of kids died of gastroenteritis indicated a definite correlation between the development of the stomach compartment and occurrence of the disease, when compared to normal kids.

## **11. Haematological studies on Malabari, exotic and cross-bred goats, under different physiological and pathological conditions**

The collection of blood samples and compilation of data are in progress. The compiled data will be useful in formulating haemogram charts for diagnosis of various disease conditions.

## **12. Incidence, pathology, and preventive measures of common diseases of goats**

The incidence of squamous cell carcinoma of the genitalia was detected in 2 does. Caseous lymphadenitis was found more in cross-bred goats and corynebacterium Sp. was identified to be its causative agent.

## **13. Investigation on posterior paralysis in goats**

In one case primary osteo-arthritis resulting in muscular dystrophy was found responsible for the

condition. There was muscular atrophy affecting both hind limbs.

In another case salmonella Sp. was isolated from the joint cavity. Examination of cerebrospinal fluid, as well as gross histopathological studies on the spinal cord, ruled out the involvement of the spinal cord.

#### 14. Investigation on caseous lymphadenitis in goats

The supra mammary lymph node was found involved in 3 cases detected. One of these cases showed rupture of the lymph node and also involvement of the teat canal.

### 3. POULTRY INCLUDING DUCKS

#### 1. Pathogenicity and treatment of helminth parasites of ducks

Fresh water snails, fishes, crustaceans, grass hoppers, etc. prevalent locally were examined and some of the grass hoppers were suspected to be intermediate hosts for the parasite, *Tetrameres anatis*, of ducks.

#### 2. Cashew nut shell oil as an anthelmintic against *Ascaridiasis* in domestic fowls.

Various fractions of cashewnut shell oil (ie; Salicylic acid fraction, Alkali soluble and Alkali insoluble fractions) were extracted and tried.

The alkali insoluble fraction was found more efficient than the other 2 fractions.

#### 3. Embryo mortality in hatcheries.

The various abnormalities and pathological conditions seen in chick embryo are being recorded, to correlate the same with the causes, so that suitable remedial measures can be adopted.

#### 4. Aflatoxicosis in ducks and chicken

The effect of low level intake of aflatoxin in feed was studied and chemical substances and feed additives are being tried towards treatment of affected birds.

### 4. PIGS

#### 1. Enterobacterial infections of pigs in Kerala

Fifty six samples were screened for enteric pathogens. *E. coli* and *Salmonella* Sp. were isolated. Those organisms were found susceptible to chloramphenicol and hence this antibiotic is recommended for treatment.

#### 2. Porcine enterovirus in Kerala State

Viral infection causing enteritis in pigs is being investigated. Out of the 186 clinical samples screened for the purpose, 40 yielded cytopathic agents, but they were found nonpathogenic to mice. Further study is in progress.

### 5. GENERAL STUDIES

#### 1. Nature and problems of livestock enterprise in Trichur Taluk

A survey was conducted to provide basic data regarding livestock enterprises.

Cross-bred milk animals have substantially increased (Upto 38.6%) compared to total milch cattle during 1976-77.

Of the total home calvings recorded, cross-bred accounted for 52.23 % and non-descript 47.77%.

Artificial insemination was made available to cattle but not to buffaloes. The number of buffalo population showed a slight decline.

32% of cross-bred cows contributed to 42% of the total milk production.

50% of cow-milk and 82% of buffalo milk produced were sold by the producers. The sale outlet for cow milk was Co-operative Societies. Buffalo-milk used to be sold locally to tea shops etc.

The feed cost accounted for 78% of the cost of milk produced.

#### 2. A survey of the outlook on Animal Husbandry in Trichur Taluk

The survey revealed the following:

- 1) Bovines were kept for milk and draught purposes
- 2) Pig rearing was not popular
- 3) The necessity to popularise high-producing exotic birds was felt in interior villages

Artificial insemination in cattle was more popular than natural service.

#### 3. Investigation on microbial etiology of infectious abortion of Livestock in Kerala

*Brucella* is the most important organism causing abortion in livestock.

121 samples were screened for the purpose. Evidence of *Brucella* infection was, however, detected only in a low percentage of cases.

In the pig farm, Mannuthy, a few positive reactors were detected and those animals were promptly culled to control the infection.

#### **4. Cocoa pods as animal feed**

Chemical analysis of cocoa pods was done and it revealed nearly 7% of crude protein and reasonable quantity of soluble carbohydrates. The palatability trials are in progress.

#### **5. Toxic principles of leaf fodders with special reference to hydrocyanic acid (HCN) content.**

The HCN content of tapioca leaves during various stages of plantation was assessed, to find out their suitability or otherwise as a useful animal feed.

Tapioca leaves were found to contain maximum HCN during the early stages of plantation (230 mg%) and then it steadily decreased upto 30 mg per cent. On the 5th month after plantation, again it increased and by the 9th month after plantation reached upto 130 mg per cent.

#### **6. Tannic acid contents and digestibility of nutrients in tree leaves.**

Analysis for tannic acid content and digestibility trials are in progress with respect to 17 tree leaves

#### **7. Parasitic fauna pasture of Mannuthy farms**

48 samples of grass were examined for parasitic larvae and 30 samples were positive for strongyl larvae.

There was also a seasonal variation in parasitic infections. The incidence and intensity of infection being maximum during the months of August-November and minimum during March-May.

#### **8. Taeniasis of Zoonotic importance**

Tests conducted in 423 cattle, 542 sheep and 833 goats indicated that a large percentage of them harboured larval stages of tapeworms.

#### **9. Ticks affecting livestock**

Nine species of ticks were found prevalent in Kerala. The incidence was common during rainy season. The life cycle of the common tick (*Boophilus annulatus*) takes about 45 days.

The chemicals, cythion 1%, Nuvan 0.3%, Dipteres 1% were found effective to control ticks.

#### **10. Pathology of the endocrine glands in cattle, goat and pigs**

Histopathological studies have been made on 49 animals so far. The work is in progress.

#### **11. Incidence and pathology of tumours of paranasal sinuses in domestic animals**

93 cases of tumours were recorded. Besides cattle and buffaloes, goats were also affected. Mostly seen in cattle aged between 6 to 8 years.

The earliest symptom appears to be intermittent nasal discharge. It is desirable that such animals are tested early for tumour and treated.

In affected animals tracheotomy was found to give temporary relief to difficulty in breathing.

A vaccine has been developed to treat animals affected with the tumour, and it has given encouraging results in early stages. Further work in this direction is in progress.

#### **12. Pulmonary pathology of animals in industrial areas**

Stray dogs procured from industrial zones of Alwaye were examined post-mortem. There were pathological changes in the lungs. Work is in progress to further ascertain the effect of environmental pollution on the health of animals.



PART III

APPENDICES

# Appendix - II

## MEMBERS OF THE STATUTORY AUTHORITIES

### I. GENERAL COUNCIL

#### Authorities of the University:

#### Ex-Officio Members

- 1 Her Excellency the Governor of Kerala  
Raj Bhavan,  
Trivandrum.
- 2 The Hon'ble Minister for Agriculture,  
Trivandrum.
- 3 The Vice-Chancellor,  
Kerala Agricultural University,  
Vellanikkara.
- 4 The Special Secretary to Government & Agri-  
cultural Production Commissioner,  
Government Secretariat,  
Trivandrum.
- 5 The Secretary (Development),  
Government Secretariat,  
Trivandrum.
- 6 The Special Secretary (Finance),  
Government Secretariat,  
Trivandrum.
- 7 The Director of Agriculture,  
Trivandrum-1.
- 8 The Director of Animal Husbandry,  
Trivandrum-4.
- 9 The Director of Dairy Development,  
Trivandrum-4.
- 10 The Director of Fisheries,  
Trivandrum-3.
- 11 The Chief Conservator of Forests,  
Vazhuthacaud,  
Trivandrum.
- 12 The Registrar of Co-operative Societies,  
Trivandrum.
- 13 The Dean,  
Faculty of Vety. & Animal Sciences,  
College of Vety. & Animal Sciences,  
Mannuthy.

- 14 The Dean,  
Faculty of Agriculture,  
College of Agriculture,  
Vellayani.
- 15 The Director of Extension Education,  
Kerala Agricultural University,  
Vellanikkara.
- 16 The Director of Research,  
Kerala Agricultural University,  
Vellanikkara.

#### Elected Members

#### Members of Legislative Assembly

- 17 Sri. O. Lukose,  
Member, Legislative Assembly,  
Arookuzhuppil,  
Kappunithala, P. O.,  
Kaduthuruthy.
- 18 Sri. E. P. Gopalan,  
Member, Legislative Assembly,  
Pattambi.
- 19 Sri. M. P. M. Abdulla Kurikkal,  
Member, Legislative Assembly,  
Mobarak Mahal,  
Manjeri.
- 20 Sri. C. Vasudeva Menon,  
Member, Legislative Assembly,  
Pallakalam, P. O.,  
Kollengode,  
Palghat Dist.

#### Representatives of Post-graduate students

- 21 Sri. Abdul Samad, K.  
M. Sc. (Ag.) Student,  
Department of Extension,  
College of Agriculture,  
Vellayani.
- 22 Sri. Premkumar, T.,  
Ph. D. Student,  
Department of Agri. Entomology,  
College of Agriculture,  
Vellayani.

### **Representatives of Under-graduate students**

- 23 Sri. Jose Joseph,  
III B. Sc. (Ag) Student,  
College of Agriculture,  
Vellayani.
- 24 Sri. Paul, T. V.  
Final B. Sc. (Hort) Student,  
College of Horticulture,  
Vellanikkara.

### **Representative of Diploma & Certificate Courses**

- 25 Sri. Mohan, B.  
Student,  
Institute of Agricultural Technology,  
Tavanur.

### **Representatives of Teachers of Faculties**

- 26 Sri. Rajappan Nair, N.  
Assoc. Professor of Agrl. Botany,  
Rice Research Station,  
Moncompu.
- 27 Dr. M. Krishnan Nair,  
Professor,  
Department of Pathology,  
College of Vety. & Animal Sciences,  
Mannuthy.

### **Representative of Non-teaching staff**

- 28 Sri. Neelakantan Kartha, K. M.  
Livestock Assistant Sr. Grade,  
Pig Breeding Farm,  
Mannuthy.

### **Representatives of Presidents of Panchayats**

- 29 Sri. Gevarcis Areekkal,  
President,  
Ankamali Panchayat,  
Ankamali
- 30 Shri K. S. Vasudeva Sarma,  
President,  
Venmony panchayat,  
Alleppey Dist.
- 31 Shri. N. Chellappan Pillai,  
President,  
Trikkovilavattom Panchayat,  
Quilon Dist.
- 32 Shri Kunhammed, V. K.  
President,  
Kayakkodi Panchayat,  
Calicut Dist

### **Representative of Mayors of Municipal Corporations and Chairmen of Municipal Councils**

- 33 Shri Pappachan, P. I.  
Chairman,  
Kunnamkulam Municipality,  
Trichur Dist.

### **Members nominated by the Chancellor Agrl. Scientists:**

- 34 Shri M. Janardhanan Nair,  
Retired Director of Agriculture,  
Jawhar Nagar,  
Trivandrum.
- 35 Shri Jacob P. John,  
Retired Additional Director of Agriculture,  
Chakai,  
Trivandrum

### **Farmers:**

- 36 Shri N. I Devassykutty,  
Nadakkavukaran House,  
Kandanssankadavu,  
Trichur Dist.
- 37 Vacant from 25—9—1978.
- 38 Sri. E. Gopalakrishna Menon,  
Ex-MLA.,  
Ayyanthole, P. O.,  
Trichur Dist.
- 39 Shri V. S. Vijayaraghavan,  
Erimayoor,  
Erimayoor, P. O.,  
Palghat Dist.
- 40 Sir, V. Gopaiakrishna Kurup  
Chairman,  
Block Development Council,  
Chambakulam,  
'Rashmi',  
Alleppey-3

### **Non-official representatives, of Co-operation**

- 41 Shri P. Vijayadas,  
Vijayavilas,  
Venjaramoodu,  
Trivandrum

### **Fisheries**

- 42 Shri C. Cheriyan,  
Chemmeen,  
Cochin—5,  
Ernakulam Dist,



### Animal Husbandry

- 43 Shri S. Harihara Iyer,  
705/14,  
Valiyakunnu,  
Attingal,  
Trivandrum Dist.

### Non-official representatives of plantation Industry

- 44 Shri James Mackil,  
Secretary,  
Association of Planters of Kerala,  
Kaloor, P. O.  
Cochin.  
Ernakulam.

### Woman Social Worker

- 45 Mrs. K. Maheswari Amma.  
Chairman,  
Block Development Council,  
Ambalapuzha, P. O.,  
Alleppey Dist.

### Engineer who has specialised in Agril. Engg. or Irrigation

- 46 Shri M. Mangala Bhanu,  
Retired Chief Engineer,  
Vazhuthacaud,  
Trivandrum.

### Educationist

- 47 Prof. K. M. Chandy,  
Kizhakkayil,  
Palai,  
Kottayam.

### Representatives of Agricultural Labour

- 48 Shri P. R. Francis, MLA,  
Porathoor House,  
Ollur, P. O.,  
Trichur Dist.
- 49 Shri M. K. Kesavan,  
Mundodythara,  
Vaikom,  
Kottayam Dist.

### Representative of Plantation Labour

- 50 Shri V. G. Kurup,  
Vapalathu Kizhakkeyil,  
Kidangoor, P. O.,  
Kottayam Dist.

### Representatives of Universities

#### Calicut

- 51 Prof. T. P. Muhammed Kunhi,  
Sir Syed College,  
Taliparamba.  
Cannanore Dist.

#### Cochin

- 52 Dr. M. G. Krishna Pillai,  
Professor,  
Department of Physics,  
University of Cochin  
Cochin-22.

#### Kerala

- 53 Shri V. S. Ouseph,  
Professor,  
Mar Ivanios College,  
Trivandrum.

#### Representative of ICAR

- 54 Dr. Silas, E. G.,  
Director,  
Central Marine Fisheries Research Institute,  
Gopala Prabhu Road  
Ernakulam—Cochin-18.

