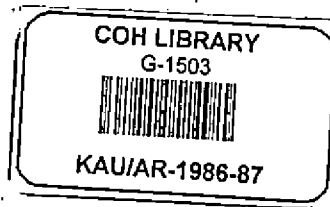
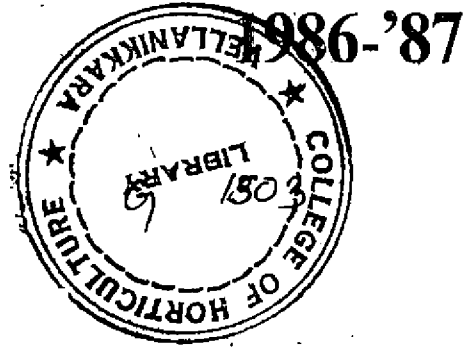


ANNUAL REPORT



KERALA AGRICULTURAL UNIVERSITY

English

ANNUAL REPORT 1986-87

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General Report

The Executive Committee of the Kerala Agricultural University presents to the General Council, its Annual Administration Report for the period from 1-4-1986 to 31-3-87.

The report pertains to the General Administration, Education, Research, Extension Education, Works, Estate and Financial Accounts. List of members of the statutory bodies of the University, Statute Amendments, Scientific, Administrative and Supporting staff of various institutions, List of new research projects and List of publications have been appended.

Sri T. Madhava Menon, IAS, continued as Vice-Chancellor of the University. Sri K. Sethumadhavan, IAS., took charge of the post of Registrar on 4-12-1985 and continued to be the Registrar during the year.

Sri K. K. Pankajakshan, Deputy Secretary to Government continued as Comptroller in-charge during the period. Mr C. Unnikrishnan was the Director of Physical Plant during the period under report.

Dr M. Aravindakshan continued to be the Director of Research in-charge during the year.

Dr A. G. G. Menon continued as the Director of Extension during the period.

Dr M. M. Koshy, Director, Centre for Excellence for Tropical Soils continued to be in charge of the Dean (Agri).

Dr N. Sadanandan continued as Director of PG studies.

Dr K. Radhakrishnan, Professor (RC) continued to be in charge of the Dean, Faculty of Veterinary and Animal Sciences, Mannuthy during the year.

Dr M. Krishnan Nair was the Director of Veterinary Research and Education.

Dr M. J. Sebastian continued as the Dean, Faculty of Fisheries during the period.

Dr P. Basak continued as Dean in-charge of Faculty of Agricultural Engineering.

Dr T. G. Rajagopalan was in-charge of the Director of Students Welfare during the period.

Dr P. K. Gopalakrishnan continued as Associate Dean of the College of Horticulture, Vellanikkara and Dr C. A. Jos, Professor held full additional charge of the post of Associate Dean of the College of Co-operation and Banking, during the period under report.

Sri S. M. A. Aslam continued as Special Officer (Forestry) for the formation of the Forestry Faculty.

Two meetings of the Academic Council were held during the period under report.

38th meeting on 27-1-'86 and 39th meeting on 9-9-86.

It was recommended to establish the following centres under Kerala Agricultural University.

- 1 Centre of Excellence for the Genetic Improvement of Pulses and Oil seeds.
- 2 Centre for Advanced Studies in Land and Water Management Engineering.
- 3 Centre for Advanced Research on Tribal Area.
- 4 Also recommended to upgrade the Department of Pathology under the Faculty of Veterinary and Animal Sciences to the status of a Centre of Advanced Studies.

Recommended to start the following courses under the Faculty of Rural Home Science.

- 1 Certificate course in Rural Home Science
- 2 U. G. Diploma course in Rural Home Science
- 3 P. G. Diploma programme in Pre-primary Education
- 4 P. G. Diploma Programme in Nutrition and Dietetics
- 5 U. G. Degree programme in Rural Home Science
- 6 Ph. D Degree programme in Food Science and Nutrition

The Council also recommended to start a four year B. Sc. (Forestry) Degree Programme in Kerala Agricultural University from 1986-87 onwards.

The Regional Agricultural Research Station, Pilicode was approved as a centre for P. G. studies.

Decided to start two year Dairy Diploma Course for Dairy Farm Instructions at College of Veterinary and Animal Sciences mainly for the inservice Dairy Farm Instructors of Dairy Development Department from 1986-87 onwards.

Approved the curriculum and course catalogue under semester pattern for the U. G. programmes of Kerala Agricultural University from the academic year 1987-88 onwards.

New Academic Programme started during the year

- M. Sc. (C & B)
- M. Sc. (Forestry)
- B. Sc. (Forestry)
- B. Sc. (Rural Home Science)

The College of Agricultural Engineering & Technology has started functioning from January 1986 and the Board of Studies in the Faculty of Agricultural Engineering and Technology was constituted in March 1986.

During the year the pattern of education in the constituent Colleges of the University for U. G. Programmes was changed over to the Semester Pattern with internal evaluation. The course curricula and syllabi were revised to suit the semester pattern.

A new College of Forestry was inaugurated on 20-7-86. The College of Rural Home Science was also established during the report period.

EDUCATION

The teaching institutions under the University are College of Agriculture at Vellayani, Trivandrum, College of Horticulture at Vellanikkara, College of Veterinary & Animal Sciences at Mannuthy, College of Fisheries at Panangad, the College of Agricultural Engineering & Technology at Tavanur in Malappuram District, College of Co-operation & Banking, at Mannuthy, College of Forestry at Vellanikkara and College of Home Science at Vellayani. Courses leading to Bachelors' degree in Agriculture, Veterinary & Animal Sciences Fisheries, Co-operation & Banking, B. Tech. in Agricultural Engineering were offered from the respective colleges. Master's and Doctorate degrees in Agriculture, Horticulture and Veterinary & Animal Sciences were offered in the College of Agriculture, at Vellayani, College of Horticulture at Vellanikkara and College of Veterinary & Animal Sciences at Mannuthy respectively. B. Sc. Forestry Programme is offered from College of Forestry. B. Sc. (Home Science) is offered from the College of Rural Home Science. Masters' degree in Agricultural Engineering and Agricultural Statistics were also offered from the College of Horticulture and College of Veterinary & Animal Sciences respectively.

The total teaching staff strength of the eight institutions was 636 at the end of the year.

Sanctioned staff strength as on 31-3-1987 in Colleges

	Agri.	Hort.	Vety	Fish	Co-op	KCA- ET	Home Science	Fore- stry	Total
Dean	1	—	1	1	—	1	—	—	4
Assoc. Dean	—	1	—	—	1	—	—	1	3
Director	1	1	5	—	—	—	—	—	7
Advisor & Dean i/c	—	—	—	—	—	—	—	—	—
Professor	31	21	42	5	—	8	1	—	108
Assoc. Professor	20	19	46	10	7	12	2	2	118
Asst. Professor	40	61	55	22	12	21	7	3	221
Jr. Asst. Professor	32	40	54	18	10	11	6	4	175
Total	125	143	203	56	30	53	16	10	636

Vacancies existed in Colleges as on 31-3-1987

	Agri.	Hort.	Vety	Fish	Co-op.	KCAET	Home Science	Fore- stry	Total
Dean	1	—	1	—	—	—	—	—	2
Assoc. Dean	—	1	—	—	—	—	—	1	2
Director	—	—	—	—	—	—	—	—	—
Advisor & Dean i/c	—	—	—	—	—	—	—	—	—
Professor	—	1	6	—	—	7	—	—	14
Assoc. Prof.	1	9	27	2	3	11	—	—	53
Asst. Prof.	6	9	27	5	4	13	—	—	64
J. A. P.	8	25	39	6	—	3	—	—	81
Total	16	45	100	13	7	34	—	1	216

Admissions

During the period 489 students were admitted for various courses. The number of students passed out from colleges are also furnished.

Course	No. admitted	No. passed
<i>Faculty of Agriculture</i>		
B. Sc. (Agri.)	159	211
B. Sc. (Hort.)	—	1
M. Sc. (Agri.)	60	34
M. Sc. (Hort.)	—	4
M. Sc. (Ag. Stat.)	5	5
Ph. D. (Agri.)	4	14
Ph. D. (Hort.)	3	—
<i>Faculty of Vety. & Animal Science</i>		
B. V. Sc. & A. H.	110	25
M. V. Sc.	3	4
Ph. D.	5	—
<i>Faculty of Fisheries</i>		
B. F. Sc.	21	30
M. F. Sc.	9	—
<i>Co-operation & Banking</i>		
B. Sc. (C & B)	26	5
M. Sc. (C & B)	6	—
<i>Agricultural Engineering</i>		
B. Tech.	18	—
M. Sc. (Ag. Engg.)	8	—
<i>Home Science</i>		
B. Sc.	29	—
M. Sc.	5	—
<i>Forestry</i>		
B. Sc.	16	—
M. Sc.	2	—
Total	489	337

The number of students who are on the roll at the end of the year is as follows:

No. of students on roll	Colleges								Total
	Agri	Hort	Vety	Fish	Co- op.	KCA- ET	Home Sci.	Fore- stry	
1	2	3	4	5	6	7	8	9	10
<i>U. G. Courses</i>									
B. Sc. (Ag)	266	260	—	—	—	—	—	—	526
B. V. SC & AH	—	—	565	—	—	—	—	—	565
B. F. Sc	—	—	—	117	—	—	—	—	117
B. Sc (C & B)	—	—	—	—	104	—	—	—	104
B. Tech	—	—	—	—	—	52	—	—	52
B. Sc. (Home Science)	—	—	—	—	—	—	27	—	27
B. Sc. (Forestry)	—	—	—	—	—	—	—	16	16
Total	266	260	565	117	104	52	27	16	1407

<i>P. G. Courses</i>									
M. Sc. (Ag)	88	57	—	—	—	—	—	—	145
M. Sc. (Hort)	—	14	—	—	—	—	—	—	14
M. Sc. (Ag. Stat)	—	—	14	—	—	—	—	—	14
M. V. Sc	—	—	25	—	—	—	—	—	25
M. F. Sc.	—	—	—	5	—	—	—	—	5
M. Sc. (C & B)	—	—	—	—	6	—	—	—	6
M. Sc. (Ag. Engg)	—	—	—	—	—	16	—	—	16
M. Sc. (Home Science)	—	—	—	—	—	—	12	—	12
M. Sc. (Forestry)	—	—	—	—	—	—	—	6	6
Ph. D (Ag)	17	19	—	—	—	—	—	—	36
Ph. D (Hort)	—	—	—	—	—	—	—	—	—
Ph. D (V & A S)	—	—	7	—	—	—	—	—	7
Total	105	90	46	5	6	16	12	6	286

1	2	3	4	5	6	7	8	9	10
<i>Other Diploma courses</i>									
D. A. Sc	—	—	—	—	—	135	—	—	135
DARE	—	—	—	—	—	51	—	—	51
P. G. Diploma (Food & Nutrition)	—	—	—	—	—	—	5	—	5
Diploma (Dairy)	—	—	20	—	—	—	—	—	20
Total	—	—	20	—	—	186	5	—	211
Grand Total	371	350	631	122	110	254	44	22	1904

The research programme of the University have been drawn out with emphasjs on solving location specific, field oriented problems faced by the farmers of the state. In addition to the state funds, the University also secure assistance through ICAR, the NARP and from the World Bank. Assistance was also received from the Department of Science & Technology, and the Department of Environment, Government of India. Under the National Agricultural Research project, five Regional Research Stations have been set up at Pilicode (Northern Region), Pattambi (Central Region), Kumarakom (Region of Problem Areas,) Vellayani (Southern Region) and Ambalavayal (High Range Region). The technical and administrative control of these stations was vested with the respective Associate Directors and the overall control with the Director of Research. Scientists in the research stations were grouped into different divisions viz. Crop Improvement, Crop Production, Crop Protection, and Social Sciences according to the field of specialisation.

Seventeen project co-ordination groups in the faculty of Agriculture and seven in the faculty of Veterinary & Animal Sciences continued to function during the year. The Faculty Research Committee of Agriculture met twice during the year and 143 projects were cleared for implementation. The Faculty Research Committee of the Veterinary Science met once and approved research projects for implementation. The Faculty Research Committee of the Fisheries met once and cleared new projects for implementation. The Faculty Research Committee of each Faculty monitored and evaluated all the research programmes regularly which was finally got approved by the General Council.

The Director of Research was assisted by three Associate Directors at the headquarters. The Associate Directors of Agriculture monitored the research programmes of different stations once in three months and the Director of Research inspected all the research stations at once during the year and submitted detailed inspection report to the Vice-Chancellor.

A detailed VII plan proposal for the University was formulated in the Directorate of Research and the plan proposals were forwarded to the ICAR and State Planning Board for their consideration.

In the faculty of agriculture eighteen research stations and units like Sugarcane Research Centre, Chittoor; AICRP Centre at Karumady and the Pineapple and Pepper Research Centres at Vellanikkara continued with their research activities. In the Faculty of Veterinary & Animal Sciences three research stations, one at Vellanikkara campus comprising of Livestock Poultry and Piggery Farm, one at Thiruvazhamkundu and another at Thumburmuzhi are functioning. There were 55 ICAR and other aided projects functioning under the KAU as detailed below:

	Ad-hoc projects	Co-ordinated projects	ORP	Schemes sanctioned by other agencies	Total
Faculty of Agriculture	9	19	2	9	39
Faculty of Vety. & Animal Sciences	8	3	—	2	13
Agri. Engineering	—	1	—	2	3
Total	17	23	2	13	55

Scientific and popular articles published

Faculty	Scientific articles	Popular articles	Total
Agriculture	62	34	96
Vety. & Animal Sciences	43	—	43
Fisheries	9	2	11
College of Co-operation & Banking	2	—	2
Total	116	36	152

The staff strength in Research Stations/Schemes/Projects
as on 31-3-87 is given below

	Dire- ctor	ADR	Prof	Assoc. Prof.	Asst. Prof.	J. A. P.	Total
Faculty of Agriculture							
CRS Balaramapuram			1	—	1	—	2
CSRC, Karamana			1	—	6	3	10
NARP, Vellayani	1		—	3	6	—	10
Special Station, Sadanandapuram			1	—	6	—	7
RARS, Kumarakom		1	6	1	18	4	30
RRS, Kayamkulam			2	2	4	3	11
SRS, Thiruvalla			2	—	—	3	5
RRS, Moncompu			3	3	11	7	24
AICRP, Karumady			—	1	2	3	6
RRS, Vyttila			2	—	1	1	4
RARS, Pilicode		1	4	12	10	4	31
PRS, Panniyur			1	1	6	1	9
RARS, Pattambi		1	6	8	22	7	44
NARP, Eruthiampathy			—	1	1	—	2
AMPRS, Odakkali			1	—	3	1	5
ARS, Chalakudy			1	3	8	—	12
BRS, Kannara			—	1	4	2	7
CRS, Madakkathara			1	—	1	1	3
ARS, Mannuthy			1	3	4	2	10
CRS, Anakkayam			—	—	—	1	1
RARS, Ambalavayal		1	—	1	4	—	6
CRS, Pampadumpara			1	3	5	2	11
Instructional Farm, Vellayani			—	1	2	4	7
Instructional Farm, Vellanikkara			—	—	1	—	1
Special Station, Kottarakkara			—	2	5	—	7
TARS, Amboori			1	1	2	5	9
ORP, Ozhalapathy			—	1	—	4	5
Directorate of Research	1	4	—	—	1	—	6
Director of Students Welfare	1	—	—	—	2	1	4
Directorate of PG Studies	1	—	—	—	—	—	1
Total	3	19	35	48	136	59	290

	ADR	Prof.	Assoc. Prof.	Asst. Prof.	J.A.P.	Total
Faculty of Veterinary & Animal Sciences						
Pig Breeding Farm, Mannuthy	—	—	—	1	1	2
Poultry and Duck Farm, Mannuthy	—	—	1	—	2	3
LRS, Thiruvazhamkunnu	—	—	2	1	3	6
CBF, Thumburmuzhi	—	—	1	1	—	2
ULF, Mannuthy	—	—	1	—	2	3
University Veterinary Hospital, Kokkalai	—	1	—	1	—	2
AICRP on Goats, Mannuthy	—	—	1	2	3	6
AICRP on Poultry for Eggs	—	1	1	—	4	6
Total	—	2	7	6	15	30
Faculty of Fisheries						
Instructional Farm, Puduveyyur	—	—	1	2	1	4
Fisheries Research Station, Panangad	—	1	—	—	—	1
Total	—	1	1	2	1	5
GRAND TOTAL	39	38	56	144	75	325

The following were the vacancies in the various Research Stations/Schemes/Projects/Directorate of Research/Directorate of Student's Welfare during the year 1986-87:

1	2	3	4	5	6	7	8
Faculty of Agriculture							
1	CRS, Balaramapuram	—	—	—	—	—	—
2	CSRC, Karamana	—	—	—	—	—	—
3	NARP, Vellayani	—	—	—	2	—	2
4	RARS, Kumarakom	1	—	—	2	1	4
5	RRS, Kayamkulam	—	—	—	1	2	3
6	SRS, Thiruvalla	—	—	—	—	1	1
7	RRS, Moncompu	—	—	—	2	5	7
8	AICRP, Karumady	—	—	—	—	—	—
9	RRS, Vyttila	—	—	—	1	1	2
10	RARS, Pilicode	1	—	1	3	3	8
11	PRS, Panniyur	—	—	—	3	1	4

1	2	3	4	5	6	7	8
12	RARS, Pattambi	—	—	3	7	5	15
13	NARP, Eruthiampathy	—	—	—	1	—	1
14	AMPRS, Odakkali	—	—	—	1	1	2
15	BRS, Kannara	—	—	—	—	—	—
16	CRS, Madakkathara	—	—	—	—	—	—
17	ARS, Mannuthy	—	—	—	—	—	—
18	CRS, Anakayam	—	—	—	—	—	—
19	RARS, Ambalavayal	—	—	—	1	—	1
20	ARS, Chalakudy	—	—	—	4	—	4
21	CRS, Pampadumpara	—	—	1	3	2	6
22	Instructional Farm, Vellayani	—	—	—	—	1	1
23	Instructional Farm, Vellanikkara	—	—	—	—	—	—
24	Special Station, Kottarakkara	—	—	—	1	—	1
25	TARS, Amboori	—	—	—	1	2	3
26	Directorate of Research	1	—	—	—	—	1
Total.		3	—	5	33	25	66

Prof.	Assoc. Prof.	Asst. Prof.	J.A.P.	Total
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Faculty of Veterinary & Animal Sciences

Pig Breeding Farm, Mannuthy	—	—	—	1	1
AICRP on Goats, Mannuthy	—	—	—	2	2
AICRP on Poultry for Eggs, Mannuthy	—	—	—	2	2
LRS,, Thiruvazhamkundu	—	—	—	2	2
Poultry & Duck Farm, Mannuthy	—	—	—	2	2
Total	—	—	—	9	9

Faculty of Fisheries

Instructional Farm, Puduveyyuppu	—	—	—	1	1	
Total	—	—	—	1	1	
GRAND TOTAL	3	—	5	33	35	76

The following additional teaching posts were created during the year 1986-87 in various institutions/schemes:

	Director	Prof.	Assoc. Prof.	Asst. Prof.	J.A.P.	Total
College of Horticulture, Vellanikkara	—	1	2	2	—	5
College of Vety. & Animal Sciences, Mannuthy	—	1	1	2	1	5
College of Home Science, Vellayani	—	—	—	3	2	5
College of Forestry, Vellanikkara	—	—	—	—	4	4
College of Co-op. & Banking	—	2	—	—	—	2
NARP (Southern Region)	—	—	1	4	—	5
Directorate of Extension Education	—	1	—	2	—	3
Training Unit, KAU, Vellayani	—	—	1	—	—	1
Total	—	5	5	13	7	30

Students Welfare

Extra curricular activities of the students of all Faculties of Kerala Agricultural University and few of the co-curricular activities are co-ordinated by the Directorate of Students Welfare.