## II. LIST OF MEMBERS OF THE EXECUTIVE COMMITTEE

- |   |  |            |
|---|--|------------|
| 1 | Sri, N. Kaleeswaran<br>Vice-Chancellor   | — Chairman |
| 2 | The Secretary to Government &<br>Agricultural Production<br>Commissioner, Agriculture<br>Department, Trivandrum. | — Member   |
| 3 | The Secretary to Government,<br>Finance Department,<br>Trivandrum.   | — „        |
| 4 | The Secretary to Government,<br>Development Department,<br>Trivandrum.   | — „        |
| 5 | Dr. E. G. Silas,<br>Director,<br>Central Marine Fisheries Research<br>Institute, Cochin.                         | — „        |
| 6 | Dr. N. Sadanandan,<br>Dean,<br>College of Agriculture,<br>Vellayani  | — „        |

- |    |   |            |   |  |     |
|----|---|------------|---|--|-----|
| 7  | Dr. M. Krishnan Nair,<br>Professor,<br>Department of Pathology,<br>College of Vety. & Animal<br>Sciences, Mannuthy. | — Member   | 9   | Shri K. Srinivasan, Professor of<br>Horticulture,<br>College of Agriculture,<br>Vellayani.   | — " |
| 8  | Sri. E. Gopalakrishna Menon,<br>Ex-M. L. A.,<br>Ayyanthole P. O.,<br>Trichur.                                       | — "        | 10  | Sri. A. Venugopalan, Professor<br>(Faculty Research) for Veterinary &<br>Animal Sciences, College of<br>Veterinary & Animal Sciences,<br>Mannuthy. | — " |
| 9  | Prof. V. S. Ousebh,<br>Mar Ivanios College,<br>Beth, Nalanchira,<br>Trivandrum-15.                                  | — "        | 11  | Shri K. Radhakrishnan,<br>Professor,<br>Department of Anatomy,<br>College of Vety. &<br>Animal Sciences,<br>Mannuthy.                              | — " |
| 10 | Sri. P. R. Francis, MLA;<br>Porathur House,<br>Ollur, P. O.<br>Trichur.   | — "        | 12  | Shri P. K. Abdulla, Professor,<br>Department of Microbiology,<br>College of Veterinary &<br>Animal Sciences,<br>Mannuthy.                          | — " |
| 11 | Shri K. S. Vasudeva Sarma<br>President,<br>Venmony Panchayat,<br>Alleppey.  | — "        | <b>Members nominated by the chancellor<br/>from among the staff of research stations.</b> |  |     |
| 12 | The Registrar<br>Kerala Agricultural University   | — Convener | 13  | Shri N. Gopalan,<br>Associate Professor,<br>Rice Research Station,<br>Pattambi.  |     |

### III LIST OF MEMBERS OF THE ACADEMIC COUNCIL

#### Ex-Officio Members

- |   |   |            |
|---|---|------------|
| 1 | The Vice-Chancellor                             | — Chairman |
| 2 | The Pro-Vice-Chancellor                         | — Member   |
| 3 | The Dean, Faculty of Agriculture                | — "        |
| 4 | The Dean, Faculty of Vety. &<br>Animal Sciences | — "        |
| 5 | The Director of Research, KAU                   | — "        |
| 6 | The Director of Extn.<br>Education, KAU         | — "        |

#### Members Nominated by the Chancellor from among the heads of Departments.

- |   |   |     |
|---|---|-----|
| 7 | Prof. A. G. G. Menon, Professor of<br>Agrl. Extension,<br>College of Agriculture,<br>Vellayani.             | — " |
| 8 | Dr. M. M. Koshy, Professor,<br>(Faculty Research) for Agriculture,<br>College of Agriculture,<br>Vellayani. | — " |

- |    |  |  |
|----|--|--|
| 14 | Dr. C. C. Abraham,<br>Professor of Entomology (Entomologist),<br>AICRP on Biological Control of Crop Pests,<br>Vellanikkara  |  |
| 15 | Dr. A. Rajan,<br>Professor of Pathology<br>(Project Officer)<br>ICAR Scheme on Incidence,<br>Etiology & Pathology of<br>Tumours of Ethmoid in Domestic Animals,<br>Mannuthy. |  |

#### Elected members from among post-graduate & research students

- |    |  |  |
|----|--|--|
| 16 | Shri Ahammed Foad,<br>M. Sc. (Ag.) Student,<br>College of Agriculture,<br>Vellayani.   |  |
| 17 | Shri K. P. Vasudevan Nair,<br>Ph. D. Scholar,<br>College of Agriculture,<br>Vellayani. |  |

**One member elected by the teachers (other than Deans of faculties)**

- Faculty of Agriculture
- 18 Sri. P. D. Vijayagopal,  
Asst. Professor,  
Department of Agrl. Botany,  
College of Agriculture,  
Vellayani.
- Faculty of Vety. & Animal Sciences.
- 19 Sri. P. A. Ommer,  
Assoc. Professor,  
College of Vety. & Animal Sciences,  
Mannuthy.
- 20 The Registrar, Kerala  
Agrl. University                      Member-Convener
- 21 The Director of Agriculture,  
Kerala, Trivandrum.                      Member
- 22 The Director of Animal Husbandry,  
Kerala, Trivandrum.                      "

**Nominated Members**

(From among those connected with service in agri. animal husbandry, forestry, fisheries, dairy development, co-operation & community development departments — not more than 5 members.)

- 23 Shri T. P. Seetharaman, Andra Estate,  
Ponnoorkara, Trichur dist
- 24 Dr. M. N. Menon, Adviser,  
Cattle Insurance,  
National Dairy Development Board,  
Anand,  
Gujarat state
- 25 Dr. T. A. Mammen, Director,  
Marine Products Exports Development Authority,  
P. B. No. 1708, M. G. Road,  
Ernakulam, Cochin-682016.
- 26 Shri A. G. Vasavan,  
Managing Director,  
Kerala Fishermen's Welfare Corporation Ltd.,  
Anil Saras,  
Jawharnagar,  
Trivandrum-693003.
- 27 Dr. P. M. Ganapathy,  
Director,  
Kerala Forest Research Institute,  
Peechi,  
Trichur dist.

**Representatives of scientists from ICAR/its institute/from other universities in India or from among well known scientists in India nominated by the chancellor.**

- 28 Dr. N. M. Nayar, Director,  
Central Plantation Crops Research Institute,  
Kasaregod.
- 29 Dr. N. Hrish, Director,  
Central Tuber Crops Research Institute,  
Trivandrum.
- 30 Dr. A. Appa Rao,  
Director of Research,  
Andhra Pradesh Agri University,  
Rajendranagar,  
Andhra pradesh
- 31 Dr. K. J. Joseph,  
Dept. of Zoology,  
University of  
Calicut.
- 32 Dr. V. Rajagopalan,  
Director of Research,  
Tamil Nadu Agrl. University,  
Coimbatore

**IV. LIST OF MEMBERS OF BOARD OF STUDIES IN THE FACULTY OF AGRICULTURE**

Dean, Faculty of Agriculture                      Chairman

**Heads of departments under the Faculty**

- 1 Agronomy
- 2 Agrl. Botany
- 3 Agrl. Entomology
- 4 Agrl. Economics
- 5 Agrl. Engineering
- 6 Agrl. Extension
- 7 Agrl. Statistics
- 8 Horticulture
- 9 Plant Pathology
- 10 Soil Science & Agrl. Chemistry
- 11 Forestry

**Two Specialists**

- 1 Sri K. K. Krishnamoorthy                      ... Member  
Dean, Agrl. College & Research  
Institute, Madurai,  
Tamil Nadu.
- 2 Dr. V. Appa Rao,  
Director of Research,  
Andhra Pradesh Agri. University,  
Rajendrenagar,  
Hyderabad.

#### Other members

- 1 Dr. M. Aravindakshan,  
Professor,  
College of Horticulture,  
Vellanikkara.
- 2 Dr. C. C. Abraham,  
Professor,  
College of Horticulture,  
Vellanikkara.

#### Students representatives

- 1 Sri. K. P. Vasudevan Nair,  
Ph.D. Scholar,  
College of Agriculture,  
Vellayani.
- 2 Shri. Ahammed Foad,  
M. Sc. (Ag) Student,  
College of Agriculture,  
Vellayani.

#### Special Invitees

- 1 Director of Research,  
Kerala Agricultural University
- 2 Director of Extension Education,  
Kerala Agricultural University.

#### V. LIST OF MEMBERS OF BOARD OF STUDIES IN THE FACULTY OF VETERINARY & ANIMAL SCIENCES.

- 1 Dean, Faculty of Vety. & Animal Sciences  
Mannuthy.
- 2 Heads of Departments under the Faculty  
(19 Nos.)
  - 1 Anatomy
  - 2 Animal Breeding & Genetics
  - 3 Animal Management
  - 4 Animal Reproduction
  - 5 Dairy Science
  - 6 Extension
  - 7 Medicine
  - 8 Microbiology
  - 9 Nutrition
  - 10 Parasitology
  - 11 Pathology
  - 12 Pharmacology
  - 13 Physiology & Biochemistry
  - 14 Poultry Science
  - 15 Statistics
  - 16 Surgery
  - 17 Therapeutics
  - 18 Veterinary Public Health
  - 19 Fisheries

#### Specialists

- 1 Dr. C. V. Reddy  
Dean,  
College of Vety. & Animal Sciences,  
Andhra Pradesh Agrl. University,  
Rajendranagar,  
Hyderabad – 500030
- 2 Dr. B. S. Kesavamoorthy,  
Professor of Vety. Microbiology,  
University of Agrl. Sciences,  
Hebbal  
Bangalore – 560024

#### Other Members

- 1 Dr C. R. Ananthasubramaniam,  
Associate Professor,  
Co-ordinated By-Products Scheme,  
College of Vety. & Animal Sciences,  
Mannuthy.
- 2 Dr. A. Rajan  
Professor,  
Dept. of Pathology  
College of Vety. & Animal Sciences,  
Mannuthy

#### Special Invitees

- 1 Director of Research,  
Kerala Agricultural University,  
Vellanikkara
- 2 Director of Extension Education,  
Kerala Agricultural University,  
Vellanikkara.

#### VI. LIST OF MEMBERS OF THE FINANCE COMMITTEE

- 1 The Vice-Chancellor —Chairman
- 2 The Secretary to Government  
(Finance) —Member
- 3 The Secretary to Government &  
Agriculture Production  
Commissioner,  
Agricultural Department — "
- 4 Sri. K. S. Vasudeva Sarma,  
President,  
Venmony Panchayat,  
Alleppy. — "
- 5 The Comptroller,  
Kerala Agricultural University  
Vellanikkara — Convener

□□

## Appendix - III

### SUB COMMITTEES OF THE UNIVERSITY

#### I. RESEARCH COUNCIL

<p>The Vice-Chancellor, Kerala Agricultural University, Vellanikkara.</p> <p>The Director of research, Kerala Agricultural University Vellanikkara.</p>	<p>—Chairman</p> <p>— Secretary</p>
1 Dr. V. S. S. Potti, Director of Extension Education, Kerala Agricultural University, Vellanikkara.	--- Member
2 Dr. N. Sadanandan, Dean, College of Agriculture Vellayani	"
3 Dr. P. G. Nair, Dean, College of Vety. & Animal Sciences, Mannuthy.	— "
4 Sri. V. S. Ouseph, Professor, Mar Ivanios College, Trivandrum.	"
5 Prof. T. P. Mohammed Kunhi, Manna, Taliparamba	— "
6 Dr. M. G. Krishnapillai, Professor, University of Cochin,	— "
7 Sri. M. Janardhanan Nair, Retired Addl. Director of Agriculture, Lakshmi, Sasthamangalam, Trivandrum.	— "
8 Sri. Jacob P. John, Retd. Addl. Director of Agriculture & Private Secretary to the Governor of Andhra Pradesh	— "

9 The Director of Research, Tamilnadu Agrl. University, Coimbatore.	— Member
10 Dr. S. N. Rao, Senior Scientist and Head of Department of Horticulture, Andhra Pradesh Agrl. University, Thirupathy.	— "
11 Dr. K. Krishnamoorthy, Director of Research, University of Agrl. Sciences, Bangalore.	— "
12 The Agrl. Production Commissioner, Trivandrum,	— "
13 Dr. M. V. George, Chief Evaluation Officer, State Planning Board, Trivandrum.	— "

#### II. FACULTY RESEARCH COMMITTEE

a) <b>Agriculture</b>	
1 The Dean, College of Agriculture, Vellayani.	— Chairman
2 The Assoc. Dean, College of Horticulture, Vellanikkara.	— Member
3 Heads of Departments	— "
4 Dr. M. Aravindakshan, Assoc. Professor, College of Horticulture, Vellanikkara.	— "
5 Sri. N. Gopalan, Assoc. Professor, Rice Research Station, Pattambi.	— "
6 Sri. N. Rajappan Nair, Assoc. Professor, Rice Research Station, Moncompu.	— "
7 Dr. U. P. Bhaskaran, Director of Research, Kerala Agricultural University Vellanikkara.	— "

8	Dr. M. M. Koshy, Professor of Agrl. Chemistry, College of Agriculture, Vellayani.	— Part-time Secretary & Conve- ner.	9	The Director of Animal Husbandry, Kerala.	—Member
<b>b) Veterinary &amp; Animal Sciences</b>			10	The Director of Fisheries, Kerala.	
1	The Dean, College of Vety. & Animal Sciences, Mannuthy.	—Chairman	11	The Chief Conservator of Forests, Kerala.	— "
2	Heads of Departments	—Member	12.	The Director of Dairy Development, Kerala,	— "
3	Superintendent, University Livestock Farm, Thiruvazhamkunnu	— "	13	All the members of the General Council nominated by the Chancellor under Section 10 (9) KAU Act. 1971.	— "
4	Research Officer, Cattle Breeding Farm, Thumburmuzhi.	— "	14	All the MLA's in the General Council of the Kerala Agricultural University.	— "
5	Dr. M. Sthanumalayan Nair, Fodder Research Officer, Mannuthy.	— "	15	The Deputy Director of Agriculture, State Planning Board.	— "
6	Dr. K. T. Punnoose, Assoc. Professor, Scheme for Studies on Porcine Enterovirus.	— "	16	The Farmers Representatives Nominated by the Vice-Chancellor	— "
7	Dr. M. Krishnan Nair, Professor of Pathology, College of Vety. & Animal Sciences Mannuthy.	Part-time Secretary & Conve- ner.	1	Sri. Vasudevan Nair, Punnapuram House, Pirappancode, P. O., Trivandrum Dist.	
<b>III. RESEARCH ADVISORY COMMITTEE</b>			2	Sri. E. P. Madhavan Nair, EPM Industrial & Agricultural Estate, Palappuram, Ottappalam, Palghat Dist.	
1	The Vice-Chancellor, Kerala Agricultural University, Vellanikkara.	—Chairman	3	Sri. T. N. Rishikesan Bhattathiripad, Kudamaloor, Kottayam Dist.	
2	The Director of Research, Kerala Agricultural University, Vellanikkara.	—Convener	4	Sri. T. V. Varghese Vaidyan Kalpakavady, Thottappally, Alleppey Dist.	
3	All non-official members in the Executive Committee	—Member	5	Sri. Joseph Alappattu Thoppil. Karanchira, Trichur Dist.	
4	All Deans in the Kerala Agricultural University.	— "	6	Sri. Vasudevan Namboodiripad, Karuvakundu, Palgat Dist.	
5	All the members of the Research Council of the Kerala Agricultural University.	—Member	17	The Farm Radio Officers, All India Radio. Trichur & Calicut.	—Member
6	The Directors or representatives of the ICAR Research Institutes in the State.	— "	18	All the members of the Faculty Research Committees of the Kerala Agricultural University.	— "
7	The Director, Forest Research Institute, Peechi Kerala.	— "	19	All the Project Co-ordinators in the Kerala Agricultural University.	
8	The Director of Agriculture, Kerala.	— "			

#### IV. VARIETY EVALUATION COMMITTEE

- |    |   |            |
|----|---|------------|
| 1  | Director of Research,<br>Kerala Agricultural University,<br>Vellanikkara.                         | —Chairman  |
| 2  | The Director,<br>C. T. C. R. I.,<br>Trivandrum or his nominee                                     | —Member    |
| 3  | Director,<br>C. P. C. R. I.,<br>Kasaragod or his nominee  | — "        |
| 4  | The Director of Agriculture,<br>Trivandrum or his nominee   | — "        |
| 5  | Director of Extension Education,<br>Kerala Agricultural University,<br>Vellanikkara,              | — "        |
| 6  | Professor of Agronomy,<br>College of Agriculture,<br>Vellayani.                                   | — "        |
| 7  | Professor of Plant Pathology,<br>College of Agriculture,<br>Vellayani,                            | — Member   |
| 8  | Professor of Agrl. Botany,<br>College of Agriculture,<br>Vellayani.                               | — "        |
| 9  | Professor of Horticulture,<br>College of Agriculture,<br>Vellayani.                               | — "        |
| 10 | Professor of Entomology,<br>College of Agriculture,<br>Vellayani.                                 | — "        |
| 11 | Assoc. Professor i/c,<br>Rice Research Station,<br>Pattambi.                                      | — "        |
| 12 | Assoc. Professor i/c,<br>Coconut Research Station,<br>Pilicode.                                   | — "        |
| 13 | Assoc. Professor,<br>Directorate of Research,<br>Kerala Agricultural University,<br>Vellanikkara. | — Convener |

#### V. SELECTION COMMITTEE

- |   |                             |                            |
|---|-----------------------------|----------------------------|
| 1 | Sri. E. Gopalakrishna Menon | — Chairman                 |
| 2 | Sri. P. R. Francis, MLA.,   | — Member                   |
| 3 | Prof. V. S. Ouseph          | — "                        |
| 4 | Sri. K. S. Vasudeva Sarma   | — "                        |
| 5 | Dr. N. Sadanandan           | — "                        |
| 6 | Dr. M. Krishnan Nair        | — "                        |
| 7 | Registrar                   | — Member<br>&<br>Secretary |