Dr T. G. Rajagopalan is holding charge of the Directorate of Students Welfare.

The extra curricular activities of the faculties are co-ordinated through the Physical Education teachers of various faculties of Kerala Agricultural University.

Sports and Games activities

The following activities were conducted during the period under report.

KAU Inter-Collegiate Tournaments

<i>Event</i>	<i>Venue</i>	<i>Winners</i>
Cricket (Men)	College of Agriculture, Vellayani	1. Agrl. College, Vellayani. 2. Vety. College, Mannuthy.
Basket ball (Men)	Veterinary College, Mannuthy.	1. Vety. College, 2. Fisheries College.
Basket ball (Women)	-do-	1. Hort. College, 2. Agrl. College.
Ball Badminton (Men)	-do-	1. C & B College, 2. Vety. College.
-do- (Women)	-do-	1. Fisheries College, 2. Vety. College.

Providing assistance for conducting physical education and coaching programme for College of Forestry.

Since the College of Forestry have no Physical Education teacher, the Directorate has extended the service of Junior Assistant Professor (Phy. Edn.) for conducting their physical education and coaching programme.

Providing assistance for College of Forestry for construction of ground.

The Directorate extended the service of Junior Assistant Professor (Phy. Edn.) for the fabrication of a Volleyball, Shuttle Badminton, Ball Badminton courts and a Cricket practice pitch.

Membership of Association of Indian Universities

The membership in Association of Indian Universities was revived during the year after discontinuation of it from 1983-84. Dr. T. G. Rajagopalan, Director of Students Welfare i/c attended the 62nd Annual meeting of the Association of Indian Universities held at Osmania University, Hyderabad from 16th to 20th December 1987.

Ethiopia Relief Fund

The objective of raising the fund through voluntary contribution from the staff and students of the University is to provide assistance to the people of Ethiopia suffered by famine conditions. An amount of Rs. 7,500/- was sent to the Ambassador of Ethiopia in India as the second instalment.

R & V NCC SQN of KAU

The R & V Sqn. organised an Annual Training Camp with 30 boys and 10 girls and also cycle expedition and trucking.

University Youth Meet

We organised one University Youth Meet at Kannapady.

EXTENSION EDUCATION

The Directorate of Extension provides technical expertise to the field extension personnel of various development departments in the state, disseminate scientific and technical information to the farmers through different media and offers technical assistance to voluntary service organizations and other educational institutions. These programmes are being implemented through the Training Service Schemes. Farm Advisory Service, Communication Centre, Krishi Vigyan Kendras, National Demonstration Scheme, Lab-to-Land programme, Village Adoption Programme, Tribal Area Research Centre etc. The Extension Education programmes are being implemented by the staff attached to the College and Research Stations. In addition, specific schemes are also functioning under the Directorate of Extension. The staff and the vacancy position in the various units attached to the Directorate of Extension during 1986-87 is also furnished below.

The following are the staff position relating to the Directorate of Extension Education during 1986-87

Station	Director	Assoc. Dire.	Prof. Editor	Assoc. Prof.	Asst. Prof.	JAP	Total
A. Directorate of Extension	1	1	1	—	—	—	3
B. Farm Advisory Service	—	—	3	3	1	—	7
C. Communication Centre							
i. Information Unit	—	—	—	—	4	2	6
ii. Publication Unit	—	—	1	—	3	—	4
iii. Exhibition & graphic unit	—	—	—	—	1	1	2
D. Training Service Scheme							
i. Central Training Institute, Mannuthy	—	1	—	—	1	1	3
ii. Training Service Scheme, Mannuthy	—	—	—	—	1	—	1
iii. Training Service Scheme, Vellayani	—	—	—	1	1	—	2
iv. Training Service Scheme, Tavanur	—	—	—	—	1	2	3
v. UNICEF, Training Cell	—	—	—	—	1	3	4
E. Krishi Vigyan Kendras							
i. KVK, Manjeswar	—	1	—	—	—	1	2
ii. KVK for Tribals, Ambalavayal	—	—	1	—	4	—	5
iii. KVK Pattambi	—	—	3	1	3	2	9
F. SCARC, Nilambur	—	—	—	1	3	—	4
TARC, Amboori	—	—	1	1	5	7	14
G. Integrated Development for Kanikar Tribals	—	—	—	—	—	1	1
H. NDS, Sadanandapuram	—	—	—	2	2	—	4
I. Lab to Land	—	—	—	1	—	—	1
Total	1	1	13	9	31	20	75

The following are vacancies in the various units attached to the
Directorate of Extension Education during 1986-87

	Prof.	Assoc. Prof.	Asst. Prof.	J A P	Total
Communication Centre					
i. Information Unit	—	—	2	—	2
ii. Training Service Scheme, Tavanur	—	—	—	2	2
KVK Tribals, Ambalavayal	—	—	4	—	4
KVK Pattambi	—	—	1	—	1
SCARC, Nilambur	—	—	2	—	2
TARC, Amboori	—	—	2	2	4
Total	—	—	11	4	15

Twenty three training programmes were conducted during the year for the various departments and agencies. The Communication Centre provides information support to the extension personnel of the State Development Departments, voluntary organisations, farmers etc. Feature articles, questions and answers, technical publications, radio-programmes, exhibition, correspondence course etc., constitute the information support programmes of the centre.

Under the publication unit a number of regular periodicals were published which include Agricultural Research Journal of Kerala (half yearly,) Kerala Journal of Veterinary Science (half yearly), Kalpadhenu (quarterly), KAU Newsletter (Monthly) and Nutrition Newsletter (quarterly). In addition 20 technical bulletins and books were also published both in English and Malayalam.

The Kerala Agricultural University Press at Mannuthy fulfils the needs of printing works of the entire university. This includes periodicals, books, Monographs, Technical bulletins, Forms, Registers, Folders, Pamphlets, Annual reports, Research report, Research journals, College magazine, Invitations, Coupons, etc.

45 persons are working in the press, out of which 10 are casual labourers. Press Manager was awarded with 3 advance increments for his meritorius service

The exhibition and graphic service units conducted major exhibitions at Trichur. In addition 7 mini exhibitions were also conducted in the Lab-to-Land and Village Adoption centres of the University. The University bagged the first stall award during Pooram Exhibition as in previous years. The Krishi Vigyan Kendras—one at Pattambi and another

at Ambalavayal are also functioning. In addition a new Krishi Vigyan Kendra was started in Kasargod district for benefit of the linguistic minorities. The Village Adoption Programmes, the NSS programmes, Lab-to-Land Programmes and All India Co-ordinated programmes on Scheduled Caste and Scheduled Tribe at Nilambur and Amboori are also functioning under the Directorate of Extension.

ENGINEERING WING

The Engineering Wing of the Kerala Agricultural University consists of the Directorate of Physical Plant, Vellanikkara with two Divisions one at Pilicode and another at Panangad. Sri. C. Unnikrishnan was the Director of Physical Plant during the year. During 1986-87 there was a provision of 300 lakhs under works (Plan) and 26.5 lakhs under maintenance and repair. The expenditure upto 31-3-87 was Rs. 2,35,57,415.07. No new works could be taken up because of the scarcity of funds. The major items of Civil Works included construction of UG Hostel for men, construction of four Blocks of semi permanent sheds for the Fisheries College, constructions of Dormitory building, and Dining Block have been completed. The lab and seed store at Vyttila under NARP has been completed. At Vellayani construction of deep litter poultry and the works improvement to protected water supply have been completed. Construction of laboratory, and library building and Indoor Stadium are in progress. Remodelling of old Ladies Hostel for Home Science is in progress.

ESTATE

Sri. K. G. Balakrishna Pillai was the Estate Officer during the year. The total area of the Estate is 391.4368 ha.

A total quantity of 28.382 tonnes of rubber was produced during the year and the total receipt from Estate was Rs. 14,36,791.31. The total expenditure was Rs. 15,54,991.30. At the end of the year there was a stock of 21.605 tonnes of rubber for sale.

FINANCE

Sri. K. K. Pankajakshan, Deputy Secretary to Government continued to be the Comptroller.

For 1986-87 the University had approved a budget of Rs. 17.87 crores. During 1986-87 Government has released Rs. 588.07 lakhs under non-plan and Rs. 220.10 lakhs under plan.

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CHAPTER

General Administration

The Kerala Agricultural University came into existence from 24th February 1971 under the Kerala Agricultural University Act 1971 (Act 33 of 1971)

The main campus of the University at Vellanikkara is 10 km east of Trichur town on the Trichur-Palghat Highway (NH-47). The College of Horticulture is located in the main campus. The University has four other teaching campuses, namely, the College of Veterinary and Animal Sciences at Mannuthy, the College of Fisheries at Panangad, Cochin, the College of Agriculture at Vellayani, Trivandrum and the Kelappaji College of Agricultural Engineering and Technology, Tavanur in Malappuram district. In addition, the University has 23 research stations distributed throughout the State. Some of the stations are also recognised as centres for post-graduate research of the University. When the National Agricultural Research Project was implemented in the University five of these stations were recognised as Regional Agricultural Research Stations. The five Regional stations are located at Pilicode, Ambalavayal, Pattambi, Kumarakom and Vellayani.

The University receives financial assistance mainly from the State Government and ICAR. Financial assistance was also received from outside agencies under the Kerala Agricultural Development Project, National Agricultural Research Project, Kerala Agricultural Extension Project (T&V), SIDA and from the Department of Science & Technology and Department of Environment, Government of India.

Officers of the University and Administrative set up

The Officers of the University are the Chancellor of the University His Excellency the Governor of Kerala, the Pro-Vice-Chancellor, the Hon'ble Minister for Agriculture and the Vice-Chancellor who is the chief executive and academic officer of the University. The Vice-Chancellor is also the Ex-Officio Chairman of the General Council, Executive Committee and Academic Council. The Vice-Chancellor is a full time officer of the University and has the immediate overall control of the University.

The general administrative control is vested with the Registrar while the Comptroller is responsible for budgeting, finance, statements of accounts and audit. The co-ordination, direction and administration of research activities in the University is vested with the Director of Research. The Director of Extension is responsible for extension education and public relations. The Deans and Associate Deans of the various faculties are in charge of resident teaching and instruction of the respective colleges. The Director of Physical Plant is in overall charge of the construction and maintenance of buildings, roads, vehicles and machinery.

Authorities of the University

The statutory authorities of the University are the General Council, Executive Committee, Academic Council, the Faculties and Board of studies of the faculties. The list of the members of these bodies is given in Appendix-I.

General Council

The supreme authority of the University is the General Council. It comprises of 59 members of whom 20 are Ex-officio 18 elected members, 17 nominated members, one representative of each of the three Universities of the State and ICAR nominee. The Council is reconstituted in every three years, the present council was reconstituted with effect from 31.1.86. Ordinarily, the council meets once in four months. The General Council were held on 2.5.86, 11.9.86, 10.12.86 and 27, 28.3.87.

important decisions taken by the General Council:-

To conduct election to the authorities of the University by secret ballot.

Report of the Assurance Committee was resolved.

Election to Executive Committee was conducted. It was also decided to constitute a 5 member committee to study various aspects of sanctioning advance increments in the revised scale of pay to the Junior Assistant Professors in different faculties under KAU.

The various sub-committees of the General Council were reconstituted. Resolved to upgrade the Department of Pathology, College of Vety. & Animal Sciences, as a centre of Excellence. After reviewing the Annual Report of the KAU for the year 1986, resolved to forward the same to the State Government.

The Budget Estimates for the year 1987-88 was also passed by the General Council.

The Executive Committee

The Executive Committee is the Chief Executive authority of the University. The Committee consists of eleven members with the Vice-Chancellor as the Chairman. The other members include three Ex-officio members, six elected members of the General Council and the ICAR representative of the General Council. During the year 11 meetings (171st to 181st) were held.

Among the major decisions taken by the executive committee include sanction regarding the inter University transfer of non-teaching staff working in the Universities within the state—transfer of Assistants and Typists to and from other Universities, creation of the faculty of Rural Home Science under the KAU, Institution of an award for Best student to the B. F. Sc students in the discipline of Fish Processing Technology; sanction to centrally sponsored scheme for establishment of Central Training Institute at the Directorate of Extension; establishment of Agromet Observatory at Amboori, approval of scheme of Family Benefit Scheme for permanent labourers of the University, re-constitution of the Research Council, approval for starting a Dairy Diploma course for the inservice Dairy farm instructors of the Dairy Development Department; sanction for the implementation of the Cadbury's Cocoa Research Scheme for a period of 10 years from 1-4-87.

Academic Council

The Academic Council is responsible for the maintenance of standards of instructions in different faculties of the University. The new Academic Council was constituted on 6-11-84 for a period of three years. Council met on 27th January 1986 and 9th September 1986.

Important decisions were:-

- 1 To establish a centre of Excellence for the Genetic improvement of pulses and oil seeds,
- 2 Centre for advance studies in land and water management Engineering.
- 3 Centre for advanced research on Tribal area,
- 4 To upgrade the department of Pathology under the faculty of Veterinary and Animal Sciences to the status of a Centre of Advanced studies.

The Academic Council recommended to start the following course under the Faculty of Rural Home Science.

- 1 Certificate course in Rural Home Science.
- 2 U. G. Diploma Course in Rural Home Science.
- 3 P. G. Diploma Programme in Pre-Primary Education.
- 4 P. G. Diploma Programme in Nutrition.
- 5 U. G. Degree Programme in Rural Home Science.
- 6 Ph. D. Degree Programme in Food Science & Nutrition.

Board of Studies

The Board of studies of the each faculty has an advisory role to look into the maintenance of academic standards. The Board of Studies were reconstituted in all the faculties on 8-11-87.

Post-Graduate Committee

The Post Graduate Committee meetings were held on 29-11-86 and 7-3-87 (29th & 30th meetings). Post Graduate Programmes of the students were approved in the meetings.

Important engagements of the Vice-Chancellor during the year

The Vice-Chancellor participated in the annual meeting of the Indian Agricultural Universities Association. He participated in the I. F. S. Officers Training Programme at the Kerala Forest Research Institute and spoke to the participants. He took part in the meetings of the State Planning Board. He attended the seminar on "the role of Anthropology, at Palghat under the auspices of the KIRTADS. He participated in the Seminar to discuss the rural development programmes of the People's Dairy Development Project at Ankamaly. He spoke at the Training course of I. F. S. Officers held at Bandipur. He participated in the meetings of the Government Body of the Institute of Management in Government. The Vice-Chancellor inaugurated the Summer Institute on Recent Advances in Diagnosis and Control of Parasites at the College of Veterinary & Animal Sciences. He spoke at the Training course of Officers of the Tribal Welfare Department, the subject being "Tribal Development Programmes in Kerala—issues and problems". He spoke at the XIV Convention of Agricultural Universities held in Srinagar.

He attended the foundation stone laying ceremony for the Academic Block and the Kelappaji College of Agricultural Engineering at Tavanur. He inaugurated the All India Veterinary Clinicians conference at the Veterinary College Auditorium. He participated in the College Day at the Kelappaji College of Agricultural Engineering at Tavanur.

He presided over the inauguration of the College of Forestry, Kerala Agricultural University. He participated in the National Workshop on Agricultural Journalism. He participated in the work experience camp held at the Government Model High School for Boys, Trichur. He participated in the Seminar on Sugarcane and the Indian Standards Seminar. He spoke at the Seminar at the Institute of Management in Government on the experience of participation in Tribal Development programmes.

He participated in the Advisory Committee meeting for the Philatelic Exhibition, Trichur. He participated in the Seminar on the Impact of Agriculture on Environment in Kerala. The Vice-Chancellor participated in the inaugural function of the Dairy Diploma Course at the College of Veterinary & Animal Sciences. He participated in the Seminar on biogas at the Communication Centre. He participated in the Seminar on "Women and Rural Development" inaugurated by Mrs. Margaret Alva, Central Minister. Sri Madhava Menon also underwent the mandatory one week refresher training course for I. A. S. Officers at the Institute of Rural Management, Anand. He participated in the following meetings. Special meeting and other meetings of the KAU General Council, Executive Committee and Academic Council. Research Councils of Faculties Officers meetings, several sittings of the Expert Committee to Review Forest Policy. Selection Committees to recommend personnel for teaching posts of Faculties, Governing Body of K. F. R. I., Land Use Board, Inter-University Consultative Committee, P. G. Committee, Works Committee.

From 13 February, 1987, Dr. M. J. Sebastian, Dean, Faculty of Fisheries, was in charge of the Office of the Vice-Chancellor. Dr. Sebastian presided over the meetings of the General Council, Executive Committee and other committees. He participated in the National Seminar on Agricultural Meteorology of Plantation Crops at Pillicode. He inaugurated the symposium on emerging diseases of poultry at the Veterinary College. He participated in the Joint Training Committee. He presided over the inauguration of Cocoa Research Project sponsored by the Hindustan Cocoa Products under KAU leadership.

Assurance Committee

This committee was reconstituted with Prof. Alexander Zacharias as Chairman.

Accounts Committee

This sub-committee with Sri. S. S. Potti as Chairman was reconstituted.

Statute Sub Committee

The statute sub committee of the General Council was reconstituted with Sri Raghavan Pozhakkadavil, Ex MLA as Chairman.

Officers' Meeting

The University officers met three times during the year on 21.6.86, 7.1.87 and 13.2.87 under the Chairmanship of the Vice-Chancellor. The important decisions taken are (a) to change over to semester system for the graduate admissions from 1986-87 onwards, (2) to install a Telephone to the KAU 1 (K) R&V Squadron NCC, Mannuthy; (3) to put the Directorate of Employment information and Guidance bureau attached to the KAU under the direct control of the Director of Students Welfare.

University Organisation

The KAU Act envisages the establishment of Faculties of Agriculture Veterinary and Animal Sciences, Fisheries, Basic Sciences and Humanities, Co-operation, Home Science, Agricultural Engineering and Forestry. However, only four Faculties, namely Agriculture, Veterinary and Animal Sciences, Fisheries and Agricultural Engineering and Technology have been established. College of Co-operation & Banking and College of Rural Home Science have been established.