#### VI. STUDENTS WELFARE COMMITTEE

- |   |                             |            |
|---|-----------------------------|------------|
| 1 | Sri. P. R. Francis, MLA.    | — Chairman |
| 2 | Sri. E. Gopalakrishna Menon | — Member   |
| 3 | Sri. K. S. Vasudeva Sarma   | — "        |
| 4 | Prof. V. S. Ouseph          | — "        |
| 5 | Dr. M. Krishnan Nair        | — Convener |

#### VII. COMMITTEE FOR DEPUTATION OF ACADEMIC STAFF

- |   |   |            |
|---|---|------------|
| 1 | The Vice-Chancellor   | — Chairman |
| 2 | The Dean, Faculty of Vety. &<br>Animal Sciences,<br>Mannuthy. | — Member   |
| 3 | The Dean,<br>Faculty of Agriculture,<br>Vellayani             | — "        |
| 4 | The Director of Research                                      | — "        |
| 5 | The Director of Extension<br>Education                        | — "        |
| 6 | The Comptroller   | — "        |
| 7 | The Registrar   | — Convener |

#### VIII. POST-GRADUATE COMMITTEE

- |   |  |            |
|---|--|------------|
| 1 | Sri. N. Kaleeswaran,<br>Vice-Chancellor  | — Chairman |
| 2 | Dr. P. G. Nair,<br>Dean,<br>College of Vety. & Animal<br>Sciences, Mannuthy.   | — Member   |
| 3 | Dr. N. Sadanandan,<br>Dean,<br>Faculty of Agriculture,<br>Vellayani.   | — "        |
| 4 | Dr. V. S. S. Potti,<br>Director of Extension Education,<br>Kerala Agricultural University,<br>Vellanikkara.                  | — "        |
| 5 | Dr. P. C. Sivaraman Nair,<br>Assoc. Dean,<br>College of Horticulture,<br>Vellanikkara.                                       | — "        |
| 6 | Dr. A. Venugopalan,<br>(Vety. & AS.)<br>Professor Research Co ordination<br>College of Vety. & Animal<br>Sciences, Mannuthy. | — "        |
| 7 | Dr. M. M. Koshy,<br>Professor Research Co-ordination<br>(Agrl.)<br>College of Agriculture,<br>Vellayani.                     | — Member   |
| 8 | The Director of Research   | — "        |
| 9 | The Registrar  | — Convener |

**IX. SELECTION COMMITTEE FOR UNDERGRADUATE COURSES**

- |   |   |                             |
|---|---|-----------------------------|
| 1 | Dr. P. G. Nair<br>Dean,<br>College of Vety. & Animal<br>Sciences,<br>Mannuthy.                          | — Chairman                  |
| 2 | Dr. N. Sadanandan,<br>Dean,<br>Faculty of Agriculture,<br>Vellayani.                                    | — Member                    |
| 3 | Dr. P. C. Sivaraman Nair.<br>Assoc. Dean,<br>College of Horticulture,<br>Vellanikkara.                  | — "                         |
| 4 | Dr. P. K. Abdulla.<br>Professor of Microbiology,<br>College of Vety. & Animal<br>Sciences,<br>Mannuthy. | — "                         |
| 5 | Sri. K. Srinivasan,<br>Professor of Horticulture<br>College of Agrl. Vellayani                          | — "                         |
| 6 | The Registrar   | — Member<br>and<br>Convener |

**X. SPORTS BOARD OF KERALA  
AGRICULTURAL UNIVERSITY**

- |   |   |            |
|---|---|------------|
| 1 | Sri. N. Kaleeswaran,<br>Vice-Chancellor   | — Chairman |
| 2 | All officers of the University  | — Members  |
| 3 | The Registrar   | — Member   |
| 4 | Dr. N. Sadanandan,<br>Dean,<br>College of Agriculture,<br>Vellayani.  | — "        |
| 5 | Dr. P. G. Nair,<br>Dean,<br>College of Vety. & Animal<br>Sciences, Mannuthy.  | — "        |
| 6 | Dr. P. C. Sivaraman Nair,<br>Assoc. Dean,<br>College of Horticulture,<br>Vellanikkara.                              | — Member   |
| 7 | Dr. M. Krishnan Nair,<br>Professor,<br>Department of Pathology,<br>College of Vety. & Animal<br>Sciences, Mannuthy. | — "        |

**One Professor from each College to be  
nominated by the Vice-Chancellor**

- |    |  |                             |
|----|--|-----------------------------|
| 8  | Dr. Radhakrishnan,<br>College of Vety. & Animal<br>Sciences, Mannuthy.     | — "                         |
| 9  | Prof. A. G. G. Menon,<br>College of Agriculture,<br>Vellayani.             | — "                         |
| 10 | Dr. K. M. N. Namboothiri,<br>College of Horticulture,<br>Vellanikkara.     | — "                         |
| 11 | The Athletic Secretary,<br>College of Vety. & Animal<br>Sciences, Mannuthy | — "                         |
| 12 | The Athletic Secretary,<br>College of Agriculture,<br>Vellayani.           | — "                         |
| 13 | The Athletic Secretary,<br>College of Horticulture,<br>Vellanikkara.       | — "                         |
| 14 | The Athletic Secretary,<br>Institute of Agrl. Technology.<br>Tavanur.      | — "                         |
| 15 | Student members in the General<br>Council.                                 | — "                         |
| 16 | The Deputy Director of Students<br>Welfare (S & G)                         | — Member<br>and<br>Convener |

**XI. EXTENSION ADVISORY COMMITTEE**

- |   |  |            |
|---|--|------------|
| 1 | The Vice-Chancellor,<br>Kerala Agricultural University                   | — Chairman |
| 2 | The Agricultural Production<br>Commissioner, Secretariat,<br>Trivandrum. | — Member   |
| 3 | The Director of Agriculture<br>Vikas Bhavan,<br>Trivandrum.              | — "        |
| 4 | The Director of Animal Husbandry,<br>Vikas Bhavan,<br>Trivandrum.        | — "        |
| 5 | The Milk Commissioner,<br>Dairy Development Department,<br>Trivandrum.   | — "        |
| 6 | The Dean,<br>College of Agriculture,<br>Vellayani.                       | — "        |
| 7 | The Dean,<br>College of Vety. & Animal Sciences,<br>Mannuthy.            | — "        |



8	The Assoc. Dean, College of Horticulture, Vellanikkara.	—	Member	22	Block Development Committee, Ambalapuzha.	—	"
9	The Director of Research. Kerala Agricultural University, Vellanikkara.	—	"	23	Sri. N. N. Ramankutty, Special Officer, Institute of Agri. Technology, Tavanur.	—	"
10	Prof. A. G. G. Menon, Dept. of Extension, College of Agriculture, Veliyani.	—	"	24	The Station Director, All India Radio, Trivandrum.	—	"
11	Prof. K. Sreenivasan, Dept of Horticulture, College of Agriculture, Vellayani.	—	"	25	The Regional Director, Directorate of Field Publicity, Trivandrum.	—	"
12	Dr. G. R. Nair, Professor of Extension, College of Vety. & Animal Sciences, Mannuthy.	—	"	26	The Director, Directorate of Arecanut & Spices Development, Cochin.	—	"
13	Dr. M. Subrahmaniam, Professor of Dairy Science, Mannuthy.	—	"	27	The Director, Directorate of Coconut Development, Cochin.	—	"
14	Dr. M. Aravindakshan, Assoc. Professor, College of Horticulture, Vellanikkara.	—	Member	28	Sri. V. Gopalakrishna Kurup, Rashmi, Alleppey-3.	—	"
15	Dr. P. C. Sivaraman Nair, Assoc. Dean, College of Horticulture, Vellanikkara.	—	"	29	Joseph Alappatt Thoppil Alappatt House, Karanchira.	—	"
16	Dr. M. S. Nair, Fodder Research Officer, University Livestock Farm, Mannuthy.	—	"	30	Sri. P. M. Joseph, Additional Director of Agriculture, Trivandrum.	—	"
17	Sri. V. K. Kunhammed, President, Kayakkodi Panchayat, Calicut Dist.	—	"	31	Sri. K. Koyamu, Addl. Director of Agriculture, Calicut.	—	"
18	Sri K. S. Vasudeva Sarma, President, Venmony Panchayat, Alleppey Dist	—	"		Dr. V. S. S. Potti, Director of Extension Education, Kerala Agricultural University, Vellanikkara	—	Convener
19	Sri. S. Balakrishnan, Assoc. Professor, Banana Research Station, Kannara.	—	"	<b>XII. PLANNING AND DEVELOPMENT COMMITTEE</b>			
20	Sri. K. I. James, Assoc. Professor, Rice Research Station, Pattambi.	—	"	1	Vice-Chancellor	—	Chairman
21	Mrs. L. Maheswari Amma, Chairman,	—	"	2	Special Secretary to Government, Agricultural Department and Agricultural Production Commissioner	—	Member
				3	Sri. K. S. Vasudeva Sarma	—	"
				4	Prof. V. S. Ouseph	—	"
				5	Dr. N. Sadanandan, Dean, College of Agriculture	—	"
				<b>XIII. STATUTE SUB COMMITTEE</b>			
				1	Sri V. Gopalakrishna Kurup	—	Chairman
				2	Sri. V. S. Ouseph	—	Member
				3	Prof. T. P. Mohamed Kunhi	—	"
				4	Dr. M. Krishnan Nair	—	"
				5	Sri. N. Rajappan Nair	—	"
				6	Registrar	—	Convener

## Appendix - IV

### LIST OF ADMINISTRATIVE POSTS OF THE KERALA AGRICULTURAL UNIVERSITY OFFICE

Vice-Chancellor	...	1	Rs.	2625/-	
Deans	...	2	Rs.	1400—1900	
Dean (P. G. Studies)	...	1	Rs.	1400—1900	
Director of Research	...	1	Rs.	1400—1900	
Director of Extn. Education	...	1	Rs.	1400—1900	
Registrar	...	1	Rs.	1400—1900	
Comptroller	...	1	Rs.	1400—1900	
Estate Officer	...	1	Rs.	1125—1725	
Public Relations Officer	...	1	Rs.	1125—1725	
Associate Professor (Agri. Bot.)	...	1	Rs.	1125—1725	
Assistant Registrars	...	3	Rs.	910—1550	
Assistant Comptrollers	...	3	Rs.	910—1550	
Labour Officer	...	1	Rs.	910—1550	
Section Officers	...	19	Rs.	650—1150	
Security Officer	...	1	Rs.	650—1150	
Transport Supervisor	...	1	Rs.	650—1150	
PA to Vice-Chancellor	...	1	Rs.	650—1150	(CA Rs. 50/-)
Senior Grade Stenographers (PA to Registrar/Comptroller)	...	2	Rs.	600—1100	
Office Superintendents (FC&D)	...	2	Rs.	600—1100	
Senior Grade Assistants	...	24	Rs.	535—950	
Senior Grade Typists	...	6	Rs.	535—950	
Translator	...	1	Rs.	535—950	
Grade I Stenographers	...	3	Rs.	450—785	
Sergeant	...	1	Rs.	420—720	
Assistant Grade I	...	40	Rs.	420—720	
Typist Grade I	...	5	Rs.	420—720	
Stenographer Gr. II	...	1	Rs.	350—580	
Assistant Grade II	...	9	Rs.	350—580	
Typist Grade II	...	3	Rs.	350—580	
Driver Grade I (LV)	...	7	Rs.	350—580*	
Driver Grade II (HV)	...	1	Rs.	265—465	
Clerical Assistant	...	1	Rs.	330—515	
Duplicator Operator	...	2	Rs.	330—515	(CA Rs. 25/-)
Duffidar	...	1	Rs.	330—515	
Special Grade Peon	...	2	Rs.	310—490	
Conductor	...	1	Rs.	330—515	(CA Rs. 10/-)
Cook-cum-Caretaker	...	1	Rs.	330—515	(CA Rs. 25/-)
Peon	...	15	Rs.	280—400	
Hostel boy for teachers Hostel	...	1	Rs.	280—400	
Watcher-cum-Gardener	...	1	Rs.	280—400	
Watchman/watch and ward	...	19	Rs.	280—400	
Sweeper-cum-Scavenger	...	3	Rs.	280—400	
Sweeper	...	1	Rs.	280—400	
Sweeper-cum-Scavenger-cum-Gardener	...	1	Rs.	280—400	
Apprentice Clerks	...	9	Rs.	130'-	Stipend.

\* 1 Post with a CA of Rs. 75/- and 5 posts @ Rs. 50/-

## Appendix - V

### LIST OF ACADEMIC STAFF FOR THE YEAR 1978-79

#### COLLEGE OF AGRICULTURE

##### Department of Agronomy:

- 1 Professor (1)  
Dr. C. Sreedharan (from 2-6-78)
- 2 Associate Professors (4)
  - 1 Dr. C. Sreedharan (till 1-6-78)
  - 2 Sri. K. P. Madhavan Nair
  - 3 Sri. P. Chandrasekharan
  - 4 Sri. U. Mohammed Kunju
  - 5 Dr. V. Thomas Alexander  
(from 10-7-78)
- 3 Assistant Professors (3)
  - 1 Sri. G. Raghavan Pillai
  - 2 Sri. M. Oommen (from 8-6-78)
  - 3 Sri. E. Tajuddin (till 14-7-78)
- 4 Jr. Asst. Professors (4)
  - 1 Sri. Abraham Varghese  
(from 24-3-79)
  - 2 Sri. H. Ramakrishna Bhat  
(from 5-8-78 to 20-1-79)
  - 3 Sri. M. Gopalakrishnan Nair  
(till 13-6-78)
  - 4 Sri M. Oommen (till 7-6-78)
  - 5 Sri. S. M. Shahul Hameed  
(till 21-8-78)
  - 6 Sri. K. Vijayakumar
  - 7 Sri. Subramania Iyer  
(from 5-8-78 to 3-11-78)
  - 8 Sri. B. Balakrishnan  
(from 9-8-78 to 19-10-78)

##### Department of Agril. Botany

- 1 Professor (1)  
Dr. Mary. K. George
- 2 Assoc. Professors (4)
  - 1 Sri. A. T. Abraham
  - 2 Sri. N. Gopinathan Nair
  - 3 Dr. V. Gopinathan Nair
  - 4 Sri. K. Gopakumar

- 3 Assistant Professors (4)
  - 1 Dr. (Mrs.) S. T. Mercy
  - 2 Sri. P. D. Vijayagopal
  - 3 Sri. Luckins C. Babu
  - 4 Sri. R. Gopimony
- 4 Jr. Asst. Professors (4)
  - 1 Sri. N. Ramachandran Nair
  - 2 Sri. S. G. Sreekumar

##### Department of Agril. Chemistry

- 1 Professor (1)  
Dr. M. M. Koshy (upto 30-8-78)
- 2 Assoc. Professors (4)
  - 1 Dr. R. S. Aiyer
  - 2 Dr. V. Gopaiaswamy
  - 3 Dr. K. P. Rajaram
  - 4 Sri. P. R. Ramasubramaniam
- 3 Asst. Professors (5)
  - 1 Dr. P. Padmaja (from 26-5-78)
  - 2 Smt. Alice Abraham
  - 3 Sri. Abdul Hameed
  - 4 Sri. K. Babukutty
  - 5 Sri. P. A. Korah
- 4 Jr. Asst. Professors (2)
  - 1 Dr. S. Kabeerathumma  
(upto 9-6-78)
  - 2 Dr. V. O. Kuruvilla (from 31-8-78)
  - 3 Smt. Chandini  
(from 17-7-78 to 20-10-78)
  - 4 Sri. Subramania Iyer  
(from 4-11-78)

##### Department of Agril. Entomology

- 1 Professor (1)  
Dr. N. Mohandas (from 2-6-78)
- 2 Assoc. Professors (7)
  - 1 Dr. N. Mohandas (till 1-6-78)
  - 2 Sri. J. Johnson

- 3 Sri S. P Christudas  
 4 Dr. T. S. Venkitesan  
 5 Dr. John Kurien  
 6 Dr. Abraham Jacob  
 (from 6-6-78)  
 7 Dr. A. Visalakshi  
 (from 8-9-78)  
 8 Sri. N. J. Narayanan  
 (from 10-2-79)
- 3 Asst. Professors (8)  
 1 Dr. Abraham Jacob  
 (till 5-6-78)  
 2 Dr. A. Visalakshi  
 (till 5-6-78)  
 3 Sri. N. J. Narayanan  
 (till 9-2-79)  
 4 Dr. Dale (till 29-9-78)  
 5 Sri. P. A. Rajan Asari  
 6 Sri. George Koshy  
 (till 20-10-78)  
 7 Sri. K. Saradamma  
 (from 8-4-78)  
 8 Sri. Kunjamma P. Mathew  
 (from 16-6-78)  
 9 Sri. K. Sasidharan Pillai  
 (from 16-6-78)
- 4 Jr. Asst. Professors (5)  
 1 Smt. K. Santhakumari.  
 2 Sri. P. J. Joseph  
 3 Sri. T. Nalinakumari  
 4 Sri. Abraham Varghese  
 (from 22-8-78 to 24-3-79)  
 5 Sri. Muralidhara Prasad  
 (from 7-8-78 to 17-8-78)  
 6 Smt. Suma Kuruvila (from 7-8-78)  
 7 Sri. Job Sathyakumar Charles  
 (from 18-8-78)  
 8 Smt. Susamma Mathai  
 (from 13-3-79)

**Department of plant pathology**

- 1 Professor (1)  
 Dr. M. Ramanatha Menon

- 2 Assoc. Professors (3)  
 1 Sri. P. V. Paily (till 15-7-78)  
 2 Dr. K. I. Wilson  
 3 Dr. M. Chandrasekharan Nair
- 3 Asst. Professors (4)  
 1 Dr. L. Remadevi  
 2 Dr. James Mathew  
 3 Dr. Susamma Philip
- 4 Jr. Asst. Professors (5)  
 1 Smt. K. J. Alice  
 (till 25-8-78)  
 2 Sri. A. Sukumara Varma  
 (till 30-8-78)  
 3 Smt. Suharban  
 (till 19-10-78)  
 4 Sri. M. Vijayan  
 (from 8-8-78)  
 5 Sri. R. Rajan  
 (from 3-11-78 to 22-1-79)

**Department of Horticulture**

- 1 Professor (1)  
 Sri. K. Sreenivasan.
- 2 Assoc. Professor (1)  
 Sri. P. Sethumadhavan.
- 3 Asst. Professors (2)  
 1 Dr. N. Mohanakumaran  
 2 Vacant.

**Department of Agri. Extension**

- 1 Professor (1)  
 Sri. A. G. G. Menon
- 2 Assoc. Professors (4)  
 1 Dr. A. M. Thampi  
 2 Dr. G. T. Nair
- 3 Asst. Professors (7)  
 1 Sri. B. Babu  
 (on deputation for higher studies)  
 2 Dr. L. Prema  
 3 Sri. O. Abdul Rahiman Kunju  
 4 Sri. M. Mohammed Hussain  
 5 Smt. K. J. Girija

- 4 Jr. Asst. Professors (4)  
 1 Sri. K. I. Thomaskutty  
 2 Sri. R. Muraleedhara Prasad  
 3 Sri. R. Raju (till 2-11-78)

**Department of Agricultural Statistics**

- 1 Professor (1)  
 Sri. E. J. Thomas  
 2 Assoc. Professors (2)  
 1 Vacant  
 2 Vacant  
 3 Asst. Professors (5)  
 1 Smt. P. Saraswathy  
 (till 31-12-78)  
 2 Sri. M. P. Abdurazak  
 (from 8-6-78)  
 3 Smt. A. Indira Devi  
 (from 16-10-78)  
 4 Jr. Asst. Professor (1)  
 1 Vacant

**Department of Agril. Economics**

- 1 Professor (1)  
 Vacant  
 2 Assoc. Professor (1)  
 1 Sri. K. S. Karayalar

- 3 Asst. Professors (2)  
 1 Sri. S. Venugopalan  
 2 Sri. E. R. Narayanan Nair  
 4 Jr. Asst. Professor (1)  
 1 Sri. D. V. Rajendran

**Department of Agri. Engineering**

- 1 Professor (1)  
 Vacant  
 2 Assoc. Professors (2)  
 1 Dr. Jose Samuel  
 2 Sri. P. Jacob John  
 3 Asst. Professors (2)  
 1 Smt. A. N. Rema Devi  
 (on deputation for higher studies)  
 4 Lecturer (1)  
 1 Sri. M. S. Thomas  
 5 Jr. Asst. Professor (1)  
 1 Sri. Jippu Jacob

**Department of Animal Husbandry**

- 1 Associate Professor (1)  
 1 Sri. J. B. Rose  
 2 Asst. Professors (2)  
 1 Dr. Skariah Oommen  
 2 Dr. E. T. Jacob

□□

## Appendix VI

### LIST OF PUBLICATIONS — COLLEGE OF AGRICULTURE, VELLAYANI

#### Department of Agronomy:

- |    |   |  |  |
|----|---|--|--|
| 1  | M. A. Salam, N. Sadanandan<br>K. P. Madhavan Nair &<br>U. Mohammed Kunju (1978)   | Effect of different plant densities on sunflower varieties in red loam soils.  | <i>Agri. Res. J. Kerala</i> , 1978<br>16 (1) : 1-4     |
| 2  | P. Suseelan, C. M. George<br>& C. Sreedharan (1978)                               | Studies on the uptake pattern of phosphorus by rice under graded doses of phosphorus in conjunction with lime.                           | <i>Agri. Res. J. Kerala</i> , 1978<br>16 (1) : 5-8     |
| 3  | P. K. Ashoken &<br>C. Sreedharan (1978)   | Effect of levels and time of application of potash on growth and yield of tapioca.   | <i>Agri. Res. J. Kerala</i> , 1978<br>16 (1) : 18-23   |
| 4  | K. Gopalakrishna Pillai,<br>& C. M. George (1978)                                 | Studies on the response of NP and K in conjunction with Ca on the growth and yield of tapioca variety Malayan-4.                         | <i>Agri. Res. J. Kerala</i> , 1978<br>16 (1) : 43-58   |
| 5  | M. A. Salam, Sadanandan,<br>K. P. Madhavan Nair &<br>U. Mohammed Kunju<br>(1978); | Performance of sunflower varieties under graded doses of nitrogen in red loam soils.   | <i>Agri. Res. J. Kerala</i> , 1978<br>16 (1) : 49-53   |
| 6  | K. C. Poulouse, C. M.<br>George, C. Sreedharan and<br>V. K. Sasidhar (1978)       | Comparative performance of two rice varieties (IR. 8 and PTB. 9) with varying levels of seed rate and nitrogen under semi-dry condition. | <i>Agri. Res. J. Kerala</i> , 1978<br>16 (1) : 74-75   |
| 7  | M. A. Salam, N. Sadanandan<br>& U. Mohammed Kunju<br>(1978)                       | A note on optimum and economic doses of nitrogen and nitrogen utilisation efficiency of sunflower.                                       | <i>Agri. Res. J. Kerala</i> , 1978<br>16 (1) : 89-90   |
| 8  | N. Sadanandan & V. K.<br>Sasidhar (1978)  | A note on the comparative efficiency of urea lone and mixed with locally available materials on the yield of rice variety Triveni.       | <i>Agri. Res. J. Kerala</i> , 1978<br>16 (1) : 100-101 |
| 9  | C. S. Ravindran, K. P.<br>Madhavan Nair and<br>V. K. Sasidhar (1978)              | A note on the effect of various herbicides on the yield and yield attributing characters of two high yielding varieties of rice.         | <i>Agri. Res. J. Kerala</i> , 1978<br>16 (1) : 104-107 |
| 10 | K. Gopalakrishna Pillai and<br>C. M. George (1978)                                | Studies on the response of N, P and K in conjunction with Ca on the growth and yield of tapioca variety Malayan-4.                       | <i>Agri. Res. J. Kerala</i> , 1978<br>16 (2) : 119-124 |
| 11 | K. Gopalakrishna Pillai<br>and C. M. George (1978)                                | Quality of tubers in tapioca var. 'Malayan 4' as influenced by N, P, K and Ca fertilization.   | <i>Agri. Res. J. Kerala</i> , 1978<br>16 (2) : 166-170 |
| 12 | K. S. Panicker, P.<br>Balakrishna Pillai and<br>P. Chandrasekharan (1978)         | Influence of age of seedlings, spacing and time of application of nitrogen on the yield of rice variety IR. 8.                           | <i>Agri. Res. J. Kerala</i> , 1978<br>16 (2) : 227-229 |
| 13 | J. S. N. Raju, C. Sreedharan<br>& V. K. Sasidhar<br>(1978)                        | Efficiency of foliar Vs. soil application of nitrogen on growth and yield of summer paddy.   | <i>Agri. Res. J. Kerala</i> , 1978<br>16 (2) : 237-239 |

- 14 P. Suseelan, C. M. George & C. Sreedharan (1978) Effect of phosphorus and lime application on rice variety IR. 8. *Agri. Res. J. Kerala*, 1978 16 (2) : 240-241
- 15 P. K. Ashokan & C. Sreedharan (1978) Scope for using tapioca leaves as fodder. *Agri. Res. J. Kerala*, 1978 16 (2) : 240-241
- 16 C. Sreedharan & V. K. Vamadevan (1978) Effect of periodical sowing and water management on protein, amylose and yield of rice. *Oryza*, 13 (1) : 1978
- 17 C. Sreedharan & V. K. Vamadevan (1978) Studies on bioclimetology of rice. *Acta Agronomica Academice Scientiarum Hungaricae*, 17, 1978. P. 444-450
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#### Department of Agril. Chemistry

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**Department of Agri. Entomology:**

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- Department of Plant Pathology**
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- 9 James Mathew, Koshy Abraham, G. Indrasenan & Marykutty Samuel (1978) A new record of bacterial wilt of ginger incited by *Pseudomonas solanacearum* E. F. Smith from India Curr. Sci. 48:213-14
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- 13 R. Raju, P. V. Paily and M. R. Menon (1978) Studies on the efficacy of different cowpea, Rhizobia under Kerala soil conditions. Paper presented at the Fourth Southern Regional Conference on Microbial inoculants in crop production held at Marathawada Agrl. University, Parbhani

#### Department of Agri. Extension

- 1 L. Prema and A. G. G. Menon Fruit and vegetable preservation-gain in knowlege of farm women due to training Paper presented in the seminar on post harvest technology organised by K A U at Vallanikkara during October, 1978
- 2 O. K. Rehiman and A. G. G. Menon (Review article) Some factors influencing communication patterns among various social systems Agri. Abstracts Vol. 2, No. 3, May, June 1977, Publ. in December, 1978
- 3 O. K. Rahiman Some factors influencing communication pattern among members of charachmandals in Kerala Agri. Res. J. Kerala, 1978 16 (1) 54-58
- 4 G. Balakrishna Pillai and G. T. Nair A study on the factors influencing adoption of soil conservation measures Indian J. soil Conserv. (1978) 5
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- 6 A. G. G. Menon and L. Prema The credibility of various sources of information on human nutrition. Agri. Res. J. Kerala 1978 16 (2): 217-223
- 7 O. Abdual Rahiman and A. G. G. Menon Motivational factors related to the participation of farmers in correspondence course in Agriculture. Agri. Res. J. Kerala, 16 (2) 155-159.
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#### Deartment of Agri. Statistics

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- 3 K. Sivan Pillai, P. Saraswathy and E. J. Thomas (1978) Biometric studies on yield and its component characters on pepper (Piper nigrum), L. Curr. Sci. 8 (7): 314-315.

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**Department of Agri. Engineering**

- 1 Jose Samuel (1978) Some Engineering aspects of post harvest technology. Paper presented in the Seminar on post-harvest technology, College of Horticulture, Vellankkara, October, 1978.
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- 3 Jose Samuel and P. Jacob John (1978) Power inputs to Agriculture in Kerala State. Paper presented to the Task force on Agro-based Industries, Kerala State Planning Board.
- 4 P. Jacob John and Jose Samuel (1978) Agricultural Engineering Education, Extension and Research in Kerala State. Paper presented to the Task force on Agro-based Industries, Kerala State Planning Board.

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## Appendix - VII

### COLLEGE OF HORTICULTURE — LIST OF ACADEMIC STAFF

Associate Dean (1)  
1 Dr. P. C. Sivaraman Nair

#### Department of Pomology & Floriculture

Professor (1)  
1 Dr. M. Aravindakshan  
Assistant Professor (1)  
1 Sri. S. Ramachandran Nair  
Jr. Asst. Professor (1)  
1 Sri. Joseph Philip

#### All India Co-ordinated Fruit Improvement Project—Survey Collection and evaluation of Germplasm of Jack Fruit

Assoc. Professor (1)  
1 Vacant  
Jr. Asst. Professors (2)  
1 Sri. T. Vilasachandran  
2 Sri. K. Gopikumar

#### Department of Plantation Crops and Spices

Professor (1)  
1 Vacant  
Asst. Professor (1)  
1 Sri. G. Sreekandan Nair  
Jr. Asst. Professor (1)  
1 Sri. E. V. Nybe

#### Department of Olericulture

Professor (1)  
1 Dr. P. K. Gopalakrishnan  
Special Officer (1)  
1 Dr. K. V. Peter  
Jr. Asst. Professor (1)  
1 Sri. Jacob John

#### Department of Processing Technology

Professor (1)  
1 Vacant  
Assistant Professor (1)  
(Nutrition)

1 Smt. N. K. Vimalakumari  
Jr. Asst. Professor (1)  
1 Smt. P. K. Valsalakumari

#### K.A.D.P.

Professors (4)  
1 Sri. K. Kannan  
2 Dr. N. Mohanakumaran  
3 Sri. V. K. Damodaran  
4 Sri. S. Balakrishnan

Assoc. Professors (3)  
1 Sri. K. Madhavan Nair  
2 Sri. P. A. Wahid  
3 Vacant

Asst. Professors (6)  
1 Sri. P. K. Rajeevan  
2 Sri. M. Abraham/Smt. S. Bhavani Devi  
3 Sri. K. K. Ravindran Nair  
4 Vacant  
5 Sri. A. Augustine  
6 Sri. K. Chandrasekharan Nair/  
Smt. K. C. Marykutty

#### Department of Agronomy

Associate Professor (1)  
1 Dr. R. Vikraman Nair  
Asst. Professor (1)  
1 Sri. G. K. Balachandran Nair

#### Department of Agri. Botany

Associate Professor (1)  
1 Dr. K. M. Narayanan Namboodiri  
Asst. Professors (3)  
1 Dr. K. Kumaran  
2 Smt. V. K. Mallika  
3 Sri. Luckins C. Babu

#### Department of Soil Science & Agril. Chemistry

Assoc. Professor (1)  
1 Dr. A. I. Jose

Asst. Professors (3)  
1 Smt. K. Leela  
2 Smt. G. Droupathi Devi  
3 Dr. S. Kabeerathumma

**Department of Agrl. Entomology**

Assoc. Professor (1)

1 Dr. D. Dale/Dr. A. Visalakshy

Asst. Professors (3)

1 Dr. P. J. Joy

2 Sri. G. Madhavan Nair

3 Smt. T. Nalinakumari

**All India Co-ordinated Research Project on  
Biological Control of Crop Pests**

Professor (1)

1 Dr. C. C. Abraham

Jr. Asst. Professors (2)

1 Smt. M. K. Sheila

2 Smt. Sosamma Jacob.

**Department of Plant Pathology**

Assoc. Professor (1)

1 Dr. Abi Cheeran

Asst. Professors (2)

1 Dr. C. K. Peethambaran

2 Sri. Sukumara Varma

**Pepper Research Scheme**

Jr. Asst. Professor (1)

1 Sri. B. Monankumar

**Department of Agrl, Economics**

Professor (1)

1 Dr. V. Radhakrishnan

Asst. Professor (1)