Research Council

In order to advise to formulate the research programmes of the University, the Research Council, the Research Advisory Committee, the Faculty Research Committee and the Project Co-ordination Committees are functioning. The Research Council also has representatives from the Scientists of the other Agricultural Universities in South India and sister Universities of Kerala, in addition to the Scientists from Kerala Agricultural University.

The Extension Advisory Committee renders advice in extension education activities which are organised through the Directorate of Extension.

Faculty Improvement

The staff members were provided with opportunities to acquire higher qualifications; by granting deputation, study leave or leave for study purposes. Staff members were also sent for short term training courses, summer institutes etc., in different specialisation and for participating in seminars, symposia, workshops etc. organised by different scientific agencies/ICAR institute or other Universities.

Students' Admission

Admission for undergraduate courses in Agriculture, Veterinary, Fisheries and Agricultural Engineering Technology were made on the basis of a common entrance examination conducted by the Govt. of Kerala. Admission to the various post-graduate courses were given on the basis of marks obtained in the qualifying examinations, experience, number of research papers published and the performance at the interview. A few seats were reserved for ICAR nominees and SC/ST candidates.

Labour

Farm labourers constitute a major category of personnel in the farm/research stations under the University. Two categories of workers—casual and permanent—exist in the farms and research stations under the Kerala Agricultural University. In respect of service conditions and wages, generally, the University follows Government orders applicable to the labourers of the Department of Agriculture and Animal Husbandry.

The total permanent labour strength in the farms under the University was 1177. In addition to the permanent labourers, there were about 2800 casual labourers and they were given work as and when work was available. In the recruitment of casual labourers a minimum of 10% reservation was allowed to scheduled castes/tribes. In the Regional Agricultural Research Station, Ambalavayal (research station situated in tribal area) 20% of the vacancies of permanent labourers were reserved for ST (Adivasis). The University has the largest number of permanent labourers in the Instructional Farm, Vellayani, followed by Regional Agricultural Research Station, Ambalavayal and Regional Agricultural Research Station, Pattambi.

Permanent labourers are eligible for pension. A Provident Fund Scheme is also in force and the rate of subscription of worker is 6½% of the monthly wages. For casual labourers, who are not eligible for pension, the University introduced a contributory Provident Fund Scheme the contribution being 6½% of the monthly wages by the worker and an equal contribution by the University. Both permanent and casual labourers are eligible for gratuity also. They are also eligible for leave with wages @ 1 day for every 20 day's work. National Festival holidays, sick leave, maternity leave for female labourers etc.

In deserving cases, labourers are sanctioned with ex-gratia payments for meeting medical expenses.

In the Vellanikkara Rubber Estate the University has tappers, factory workers, field workers as well as staff and supervisors; the strength of the Estate staff and workers, being around 100. For the

Estate staff and workers, the University is giving all benefits contemplated in the Plantation Labour Act. The University is also following recommendations of Plantation Labour Committee in respect of payment of wages and fringe benefits.

The following are some of the service benefits sanctioned to labourers. (1) Special casual leave not exceeding 12 days per year to those who are members of Panchayats for attending Board meeting; (2) Special casual leave for appearing before enquiring authority in connection with disciplinary proceedings and (3) Special casual leave for antirabic treatment was also sanctioned to permanent labourers. Leave benefits such as National and festival holidays, sick leave and leave with wages admissible to farm labourers were extended to the casual labourers of the Engineering Wing and KAU Press.

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CHAPTER II

Education and Research

FACULTY OF AGRICULTURE

1.1 COLLEGE OF AGRICULTURE, VELLAYANI

The College of Agriculture which was established in August 1955, is located at Vellayani, 11 Km south of Trivandrum City. It is surrounded by the Vellayani lake on three sides. The total area of the campus is 243 ha, including 165 ha. of the paddy lands in the lake area.

Dr. M. M. Koshy, Director, Centre of Excellence for Tropical Soils continued to be in full additional charge of the post of Dean and Head of the Institution.

Dr. N. Mohanakumaran continued as Associate Director, NARP (SR) with Headquarters at Vellayani.

Departments/Sections/Projects

A college of Rural Home Science was started inside the campus of the Agricultural College in 1986.

Dr. L. Prema, Professor of Home Science functioned as the Head of this Institution.

The following fifteen departments have been functioning in this College.

Agronomy, Agricultural Botany, Plant Breeding, Horticulture, Soil Science & Agricultural Chemistry, Agricultural Entomology, Plant Pathology, Agricultural Extension, Agricultural Statistics, Agricultural Economics, Agricultural Engineering, Animal Husbandry, and Plant Physiology, Physical Education and also Home Science. (This department was developed into the College of Rural Home Science).

Administration

Sri. P. N. Ramachandra Kurup assumed charge as Administrative Officer with effect from 4-4-1986.

New Departments/Sections/Projects started during the year

The Department of Home Science became part of the College of Rural Home Science which was formally inaugurated on 8-9-1986.

In addition the following new projects were started during the year.

1. All India Co-ordinated Research Project on pesticide residues

A unit of the AICRP on pesticide residue started functioning in the College with effect from 18-12-1986. The objective of the project is to organise, promote and co-ordinate research on pesticide residues in agricultural produce and other components of the environment at All India level, to monitor the pesticide residues in the biotic and abiotic components of the environment, to study the factors influencing the metabolism of pesticides in plants, soil and animals, to examine the effect of processing of food commodities to get rid of the pesticide residues, to maintain upto date information on this subject and to provide guidelines to research and extension workers in the country.

2. Training Service Scheme, College of Agriculture

This unit came into being on 1-12-1986 as part of the Central Training Institute, Mannuthy under the NARP. Sub Project-1. The responsibility for conducting and co-ordinating various training programmes at regional level is vested with this scheme.

3. Tissue Culture Laboratory

Sanction has been obtained for a major research project on 'tissue/epical meristem culture in the horticultural crops of Kerala like cashew and nutmeg' from the U. S. held Indian rupee. Necessary steps have been taken to establish a tissue culture laboratory attached to the Department of Horticulture and to start the project as early as possible.

Posts shifted/abolished during the year

1. In the Department of Agricultural Botany one post of Professor was shifted from the College of Horticulture, Vellanikkara to this College with the incumbent (Prof. K. Gopakumar) with effect from 8-12-1986.
2. In the Department of Horticulture one post of Asst. Professor was transferred with the incumbent (Sri Philipose Joshua) from the Kelappajj College of Agricultural Engineering and Technology to this College with effect from 9-6-1986.
3. One post of Professor of Soil Science and Agricultural Chemistry was transferred from the RARS, Piiicode to this College with the incumbent (Dr Thomas Varghese) with effect from 17-2-1987.

Faculty Improvement Programme

Smt D. I. Suma Bai, Assistant Professor of Agrl. Botany proceeded on study leave for three years from from 1-7-1987 to qualify for the Ph. D degree.

Dr S. T. Mercy, Associate Professor of Agrl. Botany rejoined duty on 20-11-1986 after undertaking post doctoral research in tissue and anther culture at the IRRJ, Manila.

Dr. D. Dale, Associate Professor of Agricultural Entomology rejoined duty on 18-12-1986 after undertaking advanced research at the IRRI, Manila.

Smt Lekha Sreekantan, Assistant Professor joined duty on 31-12-1986 after completing the Ph. D. programme.

Details of Seminars/Symposia/Extension Lectures/Training Programme/Correspondence Course etc, conducted

The eighth Regional Workshop of NARP (SR) and Zonal Workshop of the T & V was conducted on the 9th and 10th September 1986.

Fertilizer Orientation Training for the final B. Sc. (Ag) Students was conducted in collaboration with Fertilizer Association of India on 20-6-1987.

Social Forestry Training Programme was conducted for village Extension Officers of the Community Development Department of Kerala State.

An Animal Husbandry Seminar was conducted at Nedumangad in connection with the Mriga Samrakshana Mela organised by the Animal Husbandry Department of this College on 18-2-1987.

A Seminar on rabies control was conducted on 3-1-1987 at Vellayani along with the inauguration of the artificial insemination programme at Veterinary Hospital in the campus.

An Advanced Training course in Audio Visual techniques was conducted during 12-1-1987 to 24-1-1987 for the Deputy Directors of the Department of Agriculture, Kerala.

A correspondence course on 'Vegetable Gardening for Housewives' was started from 1-1-1987 and is continuing.

Extension Lectures

Dr Swayambulingam, Professor of Agronomy, Tamil Nadu Agricultural University on 'Computerisation of Agriculture'.

Dr G. Bhaskaran, eminent endovirologist of the University of Texas on 'Juvenile hormones'.

Dr G. K. Veeresh, Professor, G. K. V. K. Campus, Bangalore on 'Soil Grub Problems in India'.

Dr Lalithakumari, Professor, Centre for Advanced Studies in Botany on 'Problems of Fungicide resistance in Plant Protection'.

Dr M. R. Reddy, Professor, UAS, Bangalore, on 'Fungal antagonism and Plant disease control'.

Dr R. Jayaraman, Professor & Head, Tamil Nadu Agricultural University on 'Role of organic matter in biological control in soil borne diseases'.

Dr Mariappan, Professor, Tamil Nadu Agricultural University on 'Control of plant viruses by using inhibitors including different kinds of soils'.

Academic Programmes

The strength of students under each course:

UG course

	Men	Women	Total
I year	25	41	66
II year	40	38	78
III Year	38	36	74
IV Year	25	23	48
Total	128	138	266

Number of outside students with details of State/Country/Programme etc.

	Men	Women	Total
Meghalaya	1	1	2
Tripura	2	—	2
Andhra Pradesh	1	—	1
Bhutan	1	—	1
Lakshadweep	2	—	2
Delhi	1	—	1
Total	8	1	9

Number of students who obtained their degree during the year

1981 Admission	87
1982 Admission	45
Total	<u>132</u>

P G Course

a) No. of students for the Master's degree programme

	Men	Women	Total
1st Year	16	25	41
2nd Year	22	25	47
Total	38	50	88

Number of outside students

Number of students who obtained the degree during the year

— — 21

b) Number of students who registered for Ph. D.