1 Dr. E. R. Narayanan Nair/  
Sri. K. Mukundan

**Department of Agrl. Extension**

Assoc. Professor (1)

1 Sri. V. G. Manomohan

Asst. Professor (1)

1 Sri. K. P. Ramachandran Nair

**Department of Agrl. Statistics**

Asst. Professor (1)

1 Sri. P. V. Prabhakaran

**Department of Agrl. Engineering**

Jr. Asst. Professor (1)

1 Sri. Abraham K. George

**Department of Meteorology**

Assoc; Professor (1)

1 Dr. P. Balakrishna Pillai

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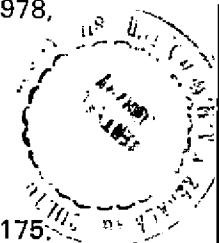
## Appendix - VIII

### COLLEGE OF HORTICULTURE — LIST OF PUBLICATIONS

- |    |  |   |   |
|----|--|---|---|
| 1  | P. K. Gopalakrishnan & B. Choudhury                          | Effect of Plant regulator sprays on modification of sex, fruit set and development in watermelon.           | Indian Journal of Horticulture, 1978 : 235-241.                                   |
| 2  | C. Ramachandran and P. K. Gopalakrishnan                     | Correlation and regression studies in bittergourd.  | Indian J. Agric. Sci. (Accepted) 1979.  |
| 3  | C. Ramachandran and P. K. Gopalakrishnan                     | Studies on genetic variability in bittergourd.  | Kerala Agric. Res. J. (Accepted) 1978.  |
| 4  | C. Ramachandran, P. K. Gopalakrishnan and K. V. Peter.       | Genetic divergence in bittergourd,  | Vegetable Science (sent for publication) 1978.                                    |
| 5  | C. Ramachandran and P. K. Gopalakrishnan.                    | Assessment of bittergourd types in relation to preservation.  | Presented in the Seminar on Postharvest Technology organised by KAU 1979.         |
| 6  | C. Ramachandran, P. K. Gopalakrishnan and P. V. Prabhakaran. | Path analysis in bittergourd.   | South Indian Horticulture (Accepted) 1979.  |
| 7  | C. Ramachandran and P. K. Gopalakrishnan.                    | Sex expression in <i>Momordica charantia</i> -L.  | Kerala Agric. Res. J. (Sent for Publication) 1979.                                |
| 8  | C. Ramachandran and P. K. Gopalakrishnan.                    | Variability for biochemical traits in bittergourd.  | Kerala Agric. Res. J. (Sent for Publication) 1979.                                |
| 9  | K. V. Peter, S. Sornaik and C. Ramachandran.                 | Inheritance of free necked character, nipple tip and oval fruit shape and their linkage estimates in tomato | Vegetable Science (sent for publication) 1979.                                    |
| 10 | V. K. Damodaran  | Processing of cashewnut and its by products.  | Paper presented in the Seminar on Post-harvest Technology of October 1978.        |
| 11 | V. K. Damodaran  | Genetic Improvement of Cashew in Kerala.  | Paper presented in the International Cashew Symposium held at Cochin-March. 1979. |
| 12 | V. K. Damodaran, P. K. Valsalakumari and K. K. Vidyadharan.  | Vegetative propagation in Cashew: Research in Kerala  | paper presented in the International Cashew Symposium held at Cochin-March 1979.  |
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- 16 C. C. Abraham and K. S. Remamony. New record of Myrmacine ants as pests of bhindi *Abelmoschus esculentus* Meench. J. Bombay. Nat. Hist Soc, April 78, 95 (1):242-243.
- 17 C. C. Abraham Post-harvest losses due to pest infestation in stored ginger and turmeric in Kerala and strategy for their management. paper presented at the Symposium on Proc. Tech. College of Hort, Vellanikkara, 1978.
- 18 C. C. Abraham, P. J. Joy & Abi Cheeran. New Record of *Ramphan* Sp. (Co. Cerambycidae: Trioniae) as a serious pest of *Erythrina indica* live standards in pepper plantations. J. Pin. Crops 1978 6 (2):97-98,
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- 42 B. Mohankumar and P. V. Prabhakaran. Determination of leaf area in pepper using at near measurement. (Sent for publication)
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- 45 K. P. Mamootty, Abi Cheeran and C. K. Peethambaran. Rhizoctonia rot of Pepper.
- 46 Mamootty, K. P., Abi Cheeran and C. K. Peethambaran. Damping of pepper seedlings. Sent for publication) Ag. Res. J. Kerala, '75
- 47 Abi Cheeran and C. K. Peethambaran. Studies on the pink and gummosis diseases of cashew. Presented at the International Symposium on Cashew, 1979 held at Cochin.



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| 48 | C. K. Peethambaran,<br>V. K. Sasidhar and<br>N. Mohanakumar.   | influence of post harvest treatments<br>on shelf life of vegetables.                                  | Presented at Post-harvest<br>Technology Seminar, 21-10-78  |
| 49 | K. K. Vidyadharan<br>& C. K. Peethambaran                      | Root studies in cashew seedlings<br>and air layers,   | International Symposium on<br>cashew, 1979.  |
| 50 | K. Gopikumar, M.<br>Aravindakshan and<br>P. V. Prabhakaran.    | Correlation between nut and seed-<br>lings character of cashew ( <i>Anacardium<br/>occidentale</i> L) | Presented in the international<br>Symposium held at Cochin from<br>12th to 15th March 1979   |
| 51 | K. Gopikumar, M.<br>Aravindakshan and<br>K. M. N Namboodiri    | Variations in open pollinated seed-<br>ling progenies in cashew ( <i>Anacardium<br/>occidentale</i> ) | Presented in the International<br>Symposium on Cashew held at<br>Cochin from 12th to 15th March<br>1979.   |
| 52 | K. Gopikumar, M.<br>Aravindakshan and<br>P. V. Prabhakaran.    | Nutrient status in relation to seedling<br>vigour in cashew.  | Cashew Bulletin, 1978 XV (12).   |
| 53 | M. Aravindakshan, K,<br>Gopikumar and S.<br>Ramachandran Nair. | Utilisation of jack fruit for<br>processing   | Presented in the Seminar on<br>Post-harvest Technology orga-<br>nised by the Kerala Agricultural<br>University held at the College<br>of Horticulture in October, 1978 |
| 54 | Joseph Philip and<br>P. C. Sivaraman Nair                      | Quantity variation of turmeric at<br>different stages of maturity.                                    | Presented in the Seminar on<br>Post-harvest Technology org-<br>nised by the KAU held at the<br>College of Horticulture in<br>October 1978                              |
| 55 | K. Gopikumar, P. V. Prabha-<br>karan and M. Aravindakshan      | Growth behaviour in cashew  | Cashew Bulletin, 1978, XVI (3)   |
| 56 | M. Aravindakshan,<br>K Gopikumar and<br>K. K. Vidyadharan      | Effect of rainfall on the quality of<br>nuts in Cashew ( <i>Anacardium occi-<br/>dentale</i> )        | Cashew Bulletin. 1978 XV (8)   |
| 57 | M. N. C. Nayar, K. R. Lyla<br>and K. Gopikumar                 | Effect of herbicides on quality and<br>shelf life of pineapple  | Presented in the Seminar on<br>post harvest Technology orga-<br>nised by the KAU held at the<br>College of Horticulture, Vellani-<br>kkara in October, 1978            |
| 58 | K. Gopikumar and<br>M. Aravindakshan                           | Variations in seedling characters of<br>different types of cashew in the<br>nursery                   | (Accepted for publication) in<br>'Cashew Causee 1979   |
| 59 | M. Aravindakshan and<br>K. Gopikumar                           | Seed viability in Cashew  | Cashew Bulletin 1979 XVI (C)   |
| 60 | K. Gopikumar and<br>M. Aravindakshan                           | Correlation studies in different<br>classes of cashewnuts In nursery                                  | (Accepted for publication) Cas-<br>hew Bulletin, 1979  |
| 61 | E. V. Nybe & P. C. S. Nair                                     | Quality variation of ginger at diff-<br>erent periods of maturity                                     | Paper presented in the Seminar<br>on post-harvest technology<br>organised by KAU Oct, 1978   |
| 62 | E. V. Nybe & P. C. S. Nair                                     | Field tolerance of ginger types to<br>important pests and diseases                                    | Indian Arecanut Spices and<br>Cocoa Journal, 1979, 2. (4)<br>109-112   |
| 63 | E. V. Nybe & P. C. S. Nair                                     | Varietal screening in ginger  | Agril. Res. J. of Kerala (sent for<br>publication)   |

- 64 E. V. Nybe & P. C. S. Nair Studies on morphology of ginger types. (Accepted for publication) Indian Arecanut spices and Cocoa Journal, 1979
- 65 E. V. Nybe & P. C. S. Nair Correlation studies in ginger Agril. Res. J. of Kerala (sent for publication)
- 66 K. C. Marykutty, Srinivas and P. B. Lal Root activity and soil feeding zones of some wheat varieties J. Indian. Soc. Soil Sci. 1978, Vol. 26 (4)
- 67 K. C. Marykutty, S. Balakrishnan and G. R. Pillai Studies on the performance of some mutants of Cavendish banana Agri. Res. J. of Kerala, 1978' 16 (1);14-17
- 68 P. V. Prabhakaran, S. Balakrishnan and K. C. Marykutty Optimum plot size for field trials with banana Agri. Res. J. Kerala, 1978, 16 (1) 33-38
- 69 R. Gonimony, S. Balakrishnan and K. C. Marykutty A comparative study of certain fruit qualities of twenty pineapple varieties Agri. Res. J. Kerala 1978 16 (1) 28-32
- 70 I. P. S. Nambiar, S. Balakrishnan & K. C. Marykutty Effect of application of graded doses of lime on the growth and yield of banana variety 'Zanzibar' Agri. Res. J. Kerala, 1978 17 (1) 128-129
- 71 N. K. Nayar, K. C. Marykutty and K. R. Lyla Studies on the genetic variability for desert qualities in banana Presented at the Seminar on post-harvest Technology Oct. 20th and 21st 1978
- 72 P. B. Pillai, K. S. Panicker and P. Chandrasekharan Influence of age of seedlings, spacing time of application of N on the yield of rice var IR. 8 Agri. Res. J. Kerala, 1977 16 (2) 227-228
- 73 P. B. Pillai, V. K. Sasidhar and R. Vikraman Nair Efficiency of complex fertilizers on rice Agri. Res. J. Kerala, 1979, 17 (1) 111-112
- 74 K. B. Nair, P. B. Pillai, K. P. M. Nair, & V. K. Sasidhar Relative efficiency of different herbicides on rice under semi-dry conditions Agri. Res. J. Kerala 1979 17 (1) 14-17.
- 75 T. Ramakrishnan Nair, P. B. Pillai & C. M. George. Chemical weed control in rice under semi-dry condition. Agri. Res. J. Kerala, 1979, 17 (1) 108-110
- 76 B. Mohankumar & P. B. Pillai Effect of different levels of N, P and K on the growth of cowpea var. P. 118. Agri. Res. J, Kerala (Accepted for publication) 1979.
- 77 B. Mohankumar, P. B. Pillai and P. V. Prabhakaran. Effect of levels of N, P and K on the uptake of nutrients and grain yield in cowpea. Agri. Res. J. Kerala (Accepted for publication) 1979.

#### Popular articles

- 1 M. Aravindakshan and K. Gopikumar. Cashew cultivation Kalpadhenu, III (6)
- 2 M. Aravindakshan and K. Gopikumar. Special features of Kerala Horticulture Accepted for publication in Idukki agri. Horticultutal Society Souvenir, (1978)
- 3 A. I. Jose Electron transport in living cells Hort. College Magazine 1978
- 4 G. K. B. Nair Modern cultivation in Vellanikkara Kalpadhenu, November 1978 1 (6).
- 5 G. Droupathi Devi and P. Balakrishna Pillai, The role of trace elements in plants Kalpadhenu 6 November—December, 1978
- 6 G. Droupathi Devi and P. Balakrishna Pillai. Bacterial Fertilizers Kalpadhenu 6 November—December, 1978.

7	A. Sukumara Varma	Rhizome root of ginger.	Mathrubumi 21-8-1978
8	C. K. Peethambaran and A. Sukumara Varma.	Mushrooms throughout the year.	Hindu, March 7, 1979.
9	Abi Cheeran	Disease of pepper	Pepper Res. Station, Souvenir 1979.
10	K. P. R. Nair and K. K. Vidyadharan.	Cashew	Kalpadhenu July-August, 1978
11	K. P. R. Nair	Pineapple cultivation	Malayala Manorama, 22nd February 1979
12	C. C. Abraham	Pest control in pepper plantations.	Silver Jubilee Souvenir, Pepper Res. Station, Pannlyoor Decem- ber 1978.
13	C. C. Abraham	Control Helopeltis antonii in cashew plantations.	Kalpadhenu, March, 1979
14	C. M. George, C. C. Abraham & P. J. Joy	Control rats effectively.	Kalpadhenu, Nov., Dec. 78-79
15	P. K. Gopaiakrishnan & C. Ramachandran	Winged Bean	Deepika Daily, December, 14, 1979
16	P. K. Gopaiakrishnan & C. Ramachandran	Model Kitchen garden	Kalpadhenu, Jan., Feb. 1979
17	P. K. Gopalakrishnan & C. Ramachandran.	Ginger cultivation in high ranges	Souvenir of Idikki Agri-Horti- cultural Society, 1979
18	P. K. Gopaiakrishnan & C. Ramachandran	Clove cultivation and problems	Kalpadhenu, March-April, 1979
19	P. K. Gopalakrishnan & C. Ramachandaran	Medicinal yam	Kalpadhenu, March-April' 1979.
20	P. K. Gopaiakrishnan & C. Ramachandran	Moringa	Kalpadhenu, 1979
21	P. K. Gopalakrishnan & C. Ramachandran	Brinjal	Kalpadhenu, 1979
22	P. K. Gopaiakrishnan & C. Ramachandran	Coccinia	Kalpadhenu, 1979
23	A. I. Jose	What makes pepper a spice,	Pepper Res. Station, Souvenir, 1978
24	P. B. Pillai	Role of calcium in plant nutrition	College of Horticulture Annual 1977
25	P. B. Pillai	Manuring of Viruppu rice (Malayalam)	Mathrubhumi, 15-5-1978
26	P. B. Pillai	Water requirement of rice (Malayalam)	Mathrubhumi, 5-6-1978
27	P. B. Pillai	Top dressing of viruppu rice (Malayalam)	Mathrubhumi, 10-7-1978
28	P. B. Pillai	Selecting varieties for Mundakan rice (Malayalam)	Mathrubhumi, 7-8-1978
29	P. B. Pillai	Mundakan rice will not be a loss (Malayalam)	Mathrubhumi, 16-10-68
30	P. B. Pillai	Seeds & Seedlings for Punched rice (Malayalam)	Mathrubhumi, 1-1-1979
31	P. B. Pillai	Is common salt a manure	Kalpadhenu (Malayalam) July- August, 1979.

## Appendix - IX

### COLLEGE OF VETERINARY & ANIMAL SCIENCES LIST OF ACADEMIC STAFF

- Note:- (1) The posts shown under each category include posts pertaining to the discipline in all Research Stations, Farms, etc. under the Kerala Agricultural University.*  
*(2) Since Junior Assistant Professors are transferrable between departments, these posts are shown separately at the end of the list.*

#### Department of Anatomy.

- 1 Professor  
1 Dr. Radhakrishnan, K.
- 2 Assoc. Professor  
1 Sri. Oommer, P. A.
- 3 Asst. Professor  
1 Smt. Lucy Paily

#### Department of Animal Management.

- 1 Professor  
1 Vacant
- 2 Assoc. Professors  
1 Sri. T. G. Rajagopalan
- 3 Assistant Professors (2)  
1 Sri. Kurien Thomas (on deputation)  
2 Vacant.
- 4 Supdt. Pig Farm  
1 Dr. V. Raju.

#### Department of Animal Reproduction

- 1 Professors (2)  
1 Sri. C. K. S. V. Raja (on deputation)  
2 Vacant.
- 2 Assoc. Professors (3)  
1 Sri. Neelakanta Iyer, C. P.  
2 Sri. Bharathan Namboodiripad, T. R.  
3 Sri. Prabhakaran Nair, K.
3. Asst. Professors (5)  
1 Sri. Mathai. E. (on leave)  
2 Sri. Sudarsanan, V.  
3 Sri. Sthanumalayan Nair, M.  
4 Sri. Madhavan, E.  
5 Vacant.

(In addition, Dr. K. Ramadas, Superintendent, Vety. Hospital, Kokkalai has also been nominated as Asst. Professor in the Department of Animal Reproduction)

#### Department of Animal Breeding & Genetics.

1. Professor  
1 Vacant
2. Assoc. Professors ( )  
1 Sri. Mukundan, G. (on deputation)  
2 Sri. Krishnan Nair, B. R.  
3 Vacant
3. Asst. Professors (4)  
1 Abraham, K. C. (on leave)  
2 Rajagopala Raja, C. A.  
3 Sosamma Iype (AICRP - Poultry)  
4 Vacant

#### Department of Clinical Medicine (Therapeutics)

1. Professor  
1 Vacant
2. Assoc. Professor  
1 Sri. Alikutty, K. M.
3. Asst. Professor  
1 Sri. Aleyas, N. M.

(Out of the two posts of Asst. Professors, one post was down graded to Instructor vide GA(4)-40516/77 dt. 23.6.1977: E2-6767/77)

#### Department of Dairy Science

- 1 Professor (1)  
1 Sri. Subrahmaniam, M.
- 2 Assoc. Professor (1)  
1 Sri. Parameswaran Nair, K.  
(at Thumburmuzhi)

- 3 Asst. Professors (3)  
 1 Sri. Pavithran, K.  
 2 Sri. Parameswaran, M. N. (on leave)  
 3 Sri. Sukumaran, M. V.  
 4 Vacant

#### Department of Extension

- 1 Professor (1)  
 1 Sri. Nair, G. R.  
 2 Assoc. Professors (2)  
 1 Sri. Prabhakaran, T.  
 3 Asst. Professor (1)  
 1 Sri. Pushkaran, P. S.

#### Department Microbiology

- 1 Professor (1)  
 1 Sri. Abdulla, P. K.  
 2 Assoc. Professor (2)  
 1 Smt. Sulochana, S.  
 2 Sri. Punnose, K. T.  
 3 Asst. Professors (2)  
 1 Sri. Jayaprakash, V.  
 2 Sri. James, P. C. (on leave)  
 3 Vacant

#### Department of Nutrition

- 1 Professor (1)  
 Sri. Sivaraman, E.  
 2 Assoc. Professors (6)  
 1 Sri. Ananthasubramaniam, C. R.  
 2 Sri. Morley Mohan Lal, G. (on leave)  
 3 Sri. Thomas, C. T.  
 4 Smt. Kunjikutty, N.  
 5 Maggie D. Menancherry  
 6 Devassia, P. A.  
 7 Vacant  
 3 Asst. Professors (5)  
 1 Sri. James, C. S.  
 2 Sri. Ramachandran, P. \*  
 3 Sri. George Mathan  
 4 Sri. Viswanathan, T. V.  
 5 Sri. Sebastian, K. S.

#### Department of Parasitology

- 1 Professor (1)  
 1 Sri. Kalyanasundaram, R.

- 2 Assoc. Professors (2)  
 1 Sri. Rajamohan, K.  
 2 Vacant.

- 3 Asst. Professors (4)  
 1 Sri. Madhavan Pillai, K. (on leave)  
 2 Sri. Chandrasekharan, K.  
 3 Sri. Sathianesan, V.  
 4 Sri. Pythal, C.  
 5 Vacant.

#### Department of Pathology

- 1 Professors (2)  
 1 Dr. M. Krishnan Nair  
 2 Sri. Rajan, A.  
 2 Assoc. Professors (2)  
 1 Sri. Ramachandran, K. M.  
 2 Smt. Maryamma. K. I. (on leave)  
 3 Asst. Professors (4)  
 1 Smt. Valsala, K. V. (on leave)  
 2 Vacant.  
 3 Vacant.  
 4 Vacant.

#### Department of Pharmacology

- 1 Professor (1)  
 1 Sri. Rajagopalan, M. K. (on leave)  
 2 Sri. Jacob V. Cheeran  
 2 Assoc. Professors (2)  
 1 Zacharias Cherian  
 2 Marykutty, P.  
 3 Assistant Professors (2)  
 1 Sri. Gopakumar, N.  
 2 Sri. Chandrasekharan Nair, A. M.

#### Department of Physiology

- 1 Professor (1)  
 1 Sri. Nirmalan, G.  
 2 Assoc. Professors (2)  
 1 Sri. Venugopalan, G. (on deputation)  
 2 Sri. Ramachandran Pillai, M. G.  
 4 Sri. Sadanandan, K. P.  
 3 Assistant Professors (4)  
 1 Sri. Surendranathan, K. P.  
 2 Sri. Jacob, E. T.  
 3 Smt. Philomina, P. T.

(\* Dr. P. Ramachandran was on working arrangement in the Pig Farm, Mannuthy. Dr. Sebastian was transferred to Thiruvazhamkunnu)

**Department of Poultry Science**

- 1 Professors (2)  
 1 Sri. Ramakrishnan, A.  
 2 Sri. Unni. A. K. K. (on deputation)  
 3 Sri. Venugopalan, C. K.
- 2 Assoc. Professor (1)  
 1 Sri. Sabarinathan Nair, R.
- 3 Assistant Professors (2)  
 1 Sri. Reghunathan Nair, G.  
 2 Sri. Renchi P. George

(one of these posts of Assistant Professors (Poultry Path. is shown in the Department of Pathology)

**Department of Preventive Medicine**

- 1 Professor (1)  
 1 Vacant.
- 2 Associate Professors (2)  
 1 Sri. Paily. E. P.  
 2 Sri. Georgekutty, P. T.
- 3 Asst. Professor (1)  
 1 Vacant.

**Department of Surgery**

- 1 Professor (1)  
 1 Vacant.
- 2 Assoc. Professors (3)  
 1 Sri. George, P. O.  
 2 Sri. Muraleedharan Nair, K. N.  
 3 Sri. Jalaluddin, A. M. (on deputation)  
 4 Vacant.
- 3 Asst. Professors (2)  
 1 Raveendran Nair, S.  
 2 Sri. Abraham Varkey, C.

**Department of Vety. Public Health**

- 1 Professor (1)  
 1 Vacant.
- 2 Assoc. Professors (2)  
 1 Padmanabha Iyer, R.  
 2 Soman, M.

- 3 Asst. Professor (1)  
 1 Sri. Prabhakaran, P.

**Veterinary Hospital, Kokkalai, Trichur**

- 1 Assoc. Professor (1)  
 1 Vacant.
- 2 Assistant Professor (1)  
 (Superintendent)  
 1 Ramadas, K.

**Veterinary Hospital, Mannuthy**

- 1 Associate Professor (1)  
 1 Vacant

**Jr. Asst. Professors in various Departments**

- 1 Dr. Francis, U. T. - Dairy Science  
 2 .. Santha E. George - Pharmacology  
 3 .. Harsan, K. R. - Anatomy  
 4 .. Sreekumaran, T. - Animal Reproduction  
 5 .. Venugopalan, K. - Pharmacology  
 6 .. Sarada Amma, T. - Surgery  
 7 .. Joseph Mathew - Animal Reproduction  
 8 .. Sreedharan  
 Unni, C. K. - Anatomy  
 9 .. Reghunanandan,  
 K. V. - Genetics  
 10 .. Lalithakunjamma,  
 C. R. - Pathology  
 11 .. Sreekumaran, T. - Pathology  
 12 .. Vijayakumar, V. - Animal Reproduction  
 13 .. Andrews, C. V. - Poultry Science  
 14 .. George, O. J. - Poultry Science  
 15 .. George, M. C. - Microbiology  
 16 .. Jayakumar, K. M. - Therapeutics  
 17 .. Peethambaran,  
 P. A. - Poultry Science  
 18 .. Athman, K. V. - Animal Reproduction  
 19 .. Mukundan, M. - Dairy Science  
 20 .. Aravindakshan,  
 C. M. - Pharmacology  
 21 .. Nandakumaran, B. - Genetics

- |    |    |                             |   |                     |    |                         |   |                        |
|----|----|-----------------------------|---|---------------------|----|-------------------------|---|------------------------|
| 22 | .. | Venugopalan, K.             | - | Preventive Medicine | 38 | Dr. Krishnan Nair, G.   | - | Microbiology           |
| 23 | .. | Annamma Kurien              | - | Nutrition           | 39 | .. Elizabeth, V. K.     | - | Poultry Science        |
| 24 | .. | Subhadra, M. R.             | - | Extension           | 40 | .. Aravinda Ghosh K. N. | - | Animal<br>Reproduction |
| 25 | .. | Somanathan, V.L.            | - | Animal Management   | 41 | .. Francis Xavier       | - | Animal Manage-<br>ment |
| 26 | .. | Amrithavallay<br>Panan      | - | Poultry Science     | 42 | .. Leo Joseph           | - | Poultry Science        |
| 27 | .. | Narayanan-<br>kutty, K.     | - | ..                  | 43 | .. Jose, M. T,          | - | Vety. Public<br>Health |
| 28 | .. | Sabu Kuruvila               | - | ..                  | 44 | .. Raghavan, K. C.      | - | Genetics               |
| 29 | .. | Nanu, E.                    | - | Vety. Public Health | 44 | .. Radhamma Pillai, A.  | - | Poultry Science        |
| 30 | .. | Baby, P. G.                 | - | (on leave)          |    |                         |   |                        |
| 31 | .. | Madhusoodanan<br>Pillai, R. | - | Microbiology        |    |                         |   |                        |
| 32 | .. | Saseendranath,<br>M. R.     | - | (on leave)          |    |                         |   |                        |
| 33 | .. | Joy, A. D.                  | - | Pharmacology        |    |                         |   |                        |
| 34 | .. | Manomohan<br>C. B.          | - | Pathology           |    |                         |   |                        |
| 35 | .. | Mercy, A. D.                | - | Nutrition           |    |                         |   |                        |
| 36 | .. | Subramaniam, H.             | - | Parasitology        |    |                         |   |                        |
| 37 | .. | Abraham, J.                 | - | Vety. Public Health |    |                         |   |                        |
- Department of Statistics**
- |   |                            |                     |
|---|----------------------------|---------------------|
| 1 | Professor                  | (1)                 |
| 1 | Dr. Surendran, P. U.       |                     |
| 2 | Assoc. Professor           |                     |
|   | Nil                        |                     |
| 3 | Asst. Professor            |                     |
|   | Nil                        |                     |
| 4 | Jr. Asst. Professor        |                     |
|   | Instructor/ Jr. Instructor | : Sri. Sunny, K. L. |

□ □

# Appendix - X

## (LIST OF PUBLICATIONS)

### COLLEGE OF VETERINARY & ANIMAL SCIENCES

#### Department of Anatomy

- 1 K. R. Harshan, K. Radhakrishnan, P. A. Ummer & Lucy Paily (1978) Post natal development of epididymis in Malabari Goats (*Capra hircus*) *Kerala J. Vet. Sci.* 9 (2): 279-289

#### Department of Animal Management

- 2 K. S. Sebastian (1978) Studies on feeding value of starch waste as an ingredient in swine ration. *Kerala J. Vet. Sci.* 8: 133-138
- 3 B. R. K. Nair & T. G. Rajagopalan (1978) Studies on certain economic traits in Surti breed of buffaloes. *Kerala J. Vet. Sci.* 9: 175-185

#### Department of Animal Reproduction

- 4 E. Madhavan & C. K. S. V. Raja (1978) Effecting of early weaning on the growth and survival capacity of piglets *Kerala J. Vet. Sci.* 9 (1):14
- 5 E. Mathai, E. T. Jacob, K. C. Abraham & B. R. Krishnan Nair (1978) Studies on certain factors influencing birth weight in Sindhi and Jersey grades *Kerala J. Vet. Sci.* 9 (1) 5-14
- 6 Joseph Mathew & C. K. S. V. Raja (1978) Studies on testicular hypoplasia in goats *Kerala J. Vet. Sci.* 9 (1): 24-30
- 7 E. Mathai, K. Prabhakaran Nair & C. K. S. V. Raja (1978) Studies on the biometry, histology and histo chemistry of corpus luteum at different stages of pregnancy in goats. *Kerala J. Vet. Sci.* 9 (1): 38-46
- 8 Joseph Mathew, & C. K. S. V. Raja (1978) Investigation on incidence of cryptorchidism in goats *Kerala J. Vet. Sci.* 9 (1): 47-52
- 9 E. Mathai, K. Prabhakaran Nair & C. K. S. V. Raja (1978) Studies on the Biometry, histology and histo chemistry of corpus luteum in cows *Kerala J. Vet. Sci.* 9 (1): 75-82
- 10 K. Prabhakaran Nair & P. J. Philip (1978) A note on caudectomy in a bull *Kerala J. Vet. Sci.* 9 (1): 88-91
- 11 E. Mathai & C. K. S. V. Raja (1976) Pattern of oestrous cycle in Jersey Sindhi heifers *Kerala J. Vet. Sci.* 9 (1): 159-166
- 12 E. Madhavan & C. K. S. V. Raja (1978) Effect of early weaning on the future reproductive performance of cows *Kerala J. Vet. Sci.* 9 (1): 186-191
- 13 V. Balakrishna Pillai, C. P. Neelakanta Iyer & E. Mathai (1978) Efficiency of Coconut milk extender as a diluent for the preservation of buck semen at room temperature *Kerala J. Vet. Sci.* 9 (2): 290-292



- 14 K. Ramadas, C. P. Neelakanta Iyer & C. K. S. V. Raja (1978) Studies on the efficiency of intra uterine administration of antibiotics to improve conception rate in cows *Kerala J. Vet. Sci* 9(2): 311-314
- 15 T. R. B. Namboothiripad & S. N. Luktuke (1978) Studies on the gonads and hypophysitis cerebri of anoestrous buffaloes *Kerala J. Vet. Sci* 9 (2): 293-310
- 16 T. R. B. Namboothiripad S. B. Kulshreshta & S. N. Luktuke (1978) A report of Genital listerial infection in a buffalo *Kerala J. Vet. Sci.* 9 (2) 315-319
- 17 T. R. B. Namboothiripad S. B. Kulshreshta, N. S. Parihar & S. N. Luktuke (1978) Studies on infection in the genital tract of buffalo *Kerala J. Vet. Sci.* 9 (1): 320-330
- 18 E. Mathai & K. M. Ramachandran (1978) Testicular degeneration in a saanen buck. A case report *Kerala J. Vet. Sci.* 9 (2): 331-333

#### Department of Animal Breeding & Genetics

- 19 B. R. Krishnan Nair, K. R. Kelath, K. C. Abraham & P. G. Nair (1978) Evaluation of Brownswiss sires by progeny testing. *Kerala J. Vet. Sci.* 2 : 175-185
- 20 B. R. Krishnan Nair & T. G. Rajagopalan (1978) Studies on certain economic traits in Surti breed of buffaloes (1), Birth weight and sex ratio. *Kerala J. Vet. Sci.* 9 (1) : 149-158
- 21 B. R. Krishnan Nair (1978) Goats for Milk production - performance of crossbreds. Proceedings of Seminar on progress of research in Animal Breeding and Genetics during a decade, NDRI, Karnal, June 1978.
- 22 K. V. Reghunandan, B. R., Krishnan Nair and T. G. Rajagopalan (1978) Pro-weaning performance of pure-bred Vs. crossbred pigs. Proceedings of Seminar on Research in Animal Breeding and Genetics during a decade. Held at Karnal, June, 1978.
- 23 E. Mathai, E. J. Jacob, K. C. Abraham & B. R. Krishnan Nair (1978) Studies on certain factors influencing birth weight in Sindhi and Jersey grades. *Kerala J. Vet. Sci.* 2 (1) : 5-14

#### Department of Clinical medicine (Therapeutics)

- 24 K. M. Alikutty & N. M. Aleyas (1978) Experimental weed *Glinucs oppositifollum* toxicity in cattle. *Kerala J. Vet. Sci.* 2 (1) : 145-148
- 25 K. M. Alikutty & N. M. Aleyas (1978) Amastia of the rear quarter in a cow. *Modern Vet. Practice*, 59 (8) : 623

#### Department of Dairy Science

- 26 P. R. Moorthy & Subrahmanyam, M. (1978) Studies on the keeping quality of raw milk samples under tropical conditions. *Kerala J. Vet. Sci.* 9 (2): 254-259.