	Men	Women	Total
1st Year	2	1	3
2nd Year	5	2	7
3rd Year	4	3	7
Total	11	6	17

No. of students who obtained the degree during the year

— — 10

Practical Training Programme

The work experience programme instituted for the undergraduate students for imparting practical knowledge in Agriculture and ability in tackling field problems was successfully completed. Work experience was given for the cultivation of tapioca, banana, pulses, vegetables, fodder, maize and homestead farming crops. The final B. Sc. (Ag) students cultivated paddy during puncha season in the Kayal lands. In addition to the annual crops listed above, the students were allotted perennial trees during the first year. They kept necessary records and maintained the trees properly till the end of the B. Sc. (Ag) Programme.

Under the farm training programme, the final year B. Sc. (Ag) students were assigned to various research stations of the KAU in the southern region for getting an insight into the activities of the stations during the final trimester under the direct supervision of the concerned officers in charge of those stations.

The final year students were also provided with opportunities for getting practical training under field situations in agricultural development projects. This programme was arranged and monitored by the Department of Agril. Extension and was conducted in collaboration with the State Department of Agriculture.

Study tours

The final years students were taken out for an All Kerala study tour during 10-12-1986 to 20-12-1986.

The third year students were taken out for an All India study tour during 4-9-1986 to 27-9-1986.

The second year students were taken out for all Kerala study tour during 10-11-1986 to 22-11-1986.

Scholarships, awards and aids to students

1	National Merit Scholarship	15
2	ICAR Merit-cum-means scholarship	2
3	ICAR Junior Research fellowship	17
4	ICAR Senior Research fellowship	8
5	Merit Scholarship to the children of School teachers	1
6	USAID (New Delhi) for Nepal students	1
7	Educational concession to Tripura students	2
8	Educational concession to Meghalaya students	2
9	Stipend to village level workers admitted to B. Sc. (Ag.) course	2
10	Educational concession to Lakshadweep students	2
11	Merit Award to the students on Districtwise basis	2
12	Senior Research Fellowship from the Potash Res. Institute of India, Haryana	1
13	KAU Merit Scholarship	28

14	KAU Fellowship (Junior)	27
15	Educational concession under KPCR	34
16	Educational concession to scheduled caste students	37
17	Educational concession to scheduled tribe students	2
18	Educational concession to OBC students	3
	Total	<u>186</u>

Extra curricular/Co-curricular activities

NSS activities

Dr Skariah Oommen, Associate Professor, Department of Animal Husbandry continued to be the Programme Officer of the NSS Unit. I. Sri P. A. Rajan Asari, Assistant Professor, Entomology continued to be the Programme Officer of NSS Unit II till 30-6-1986 and thereafter from 1-7-1986 Sri S. Motilal Nehru, Assistant Professor, Department of Agricultural Extension took charge as Programme Officer, NSS Unit II.

The student strength allotted to the College for 1986-87 was 260. The volunteers took active participation in the various activities listed below:

- 1 Maintenance of the community centres at Kakkamoola and Palapur
- 2 Classes under the functional literacy programme at Kakkamoola
- 3 Celebration of International literacy day on 8th September 1986 at the Community Centres
- 4 Vaccination campaigns at Palappur and Kalliyoor where 560 birds were vaccinated against the Ranikhet disease in Poultry
- 5 Agricultural Extension work in the two adopted villages around the college
- 6 A cleaning campaign at the Vellayani Government Hospital premises on Gandhi Jayanthi day
- 7 Data collection on the socio-economic status of 200 farmers at Vattiyoorkkavu Panchayat
- 8 A campaign to destroy stray dogs in and around Vellayani campus
- 9 A group discussion meeting on problems of vegetable cultivation at Palappur on 23-12-86
- 10 A special camping programme at Melamood Village in Nedumangadu from 14th to 18th February 1987, where the following items of work were carried out:
 - a) Construction of a pond for irrigation purpose
 - b) Distribution of vegetable seeds
 - c) Soil sample collection for soil testing and fertilizer recommendations
 - d) Animal Husbandry Mela
 - e) A calf rally and cattle sterility campaign
 - f) Anti rabies vaccination

Physical Education Programme

The students of the College participated in the following competitions.

i. Inter-class competitions

The annual inter-class athletic meet was held on 15th and 16th October 1986. A crosscountry race was also arranged. Inter-class competitions in various games were also conducted.

ii. Inter-collegiate competitions

The students of this college participated in the inter-collegiate competitions at Mannuthy during 16th to 19th May, 1986. The inter-collegiate Athletic meet was conducted on this campus during February, 1987.

iii. Inter-University Competitions

Three cricket players, two hockey players and three athletes from this College participated in the II Kerala Inter-University tournaments held at Calicut during September, 1987.

The levelling and turfing of the stadium is in progress. An eight lane track has been laid and the construction of the gallery around the stadium was completed.

Hostels

PG Hostel

Dr K. P. Vasudevan Nair continued as the Assistant Warden. Sri. S. Sathiadevan continued as Steward. The total number of students in the Hostel was 33.

UG Hostel

Sri S. Pazhaniya Pillai continued as Assistant Warden and Sri K. Gopakumaran Nair continued as Steward of the UG Hostel. The number of students in the UG Hostel was 112.

Ladies Hostel

Smt K. Saradamma continued as Assistant Warden and Smt L. Kamalakshy was the Matron of Hostel. The total strength of inmates in the hostel was 121.

College Library

The total number of books in the Library as on 1-4-1986 was 20653. Only 93 books were newly purchased during the year. Sixty two foreign and 33 Indian journals were subscribed for. A Book exhibition was conducted on the 30th and 31st December, 1986.

The Livestock and Instructional Farms

Livestock Farm (Dairy and Poultry Units)

The Livestock position of the farm attached to the Department of Animal Husbandry was as follows:

<i>Kind of Livestock</i>	<i>Milch</i>	<i>Dry (as on 31-3-87)</i>
Cows	22	9
Heifers	—	5
Bulls	—	2
Bull calves	—	1
Cow calves	—	16
Working Bullocks	—	2
Total animals	—	57
Birds (Poultry)	—	197

The lactation average of the herd was 1947.8 litres and the mean milk production per day was 122 litres. The farm produced a total quantity of 141.75 M. T. of grass fodder during the year. The average egg production per day was 90. The number of birds culled and died during the year was 111.

In the Veterinary Hospital attached to the Animal Husbandry Department of the College 984 cows and buffaloes, 279 poultry birds and 714 other animals were treated during the year. Pregnancy diagnosis was conducted in 385 animals and 506 birds were vaccinated. Twenty eight fresh and 12 repeat inseminations were also done during the year.

The total expenditure of the livestock unit was Rs. 2,71,676.45 and the total receipt was Rs. 2,66,572.75.

Lab-to-Land Programme

Twenty five farm families were selected for lab-to-land adoption during the year and the programme was inaugurated by Sri K. V. Surendranath, MLA on 29-6-1986. The bench mark survey of the socio-economic and farming situations of the selected 25 farm families was conducted. Two hand compression sprayers and five hand pneumatic sprayers were distributed to the farmers for common use. The farmers were given regular training on various aspects of agriculture with the help of experts from the College of Agriculture, Vellayani. The beneficiaries of this scheme were invited to the College Campus and they were given on the spot training on vegetable cultivation and other farming methods with the help of the officers of the Instructional Farm. Demonstrations, group discussions, distribution of literature, supply of critical inputs like seeds and other planting materials were also undertaken for the benefit of the selected farmers.

Visitors to the Institution

The following important persons visited the campus during the year.

Dr V. D. Guruswami Raja, Dean, P. G. Tamil Nadu Agrl. University on 11-4-1986.

Dr S. R. Sreerangaswami, Director, School of Genetics, Tamil Nadu Agrl. University, Coimbatore visited on 21-4-1986.

Members of the IDA Mission visited on 18th August 1986.

Dr S. H. Patel, Groundnut Breeder, B. A. R. C. Trombay visited on 26th February 1987.

Dr D. Lalithakumari, Professor, Centre for Advance Studies in Botany, Madras visited on 7-3-1987.

Dr N. P. Jayasankar, Joint Director, CPCRI, Kayamkulam visited on 7-3-1987.

Sri Sarat Pawar, former Chief Minister of Maharashtra visited the campus on 20-5-1986.

Instructional Farm, Vellayani

The total area of the farm comprises of 75 ha of garden land and 165 ha of Kayal lands. The garden land is cropped to coconut (20 ha), Rubber (2 ha), Banana (10 ha), Paddy (5 ha), Mango (10 ha), Guava (1 ha), Sapota (0.5 ha), Bread fruit (0.5 ha), Jack (0.5 ha), Nutmeg (1.5 ha) and Cloves (0.5 ha).

The main activities of the farm centered around the production and distribution of quality coconut seedlings, grafts, layers and seedlings of fruit and ornamental plants, production and distribution of quality vegetable seeds, maintenance of banana varietal collection and bulk cultivation of paddy in the Kayal lands during punja season. A portion of the kayal land is being reclaimed and planted to coconut. The following quantities of farm produce and planting materials were produced and sold during the year.