#### Department of Microbiology

- 27 R, Madhusoodanan Pillai, P. K. Abdulla & K. T. Punnose (1979) Studies on the bacterial species associated with pneumonia in goats. *Kerala J. Vet. Sci.* 10 (1)

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- 39 C. R. Ananthasubramaniam & C. S. James (1979) Nutritive value of solvent extracted coconut meal for cattle. *Kerala J. Vet. Sci.* 10 (1) : 17-20
- Department of Parasitology**
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- Department of Pathology**
- 41 K. M. Ramachandran (1978) Electron microscopic observations on nerve lesion in classic form of natural cases of Marek's disease. *Kerala J. Vet. Sci.* 10 (1) : 31-34
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- Department of Physiology**
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63	A. Radhamma Pillai, C. K. Venugopalan, A. K. K. Unni & Maggie Menachery (1978)	Evaluation of Rubber seed meal in broiler diets.	<i>Orissa Vet. J.</i> 12 (5):199-204.
64	V. K. Elizabeth, C. K. Venugopalan & A. K. K. Unni.	Utilization of dried poultry manure in broiler ration.	<i>Kerala J. Vet. Sci.</i> 9(2): 235-240.
65	A. Ramakrishnan, M. Sreenivasa Reddy and C. R. Mathur (1978)	Nutritive value of Niger cake for chicks.	<i>Indian Poult. Gaz.</i> 62(2):118-121

**Department of Statistics**

66	P. U. Surendran (1978)	Estimation of body weight of calves from body measurements.	<i>Kerala J. Vet. Sci.</i> 9(1):53-57.
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**Others**

P. G. Nair, R. P. Iyer & G. Nirmalan (1978)	Sources of meat for human nutrition in Kerala, India.	Papers read in absentia at the XII <sup>th</sup> International Symposium on Animal Husbandary Milano, Italy.
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**List of Extension Articles Published**

1	K. Chandrasekharan (1978)	Coccidiosis in Goats	<i>Kalpadhenu</i> , 5(5): 149-150.
2	V. Santhianesan (1978)	Nematodes of goats	<i>Kalpadhenu</i> 5 (5).
3	C. R. Lalithakunjamma & K. M. Ramachandran (1978)	Pneumonia in goats (Malayalam)	<i>Kalpadhenu</i> 5:123-124.
4	C. R. Lalithakunjamma & K. M. Ramachandran [1978]	Paratuberculosis in goats (Malayalam)	<i>Kalpadhenu</i> , 5:101.
5	K. M. Ramachandran and C. R. Lalithakunjamma (1978)	False tuberculosis in goats (Malayalam)	<i>Kalpadhenu</i> 5:102.
6	K. I. Mariyamma (1978)	Aflatoxicosis in Goats (Malayalam)	<i>Kalpadhenu</i> 5:97-98.
7	K. I. Mariyamma (1978)	Fungal toxins could be fatal (Malayalam)	<i>Mathrubhumi</i> dated 14-8-78.
8	K. I. Maryamma (1978)	Cancer in birds (Malayalam)	<i>Malayala Manorama</i> dated 14-9-78.
9	A. Rajan (1978)	Cancer of the facial sinuses in cattle (Malayalam)	<i>Mathrubhumi</i> dated 7-11-78.
10	A. Ramakrishnan (1979)	Modern Trends in Poultry production	<i>RAASH</i> Feb. 79:63-65.
11	Radhamma Pillai, A. (1979)	Thyroid in birds.	<i>Poultry Adviser</i> . 12 (3): 49-53.
12	V. K. Elizabeth (1978)	A review on the utilisation of dried Poultry manure in poultry feeding.	<i>'RAASH'</i> Dec. 78:579-583.
13	R. Sabarinathan Nair and A. Jalaludeen (1979)	Behavioural pattern in fowls.	<i>Poultry Adviser</i> 12(2)25-26)
14	A. Jalaludeen, G. R. Nair & A. K. K. Unni (1979)	The importance of compound feed in egg production.	<i>Poultry Adviser</i> 12(2)25-38)
15	Amrithavally Panan (1979)	B. D. G. in Poultry feed (Malayalam.)	<i>Kalpadhenu</i> 6 (3):111-112.
16	R. Sabarinathan Nair (1979)	Meat birds (Malayalam)	<i>Kerala karshakan</i> 28:25-31.
17	R. Sabarinathan Nair (1979)	Grow meat birds (Malayalam)	<i>Deepika</i> , March, 16 1979
18	J. Abraham (1978)	Worm infestation in man and Animals (Malayalam)	<i>Malayala Menorama Daily</i> October, 78.

## Appendix XI

INSTITUTE OF AGRICULTURAL TECHNOLOGY, TAVANUR.

### LIST OF ACADEMIC STAFF

Special Officer		
Assoc. Professor (Agrl. Botany)	1	
Assistant Professor (Hort)	1	
-do- (A. H. Nutrition)	1	(Vacant)
Instructor (Agrl. Engg.)	1	
Research Assistant	1	
Jr. Asst. Professor (Pharmacology)	1	
-do- (Plant Path.)	1	
-do- (Plant Path.)	1	
-do- (Farm )	1	
<b>LSA Training Course</b>		
Asst. Professor	1	(Vacant)*
Jr. Asst. Professor	2	(Vacant)*
<b>Inservice Training</b>		
Assistant Professor	1	(Vacant)*
Jr. Asst. Professor	2	

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\* Included in the Veterinary Faculty

## Appendix - XII

### STAFF OF RESEARCH STATION

<p><b>1 Coconut Research Station, Nileshwar/ Pilicode</b></p> <p>1 Assoc. Professor (Agronomy, Entomology &amp; Chemistry) 3</p> <p>2 Assistant Professor (Agronomy, Botany and Plant Pathology) 3</p> <p>3 Supporting staff 46</p>	<p><b>8 Rice Research Station, Moncompu</b></p> <p>Assoc. Professors (Botany, Chemistry &amp; Agronomy) 3</p> <p>Asst. Professor (Entomology) 1</p> <p>Supporting Staff 16</p>
<p><b>2 Coconut Research Station, Balaramapuram</b></p> <p>1 Assoc. Professor (Agronomy) 1</p> <p>2 Asst. Professor (Entomology, Plant Pathology) 2</p> <p>3 Supporting Staff 8</p>	<p><b>9 Horticultural Res. Station, Ambalavayal</b></p> <p>Assistant Professor (Agronomy, Botany &amp; Entomology) 3</p> <p>Supporting Staff 39</p>
<p><b>3 Coconut Research Station, Kumarakom</b></p> <p>1 Assoc. Professors (Plant Pathology) 2</p> <p>2 Asst. Professor [Entomology] 1</p> <p>3 Supporting Staff 10</p>	<p><b>10 Pepper Research Station, Taliparamba</b></p> <p>Assistant Professor (Agronomy, Chemistry and Botany) 3</p> <p>Jr. Instructor (Entomology) 1</p> <p>Supporting Staff 6</p>
<p><b>4 Rice Research Station, Pattambi</b></p> <p>1 Assoc. Professors (Agri. Botany &amp; Chemistry) 2</p> <p>2 Asst. Professor (Plant Pathology &amp; Chemistry) 2</p> <p>3 Instructor (Plant Pathology) 1</p> <p>4 Junior Instructors 3</p> <p>5 Supporting Staff 72</p>	<p><b>11 Cashew Res. Station, Anakkayam</b></p> <p>Assoc. Professor (Agronomy) 1</p> <p>Asst. Professor (Plant Pathology) 1</p> <p>Supporting Staff 5</p>
<p><b>5 Research on Rice, Mannuthy</b></p> <p>Instructors (Botany &amp; Chemistry) 2</p> <p>Junior Instructor (Agronomy) 1</p> <p>Supporting Staff 8</p>	<p><b>12 Banana Res. Station, Kannara</b></p> <p>Supporting Staff 7</p>
<p><b>6 Rice Research Station, Kayamkulam</b></p> <p>Asst. Professor (Agri. Botany) 1</p> <p>Assoc. Professor (Agronomy) 1</p> <p>Assisiant Profescor (Botany) 1</p> <p>Instructor (Plant Pathology) 1</p> <p>Jr. Instructor (Entomology) 1</p> <p>Supporting Staff 13</p>	<p><b>13 Lemongrass Research Station, Odakkali</b></p> <p>Assoc. Professor (Agronomy) 1</p> <p>Asst. Professor (Agri. Chemistry) 1</p> <p>Jr. Instructor (Botany &amp; Chemistry) 2</p> <p>Supporting Staff 51</p>
<p><b>7 Rice Research Station, Vyttila</b></p> <p>Associate Professor (Agronomy and Botany) 2</p> <p>Supporting Staff 10</p>	<p><b>14 Cardamom Research Station, Pampadumpara</b></p> <p>Asst. Professors (Chemistry &amp; Entomology) 2</p> <p>Supporting Staff 13</p>
	<p><b>15 Agronomic Research Station, Chalakudy</b></p> <p>Supporting Staff 4</p>
	<p><b>16 Model Agronomic Research Station, Karamana</b></p> <p>Junior Instructor (Botany) 1</p> <p>Supporting Staff 3</p>
	<p><b>17 Pepper Research Scheme, Vellanikkara</b></p> <p>Jr. Instructor 1</p> <p>Supporting Staff 4</p>

<b>18 Integrated Research Project on mixed farming of Coconut, Livestock and Fish (Kumarakom)</b>		<b>28 Fisheries Research Station, Kuttanadu (Moncompu)</b>	
Jr. Instructor (Vety. Science)	1	Associate Professor	1
Jr. Instructor (Fisheries)	1	Instructor	1
Supporting Staff	4	Jr. Instructor	1
		Supporting Staff	3
<b>19 Livestock Farm, Mannnthy</b>		<b>29 Fisheries Research Station, Vyttila</b>	
Associate Professor (Nutrition)	1	Assistant Professor	1
Instructor	1	Instructor	1
Supporting Staff	16	Junior Instructor	1
		Supporting Staff	1
<b>20 Livestock Research Station, Thiruvazhamkunnu</b>		<b>30 Fodder Research &amp; Development Centre, Mannuthy</b>	
Assoc. Professor (Nut.)	1	Supporting Staff	2
Asst. Professor (Nut.)	1		
Supporting Staff	34	<b>31 Providing Supporting Staff to KADP</b>	
		Supporting Staff	14
<b>21 Cattle Breeding Farm, Thumburmuzhi</b>		<b>32 Scheme for the investigation on the incidence, nature and magnitude of infertility conditions among cross-bred cattle of Kerala</b>	
Assistant Professor	1	Instructor	1
Supporting Staff	13	Junior Instructor	1
		Supporting Staff	2
<b>22 Poultry Farm &amp; Duck Farm, Mannuthy</b>		<b>33 Scheme for intensification of sugarcane Research in Kerala (Main Campus, Thiruvalla, Punalur, Idukki and Chittoor.)</b>	
Junior instructor	1	Professor (Agri. Botany)	2
Supporting Staff	11	Assistant Professor	6
		Instructors	7
<b>23 Pig Breeding Farm, Mannuthy</b>		Supporting Staff	9
Asst Professor (Nut.)	1	<b>34 O. R. P. on integrated control of rice pests in Kuttanad (Moncompu)</b>	
Asst. Professor (A. R.)	1	Associate Professor (Entomology)	1
Jr. Instructor	1	Asst. Professor (Plant Pathology)	1
Supporting Staff	9	Instructor in Entomology	2
		Junior instructors	2
<b>24 Mobile Vety, Dispensary</b>		Junior Statistician	1
Supporting Staff	2	Supporting Staff	2
		<b>35 AICP in National Demonstration on major food crops in Kerala</b>	
<b>25 Veterinary Hospital, Trichur</b>		Associate Professor (Agronomy)	1
Asst. Professor (Supdt)	1	Assistant Professor (Entomology)	3
Supporting Staff	7	(Chemistry) & (Agri. Engg.)	3
		Supporting Staff	2
<b>26 Fodder Research &amp; Development centre, Mannuthy</b>			
Asst. Professor (Animal Reproduction)	1		
Instructor (Agronomy)	1		
Supporting Staff	8		
<b>27 Regional Livestock Research Station, Thiruvazhamkunnu</b>			
Asst. Professor (Genetics and Animal Reproduction)	1		
Instructor (Dairy Science & Pathology)	2		
Supporting Staff	8		

<b>36 Project for development of rice varieties resistant to BPH &amp; GSV Pattambi/ Moncompu</b>		<b>45 Special Disease and Pest Research sub Centre, Moncompu.</b>	
Assistant Professor (Botany)	1-1	Assoc. Professor (Plant Path.)	1
Asst. Professor (Entomology & Agro)	2	<b>46 Double Cropping sub Centre, Pattambi.</b>	
Junior Instructors	1-3	Assoc. Professor (Botany)	1
<b>37 AICRP on Biological control of crop pests</b>		<b>47 AICARP Staff at Headquarters.</b>	
Professor (Entomology)	1	Assoc. Professor (Agronomy)	1
Instructors	2	Asst. Professor (Agrl. Chemistry & Agrl. Statistics)	2
Supporting Staff	3	Junior Instructor	1
<b>38 SIDA Assisted project Research on integrated use of groundwater, surface water and rainfall for crop Production.</b>		Supporting Staff	3
Professor of Agronomy (WM)	1	<b>48 Research Project at Kozhikode</b>	
Supporting Staff	13	Asst. Professor (Agronomy)	1
<b>39 Scheme for Survey Collection and Evaluation of Germplasm of Jack Fruit.</b>		Supporting Staff	11
Assoc. Professor (Hort)	1	<b>49 Research Project at Changanacherry.</b>	
Instructors	2	Asst. Professor (Agronomy)	1
Supporting Staff	2	Supporting Staff	11
<b>40 Model Agronomic Research Station, Karamana.</b>		<b>50 AIC Fruit Improvement Project, Kannara.</b>	
Associate Professor (Agronomy)	1	Assoc. Professor (Botany, Horticulture, Plant Path.)	3
Supporting Staff	5	Asst. Professor (Agronomy, Botany, Entomology)	3
<b>41 Research on Cardamom (Pampadumpara)</b>		Junior Instructors (Agronomy, Botany, Entomology & Plant Path.)	5
Associate Professor (P. P.)	1	Supporting Staff	14
Assistant Professor (Botany)	1	<b>51 Research on Forage Crops, Veliayani</b>	
Jr. Instructors (Botany & Plant Path.)	2	Asst. Professor (Agronomy)	1
Supporting Staff	4	Jr. Instructor (Agronomy)	1
<b>42 Research on Pepper (Vellanikkara)</b>		Supporting Staff	5
Assoc. Professor (Botany)	1	<b>52 Integrated Research Project on water Management and soil salinity, Chalakudy.</b>	
Assoc. Professor (Plant. Path.)	1	Assoc. Professor (Agrl. Chemistry)	
Instructor in Plant Path.	1	Agronomy, Agrl. Egg.	4
Supporting Staff	4	Junior Instructors	3
<b>43 Research on Cashew. Mannuthy/ Anakkayam.</b>		Supporting Staff	6
Assoc. Professor (Botany)	1	<b>53 AIC Floriculture Improvement Project.</b>	
Junior Instructor (Botany)	1	Assoc. Professor (Botany)	1
Supporting Staff	3	Junior Instructor (Botany)	2
<b>44 Double Cropping Main Centre, Pattambi.</b>		Supporting Staff	2
Assoc. Professors (Pathology, Entomology, Botany & Agronomy)	4	<b>54 AIC Coconut and Arecanut Improvement Project.</b>	
Asst. Professors (Pathology, Entomology, Botany & Agronomy)	4	Assoc. Professor (Botany)	1
Supporting Staff	6	Instructor (Agrl. Entomology)	1
		Jr. Instructor (Botany)	1



<b>55 AICARP on Sugarcane</b>		<b>61 AIC Research Project on Goats.</b>	
Assoc. Professor (Agronomy)	1	Assoc. Professor (Genetics & Nutrition)	2
Jr. Instructor (Agrl. Botany)	1	Asst. Professor (Path, Genetics & Farm Management)	3
Supporting Staff	1	Asst. Professor (Statistics)	1
		Junior Instructors	3
<b>56 AICP for Improvement of Tubercrops (Other than Potato)</b>		Supporting Staff	32
Asst. Professor (Agronomy)	1		
Junior Instructor (Agronomy)	1	<b>62 AICRP on Poultry</b>	
Supporting staff	1	Professor of Poultry Science	1
<b>57 AICFIP Citrus die back Centre, HRS, Ambalavayal.</b>		Assoc. Professor (Nut )	1
Assoc. Professor (Agrl. Botany)	1	Asst. Professor (Farm Manage Poultry)	1
Asst. Professor (Plant Path.)	1	Asst. Professor (Jr. Poultry Geneticist)	2
Jr. Instructor (Botany & Chem.)	2	Asst. Professor (Statistician)	1
Supporting Staff	4	Junior Instructors	3
		Supporting Staff	22
<b>58 AIC Project for Intensification of Research on Pulses, Pattambi.</b>		<b>63 AIC Research Project on Brackish Water Fish Farming.</b>	
Asst. Professor (Botany & Agron.)	2	Assoc. Professor (Fisheries)	1
Jr Instructors	4	Jr. Instructor (Biology & Chem)	2
Supporting Staff	7	Supporting Staff	6
<b>59 Scheme for the study of incidence, etiology and Pathology of tumours of the ethmoid in domestic animals.</b>		<b>64 KADP Research and Training by K. A. U.</b>	
Professor/Project Officer (Path.)	1	Professors of Horticulture (Cocoa, Coconut, Cashew & Pepper)	4
Assoc. Professor of Virology	1	Assoc. Professors (Instrumentation Safety Officer, Radio Tracer)	3
Supporting Staff	3	Asst. Professors (Horticulture, Plant Path., Nematology, Soil Science)	6
<b>60 Scheme for Investigation of Agrl. by-Products for evolving economic rations for Livestock feed.</b>		<b>65 Maintenance of Vellanikkara Estate.</b>	
Assoc. Professor	1	Supporting Staff	21
Asst. Professor	2		
Instructor	1		
Jr. Instructor	2		
Supporting Staff	13		

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## Appendix - XIII

### LIST OF PUBLICATIONS BY RESEARCH STAFF

#### RICE RESEARCH STATION, PATTAMBI.

- |                                       |   |  |   |
|---------------------------------------|---|--|---|
| 1                                     | T. V. Viswanathan, K. V. Viswambharan and P. Chandrika. | Response of Cowpea ( <i>Vigna sinensis</i> ) to different levels of N, P and K.                                  | Agri. Res. J. Kerala 1978. 16 (2) 129-132   |
| 2                                     | K. Karunakaran  | On the need and feasibility of identifying rice varieties giving higher yields at lower levels of NPK.           | Agri Res. J. Kerala 1978, 16 (2) 230-232  |
| 3                                     | R. R. Nair & P. J. Tomy                                 | Slow release nitrogen fertilisers for transplanted rice.   | Agri. Res. J. Kerala 1978, 16 (2) 251-252   |
| 4                                     | R. R. Nair, T. F. Kuriakose and N. Saifuddin.           | New pre-emergence chemicals for weed control in flooded rice.  | Agri. Res. J. Kerala 1978 16 (2) 264-264  |
| 5                                     | P. A. Varkey & R. Gopala-Krishnan.                      | Performance of new high yielding wheat varieties on the high altitude regions of Kerala                          | Agri. Res. J. Kerala 1978 16 (1) 85-88.   |
| 6                                     | K. I. James, P. A. Varkey                               | ARC 11775 an Assam Rice cultivar that promising for rainfed lowlands.  | IRR News letter 3.1. Feb. '78   |
| 7                                     | T. K. Mithran.<br>K. Mukundan                           | Effect of agronomic practices on the milling quality of rice,  | Paper presented at the seminar cumworkshop on Modernisation of Rice. Milling Industry, held at Annamalai University. Pestology 2 (10) 12-14 |
| 8                                     | B. Thomas, K. Karunakaran & D. Sitarama Rao.            | Relative efficacy of some granular insecticides against gall midge, stem borer and leaf folder pests of rice.    |   |
| 9                                     | R. Gopaiakrishnan & R. R. Nair                          | Upland rice in Kerala needs more attention.  | Indian Farming Aug. '78 pp. 17-19.  |
| 10                                    | T. V. Viswanathan                                       | 'Kanakamani' a dual purpose cowpea<br>The pinch method of dibbling rice in                                       | Indian Farming June 1978. pp. 10  |
| 11                                    | M. R. C. Pillai   | a paste of cowdung under wet conditions in Southern Kerala-India.  | IRR News letter Vol. 3. No. 2 May 1978.   |
| 12                                    | M. R. C. Pillai   | Relay cropping of Nendran banana in rice fields in Kerala  | India IRR News letter Vol. 4 No. 2, 1979.   |
| <b>Cashew Res. Station, Anakkayam</b> |   |  |   |
| 1                                     | P. G. Veerarghavan & M. G. Vasavan.                     | Influence of Rainfall on the productivity of Cashew  | Indian Cashew Journal Vol. XIII, No. 2.   |
| <b>Aicarp Ecf Changanacherry.</b>     |   |  |   |
| 1                                     | K. S. Panicker, P. Balakrishna Pillai & Chandrasekharan | Influence on the age of seedlings spacing and time of application of Nitrogen on the yield of rice variety IR-8. | Agri. Res. Journal of Kerala 1978 16 (2)  |

2	G. Mathai & K. S. Panicker	A note on the relationship between yield of coconut and rainfall pattern in the back-water region of Kerala.	Agri. Res. J. Kerala 1978 16 (2)
<b>Instructional Farm, Mannuthy,</b>			
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4	V. K. Sasidhar	Efficiency of Foliar Vs. Soil application of nitrogen on growth and yield of summer paddy.	Agri. Res. J. Kerala 1978 16 (2)
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2	S. S. Nair, N. Rema Bai & K.P.V. Nair	Some promising BPH resistant/ tolerant culture of rice.	IRRI News letter 1978, Vol. 3.
3	K. M. Rajan & P. V. Nair	Fungicidal control of sheath rot and glume discolouration	Presented in Symposium on plant diseases problems held at Jaipur in 1978, Abstract published in special issue of Indian Journal of Mycology and Plant Pathology 1978
4	P. V. Nair & K. M. Rajan	Raction of different coconut hybrids to root (wilt) disease.	Coconut Journal 1978, IX (6) (9)
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6	Nair, P. V. and K. M. Rajan	Reaction of rice breeding lines to bacterial blight.	IRRI News letter Vol. 3:4:8
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6	P. J. Ittyavirah, S. S. Nair K. Sivasankara Pillai & Thomas Varghese.	Feasibility of moderate Nitrogen Technology for rice in acid sulphate soils of Kuttanad in Kerala	Fertilizer News, April, 1979.
9	M. J. Thomas, S. S. Nair & N. R. Nair	Out break of rice thrips in Kuttanad	IRRI News letter Vol. 4 No. 1 Feb. 1979.
<b>Cardamom Res. Station, Pampadumpara</b>			
1	D. Joseph, K I. Wilson & R. Rajagopalan.	On the frequency of insecticidal application against cardamom thrips.	Pesticides 12 (5) 1978
2	D. Joseph	ഏലപ്പേൻ നിയന്ത്രണം	Kalpadhenu 5 (6) 1978
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- 2 P. K. Satayarajan & G Mathai New host record for P. Sandomans solanocearum. E. F. Smith Agri. Res. Journal of Kerala, 16 (1) 1978
- 3 G. Mathai, K. P. V. Nair & A. P Thampi Fractional application of fertiliser for coconut seedlings. Agri. Res. Journal of Kerala 16 (2) 1978
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- 2 N. Neelakantan Potty A moisture modulation technique to increase the intensity of intercropping in un-irrigated coconut garden in the West Coast. -do-
- 3 N. Neelakantan Potty & T. C. Radhakrishnan Studies on the nutritional relation on the incidence of stem bleeding disease -do-

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- 1 C. C. Abraham & K. S. Ramamony New record of Assuania as a pest of banana Entomon Vol. 3 (2) 311-1978
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- 1 P. K. Venugopalan Nambiar V. Sukumara Pillai, S. Sasikumar & K. C. Chandy. Pepper research at Panniyur a Resume. Journal Plantation Crops 6(1).
- 2 V. Sukumara Pillai, S. Sasikumar & D. Alexander. A guide for the fixation of market price of Tender pepper spikes harvested for pickling. Indian Spices 15 (1)
- 3 T. F. Kuriakose & K. C. Chandy. Some characteristics of normal and branched spikes of pepper variety Ampiriyam. Silver Jubilee Souvenir 1978

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- 1 R.R. Nair & P. J. Tomy. Slow release nitrogen fertilizer for transplanted rice. Agril, Res. Journal Kerala 1977 16 (2)

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- 1 N. Rajappan Nair, S. Santhakumari & Dr. Gopalakrishnan. A comparative study of soil and foliar application of urea on sesamum. Agril. Res. Journal of Kerala 1975 Vol. 13 (2) 128-131.

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## Appendix - XIV

### LIST OF EXTENSION EDUCATION PERSONNEL

- |  |   |  |
|--|---|--|
| 1) Director of Extension Education               | : | Dr. V. S. S. Potti   |
| 2) Public Relation Officer                       | : | Sri. V. K. Moideen Koya  |
| 3) Assistant Registrar (Technical)               | : | Dr. T. R. Sankunny   |
| 4) National Demonstration Project                | : | Sri. A. J. Thomas, Assoc. Professor  |
| 5) Communication Centre                          | : | Sri. K. C. Varghese, Assistant Professor<br>Sri. P. Ramachandran Nair, Assistant Professor |
| 6) Institute of Agricultural Technology, Tavanur | : | Special Officer, Sri. P. K. G. Menon,<br>Associate Professor                               |

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## Appendix - XV

### LIST OF MEMBERS OF STAFF IN THE DIRECTORATE OF PHYSICAL PLANT

Sl. No.	Name of Post	Scale of pay	No. of sanctioned post	No. filled up	Vacant
1.	Director of Physical Plant	1400—1900	1	1	
2.	PA to DPP	750—1450	1	1	
3.	Financial Asst.	910—1550	1	1	
4.	Asst. Engineer	600—1100	2	1	
5.	Section Officer	650—1150	2	2	
6.	Office Supdt. (FC & D)	600—1100	1	1	
7.	Head Draftsman	600—1100	1	1	
8.	Senior Gr. Asst.	535— 950	4	4	
9.	Stenographer Gr. I	450— 785	1	1	
10.	Senior Gr. Typist	535— 950	1	1	
11.	Assistant Gr. I	420— 720	3	1	2 upgraded
12.	Draftsman Gr. I	450— 785	1	1	
13.	Typist Gr. I	420— 720	1	1	
14.	Asst. Gr. II	350— 580	5	5	
15.	Typist Gr. II	350— 580	2	Nil	2
16.	Driver Gr. II (LV)	330— 515	1	1	
17.	Tracer	350— 580	2	Nil	2
18.	Blue Printer-cum-Sterio Operator	330— 515	1	1	
19.	Peon	280— 400	1	1	
ii) Execution					
1.	Architect	1125—1725	1	Nil	1
2.	Junior Architect	750—1450	1	1	
3.	Asst. Executive Engineer	750—1450	5	5	
4.	Asst. Engineer	600—1250			
5.	Asst. Engineer	600—1100	14	14	
6.	Draftsman Gr. I/Overseer Gr. I	450— 785	23	23	
7.	Technician Gr. I (Electrician-Cum Mechanic)	450— 785	1	1	
8.	Asst. Gr. I	420— 720	4	4	
9.	Typist Gr. I	420— 720	3	2	1
10.	Asst. Gr. II	350— 580	8	6	2
11.	Typist Gr. II	350— 580	4	2	2
12.	Bull Dozer Operator	420— 720	1	1	
13.	Road Roller Driver	265— 465	1	1	
14.	Technician Gr. I (Fitter)	450— 785	2	1	
15.	Driver Gr. II (LV)	330— 515	2	2	
16.	Pump Operators	330— 515	7	6	1
17.	Peon	280— 400	8	1	7
18.	Cleaners	280— 400	5	2	3
19.	Helper	280— 400	1	Nil	1
20.	Watchmen	280— 400	3	3	

# Appendix-XVI

## ANNUAL STATEMENT OF RECEIPTS AND EXPENDITURE FOR 1978-79

RECEIPTS	EXPENDITURE
<b>A GENERAL FUND</b>	<b>A GENERAL FUND</b>
I) Statutory grant from State Government.	I) Direction <span style="float: right;">42,63,423.71</span>
a) Non-plan <span style="float: right;">157,11,216.49</span>	II) Resident Teaching <span style="float: right;">80,15,789.39</span>
b) Plan <span style="float: right;">130,00,000.00</span>	a) Agrl. College <span style="float: right;">4100121.27</span>
II) Grant from other sources	b) Vety. College <span style="float: right;">2284213.20</span>
a) ICAR <span style="float: right;">26,24,149.50</span>	c) Hort. College <span style="float: right;">955380.40</span>
b) Other sources <span style="float: right;">41,85,141.84</span>	d) IAT, Tavannur <span style="float: right;"><u>676075.02</u></span>
III) Income from colleges <span style="float: right;">7,90,845.25</span>	III) Research <span style="float: right;">63,63,192.64</span>
IV) Income from University properties <span style="float: right;">48,47,602.30</span>	Agrl. Research <span style="float: right;">3863156.19</span>
V) Income from investments <span style="float: right;">1,723.33</span>	Research on Vety. & A. S <span style="float: right;">2500036.45</span>
VI) Other Misc. Income <span style="float: right;">6,05,187.28</span>	<span style="float: right;"><u>6363192.64</u></span>
Total A. General Fund <span style="float: right;">417,55,865.99</span>	IV) Plan Schemes <span style="float: right;">122,27,285.17</span>
<b>B DEBT &amp; SUSPENSE ACCOUNT</b> <span style="float: right;">42,25,568.07</span>	V) Scheme Sponsored by ICAR and other agencies <span style="float: right;">76,80,262.34</span>
Total of A & B <span style="float: right;">459,91,434.06</span>	a) Agrl. Research <span style="float: right;">2421158.16</span>
	b) Vety. Research <span style="float: right;">1765501.25</span>
	c) Research on fisheries <span style="float: right;">112408.97</span>
	d) National service scheme <span style="float: right;">11496.17</span>
	e) KADP Training & Research <span style="float: right;">3369697.79</span>
	<span style="float: right;"><u>7680262.34</u></span>
	VI) Maintenance of Vellanikkara Estate <span style="float: right;">7,29,244.39</span>
	VII) Contribution for pension fund <span style="float: right;">25,000.00</span>
	<span style="float: right;"><u>393,04,198.14</u></span>
	<b>B. Debt and suspense account</b> <span style="float: right;">48,83,900.94</span>
	Total A & B <span style="float: right;"><u>441,88,099.08</u></span>
	Add closing balance <span style="float: right;">38,02,895.36</span>
Add Opening Balance <span style="float: right;">19,99,560.38</span>	<b>GRAND TOTAL</b> <span style="float: right;">479,90,994.44</span>
<b>GRAND TOTAL</b> <span style="float: right;">479,90,994.44</span>	<b>GRAND TOTAL</b> <span style="float: right;">479,90,994.44</span>



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