1 Coconut	173113 Nos.
2 Coconut seedlings	
a) Komadan	2895 Nos.
b) WCT	7456 Nos.
3 Rubber sheets	1853 kg
4 Rubber waste	231 kg
5 Grafts & layers of fruit trees	15095 Nos.
6 Paddy (Bulk)	44.143 tonnes
7 Paddy seeds	6.422 tonnes
8 Banana fruits	17.31 tonnes
9 Banana suckers	70 Nos.
10 Seedlings & layers & cuttings of ornamental plants	3550 Nos.
11 Vegetable seeds	199.405 kg.

The total expenditure in the Instructional farm of the College was Rs. 42,08,809.44 and the receipt was Rs. 8,56,858.85 during the year.

1.1.1. Centre of Excellence for Tropical Soils

The Centre of Excellence for Tropical Soils was established on 1-6-1985. The main objectives are to document the work already done on the soils of Kerala, to co-ordinate soil work carried out by different agencies in this State and to carry out advanced research on tropical soils with special reference to those of Kerala.

Dr. MM Koshy, is the Director of this Centre.

The Director Dr.MM Koshy has been holding full additional charge of the duties of Dean of the College of Agriculture.

A total number of 126 scientific papers published on the soils of Kerala during the period 1926 to 1986 have been summarised and compiled in a chronological order under the title "Sixty years of Soil Research in Kerala". The compilation will be useful to research workers on Kerala soils to know what has already been done in the past.

A monograph entitled "Soils of Kerala" containing data relating to the morphological, physical, physico-chemical and chemical characteristics of Kerala Soils has been prepared.

Research

1. Fertility investigations in different soil groups of Kerala with special reference to the micronutrients

A preliminary study was undertaken to evaluate the nutrient status of the different soil groups of Kerala with special reference to the distribution of the micronutrients. Soil samples from three locations pertaining to each soil group were used in the study. The soils were examined for their physico-chemical properties and available macro and micro-nutrients. The mean values of the micro-nutrients in five of the different soil groups have been worked out. The work on the other five soil groups is in progress. Based on the results of this preliminary investigation more detailed studies will be undertaken.

2. Micronutrient status of the Kole soils of Kerala

Kole soils collected from two depths (0-20 and 20-40 cm) from 15 locations in Trichur district were used for the study. The physico-chemical properties and available micro-nutrients, viz., Fe, Mn, Zn, B, Cu and Mo were determined in these soils. The correlations between the micro-nutrients and other soil parameters were also studied.

Based on the accepted standards none of the micro-nutrients was found to be deficient in these soils.

Iron and manganese showed significant negative correlation with pH; whereas Boron showed a significant positive correlation.

3. Effect of drying and wetting on the physical, physico-chemical and chemical properties of the submerged soils of Kuttanad

Thirty one soil samples representing Karapadom and Kayal soils collected from various parts of Kuttanad were analysed for various parameters.

In Kari soils fungal population was significantly higher than Karapadom and Kayal. Bacterial population in Kari was significantly lower than Kayal and Karapadom soils.

Kari soils were extremely acidic (4.2), Kayal recorded a higher value of 5.25 and Karapadom recorded the highest pH of 6.0.

There was no significant difference in specific conductance of Kari, Kayal and Karapadom.

There was no significant statistical difference in the contents of Av-N, K, P, exch. Al and Fe.

All the soils recorded a marked decrease in soil pH due to drying. Air drying and sun drying decreased available N content, available P and available K and Fe in Karapadom soils. Similar trend was noticed in Kari and Kayal soils.

4 Comparative study of the nature of acidity in the upland and lowland soils of South Kerala

A study has been made of the nature of acidity of Kerala soils collected from 12 locations in relation to their chemical and physico-chemical properties. From each place the soils were collected from the three physiographic positions namely the bottom, terrace and upland areas in two depths (0-20 cm & 20-40 cm).

The soils were all acidic in reaction. Drying of the soils resulted in a lowering of pH. Acidity of moist soils of bottom regions was significantly lower than that of the terraces and uplands. The CEC of the uplands was significantly higher than that of the terraces and bottom lands. All the soils were found to contain appreciable amounts of Al in addition to exchangeable H. Exchangeable Fe varied from 0.06—0.22 me/100 g soil. It was constant in the three physiographic positions. Exchangeable Ca & Mg were nearly constant in the upland, terrace and bottom areas. Exchangeable K showed a decrease in trend from uplands to terraces and bottom areas.

With increase in pH there was an appreciable increase in the exchange capacity.

5 Occurrence and distribution of the micronutrient elements in the rice soils of South Kerala

Rice soils of Kerala namely, lateritic Kari, Karapadom and sandy soils were subject to the study. Soil samples from 15 locations of each

of these soils were analysed for their physical properties and available micronutrients namely Fe, Mn, Zn, Cu, B & Mo in two depths. The results are being studied for interpretation.

Morphological and physico-chemical properties of denuded forest soils under the influence of oilpalm plantation.

A total number of 24 profile samples of forest soils of oilpalm plantation of different age groups were collected. The morphological features were studied and the soils were processed for detailed investigation.

6 Distribution, fixation and availability of phosphorus in the Kole soils of Kerala.

Soil samples from 15 locations at two levels from the Kole lands at Trichur were collected and the soil processed for the following objectives:-

- 1 to study the chemical nature and distribution of P in Kole soils.
- 2 to study fixation and availability of soil P
- 3 to study the availability of added phosphatic fertilizer.

Further work is in progress.

1.2 COLLEGE OF HORTICULTURE, VELLANIKKARA

The College of Horticulture is situated in the Main Campus of the Kerala Agricultural University at Vellanikkara 10 Km away from Trichur town on Trichur-Palghat Road.

The College was established on 28th October 1972 and was temporarily located at Mannuthy. It was shifted to the Main Campus during November 1977.

The College has an area of 95.3 ha. (Instructional Farm, Vellanikkara) and is utilized for imparting practical training to students and for undertaking research by staff and students,

Dr P. K. Gopalakrishnan was holding the post of Associate Dean upto 2nd March 1987 till his retirement. Dr C. C. Abraham, Associate Director of Research was holding additional charge of the post from 2nd March 1987 to 31st March 1987.

In the beginning, only 20 students were admitted to the B. Sc. (Hort) degree programme of four year duration after Pre-degree course. The number of admission was increased to 30 from the Academic year 1976-77 and to 40 from 1979-80, excluding the sponsored candidates from other states and institutions. The B. Sc. (Ag) programme was also introduced from the academic year 1977-78 with the initial intake of 50 students.

The syllabi for B. Sc. (Ag) and B. Sc. (Hort) were unified during the academic year 1980-81.

Master's degree programme was started during the academic year 1976-77 in six disciplines viz. Horticulture, Agronomy, Agrl. Botany, Agrl. Chemistry, Entomology and Plant Pathology. From the academic year 1979-80, Ph. D programme in Horticulture and M. Sc. programmes in Agricultural Economics, Plant Breeding and Agrl. Engineering were also commenced.

There are 15 departments in the College, viz, Pomology & Floriculture, Plantation Crops & Spices, Olericulture, Processing Technology, Agronomy, Agrl. Botany, Soil Science & Agrl. Chemistry, Agricultural Entomology, Plant Pathology, Agricultural Economics, Agricultural Extension, Agricultural Engineering, Agricultural Statistics, Agricultural Meteorology, and Physical Education. In addition to these a Centre of Advanced Studies for Humid Tropical Tree Crops and Environmental Horticulture is functioning in college with Dr. M Aravindakshan as Director.

Other schemes are Manpower Development Scheme of Coffee Board, Coconut Root (Wilt) Disease Project (Part of the Scheme is attached to the College of Horticulture); All India Co-ordinated Vegetable Improvement Project; All India Co-ordinated Spices and Cashew Improvement Project, Research on Ginger and Turmeric; Restoration of degraded environment in Chambakkad Tribal Colony area; Establishment of Central Nursery for Hybrid Pepper Vellanikkara; The adhoc Scheme for marketing of coconut and cocoa in Kerala; All India Co-ordinated Research Project on the Biological Control of Crop Pests; Mechanical Control and utilization of floating types of aquatic weeds; AICRP on Weed Control in Plantation Crops; CAPART Scheme on Sand Dredging; All India Co-ordinated Floriculture Improvement Project, ICAR Adhoc Scheme on Breeding for resistance to bacterial wilt in chilli and brinjal; vegetable seed production complex; SIDA project on Water Management Studies using Ground Water.

In addition to the above departments/schemes/the College also maintained an Instructional Farm, Botanical Garden and a Central Instrumentation Room.

One post of Associate Professor (Horticulture) was sanctioned in the ICAR Adhoc Scheme on breeding for resistance to bacterial wilt in chilli and brinjal w.e.f. 1.4.86.

Posts shifted during the year

One post of Professor (Ag.Bot) was shifted along with the incumbent to the College of Agriculture, Vellayani, with effect from 6.12.86.

One post of Professor (Pl.Path) under Coconut Root (wilt) scheme was shifted to RARS, Kumarakom along with the incumbent w.e.f. 1.12.86.

Smt. Valsamma Mathew, Assistant Professor (Hort) was granted deputation for a period of 3 years to obtain Ph. D in Landscaping and Ornamental Horticulture at IARI, New Delhi.

Details of staff granted study leave

Smt. S. Pathummal Bevi, Assistant Professor was granted study leave for 3 years for undergoing Ph.D course at TNAU, Coimbatore.

Smt KT Prasannakumari, Assistant Professor was granted study leave for 3 years for undergoing Ph.D at KAU.

Sri K Aravindakshan, Assistant Professor was granted study leave for 3 years for undergoing Ph.D course in Horticulture at TNAU, Coimbatore.

Smt PK Sushama, Assistant Professor was granted study leave for 3 years for undergoing Ph.D course in Agrl. Chemistry at UAS, Bangalore.

Details of seminar conducted by the Institute:-

Training conducted:

The various categories of technical staff of the Cardamom Board were given Training on spices production Technology as detailed below.

The staff of the various departments of the College gave extension lectures to the farmers as organised by the Extension Department.

Academic Programmes:-

Strength of students under each course.

(i) U. G. Course:-

B. Sc. (Ag. Programme)

Year of admission	Men	Women	Total
I st year (1986 Admission)	35	40	75
II nd year (1985-Admission)	38	25	63
III rd year (1984-Admission)	32	36	68
IV th year (1983-Admission)	30	24	54
Total	135	125	260

No. of outside students with details of state/country programme etc.

State/ Gountry	Ist year		II year		IIIrd year		IVth year		Total
	M	W	M	W	M	W	M	W	
Bhutan			3				1		4
Meghalaya				1					1
Mizoram			1						1
Arunachal Pradesh			1						1
Manipur							2		2
Sudan							1		1
Andhra Pradesh		2							2
Tamil Nadu		1							1
	1	2	5	1	—	—	4		13

No. of Students who obtained their degree (B.Sc. Ag) degree programmes:-

Year of admission	Men	Women	Total
B.Sc (Ag) 1981 admission	29	6	35
1982 admission	19	25	44
Total	48	31	79
B.Sc. Hort)—1979 admission		1	1
Total		1	1

(ii) P. G. Courses

Strength of students in each cadre

M.Sc (Hort) Degree Programme

Year of admission	Men	Women	Total
1st year	2	5	7
2nd year	1	6	7
Total	3	11	14

M.Sc. (Ag) Programme

Year of admission	Men	Women	Total
I st year (1986) admission	11	17	28
II nd year (1985) admission	11	18	29
Total	22	35	57

(iii) Ph.D Programme

Year of admission	Men	Women	Total
Ist year (1986-admission)	2	2	4
II nd year (1985-admission)	2	5	7
III rd year (1984-admission)	1	7	8
Total	5	14	19
G. Total (PG)	30	60	90

No. of students who secured degrees during the period

Courses	Men	Women	Total
M.Sc. (Ag)	9	4	13
M.Sc. (Hort)	1	3	4
Ph.D	3	1	4
Total	13	8	21

Practical training programmes

The students for UG and PG courses attended the field practicals and work experience courses as per the course curriculum.

Study tours

The IInd year B.Sc. (Ag) students were taken all around Kerala and they have visited all the research stations under KAU, CPCRI and other places of agricultural importance.

The IIIrd year (B.Sc. Ag) students were taken on All India tour and they have visited all places of agricultural importance in India.

The final year B.Sc (Ag) students who had studied the elective course on coffee were taken to Regional Office Research Station, at Kalpetta and neighbouring estates and curing works of Wynad District. Scholarships, Awards and Aids to students:

Name of scholarships/awards/aids	No.of recipients
Educational concessions to SC/ST	21
Educational concessions under KPCR to SEBC & FC students	56
Educational concessions to O.E.C. Students	7
National Merit Scholarship	46
District Merit Scholarship	4
Stipend to Andaman & Nicobar Islands students	1
Stipend to Lakshadweep students	1
Stipend to nominee of Meghalaya	1
Stipend to nominee of Meghalaya	1
Stipend to nominee of Arunachal Pradesh	1
KAU Merit Scholarships	22
KAU Merit Junior Fellowship	26
KAU Merit Sr. Fellowship	2
ICAR Junior Fellowship	18
ICAR Senior Fellowship	3
ICAR Merit cum means scholarship	4
ICAR post metric scholarship under HRD programme	2

Extra-curricular/Co-curricular activities

Sports & Games

The inter class competition in various sports and games have been conducted.

The College Annual Athletic meet was conducted on 28th and 29th October 1986. Sri U. Unnikrishnan, Director of Physical plant inaugurated the meet and Sri P. Krishnankutty, Superintendent of Police presided over the closing ceremony and distributed the prizes to the various winners of the meet.

A good number of friendly matches in various activities have been played against the other colleges and institutions of Trichur Dt. The College Foot ball team has participated in the Trichur Dt. Football league tournament and the cricket team in the Trichur Dt. Cricket league tournament.

The college team has participated in all the inter collegiate tournaments of KAU and has won in cricket (Men) Basket ball (Women) shuttle badminton (Women) and runners up in Table tennis (Men).

N. S. S. Activities

The N. S. S. Volunteers are in close contact with the farmers in the adopted villages Mullakkara and they helped them in the production oriented programmes like rodent control and pest management, weed control, soil testing, awareness in use of fertilizers and hybrid seeds etc.

The community centre at Mullakkara continued to function with facilities for reading newspapers, leaflets etc.

The volunteers celebrated Vanamahotsava in the Main Campus of the University. Sri K. Sethumadhavan, I. A. S. Registrar and Dr. AGG Menon, Director of Extension and programme co-ordinating members of the University attended the function. The students planted 700 seedlings in the KAU School and the Main Campus of the University. They distributed 1200 seedlings of neem, mango, eucalyptus etc. to the farmers of the adopted village.

Two Kitchen gardens were laid out and maintained by the N. S. S. students at Government School, Ramavarmapuram and Holy family convent School, Mannuthy. Two coconut nurseries were raised in the Girijan/Malayan colonies at Povanchira and Payyaram and seedlings were distributed to the inmates of the two colonies.

Twenty four NSS volunteers donated blood to the patients in the various hospitals at Trichur. Adult education classes are being conducted by the NSS volunteers for the illiterate labourers of the estate office. Thirty four labourers are attending classes on every Tuesday, Wednesday and Friday. The tuition classes for school going children are being held in the college of Horticulture. Fifty two girls and boys are attending the classes. Seventy eight students were actively involved in the Mass Functional literacy programme.

Republic day, Independence day, Gandhi Jayanthi and International Literacy Day were celebrated. The labourers working in the estate office presented entertainment programme on 8th September, 1986. Sri Narayanan, Principal of Kerala Varma College and Sri Sethumadhavan, Secretary of KANFED spoke in the occasion.

The sprayer purchased under the scheme was given free of rent to the farmers of the adopted village. Spraying insecticides and fungicides were done whenever necessary.

An agricultural seminar was conducted on 7th March in the College of Horticulture, Vellanikkara.

The NSS students won the first price on the Republic Day parade on 26-1-1987.

Special camp

A five day camp was conducted in the Girijan colony, Thalore, Wynad District from 9th to 13th August, 1986. Planting banana suckers, coconut seedlings, pepper rooted cuttings, construction of road and ESP latrines, animal health camp, medical camp were main items of work attended during the period. A total of 130 students participated in the camp.

Hostel

Dr S. Rajan, Asst. Professor (Hort) continued as Asst. Warden, Men's Hostel and Dr (Mrs) Sosamma Jacob, Assistant Professor (Ent) continued as Asst. Warden (Women's Hostel).

A total of 355 students are staying in the Hostel of which 190 are men & 165 are women.

College/Institute Library

The total number of titles as on 31-3-87 was 21,901 Four hundred and thirty titles were added during the year.

The number of Indian journals in the library were 150 and the number of foreign journals were 97 as on 31-3-87. Total number of back volumes at the end of the year was 2220.

Instructional Farm

The Instructional farm comprises an area of 95.35 ha.

Crop coverage

Coconut	:	30 ha
Mango	:	4 ha
Guava	:	1.1 ha
Citrus	:	0.5 ha
Sapota	:	0.75 ha
Pineapple	:	0.8 ha
Nutmeg	:	2.20 ha
Cocoa	:	2.15 ha
Cinnamon	:	1.40 ha
Clove	:	1.25 ha
Vacant land	:	4.0 ha

Other matters

The college day and Hostel day were celebrated during the year under report.

Visitors

Dr R. Krishnan, National Fellow (ICAR), UAS, Bangalore visited the college.

Ram Mohan, Reader in Meteorology, School of Marine Science, Cochin University visited the College.

The Vice-Chancellor Gujarat Agricultural University visited during April-'86

Dr Krishnamoorthy, Joint Director (Trg) Ministry of commerce-Govt. of India visited the college on 5-2-87.

Dr S. Edison, Project Co-ordinator, AICSIP visited the college on 18-2-87 and held discussion with officers concerned.

Sri D. V. V. Ramana, Project Officer, AFC, Hyderabad visited the college on 17-3-87.

Sri S. K. Warriar, Chairman, Coffee Board, Sri M. A. Balasubramanian, Joint Director (Extension) Coffee Board and Sri P Geetha-krishnan Nair, Dy. Director of Agri. Coffee Board visited the College on 12-11-87 and reviewed the progress of work undertaken in the Manpower Development scheme of the coffee Board.

Dr Rajendra Gupta, Project Co-ordinator, Medicinal plants, ICAR and Dr R. Krishnan Senior Scientist, IHR visited the college on 27-11-87.

1.3. College of Co-operation and Banking, Mannuthy

The B. Sc. (C & B) programme was started under the control of the Associate Dean, College of Horticulture on 16th November, 1981. From 1.4.85, the programme was delineated from the College of Horticulture and started to function as a separate College under the Faculty of Agriculture. The College started Post-Graduate Programme in Co-operation in 1986.

Dr. CA Jos was the Associate Dean i/c. of the College.

Based on the decision taken by the University, the semester system of teaching has been followed from 1986 admissions onwards.

Academic positions newly sanctioned during the year:

Under Applied Economics Rural marketing one post of Professor was created during the year.

New schemes/Projects commenced and Projects/Schemes terminated with dates of termination/date of commencement

1. Impact of Developmental Projects in the Western Ghat Region on the Forest Dependent population—
2. A case study of Wynad District in Kerala (Department of Environment, Government of Kerala) with Project Leader—M. Mohandas.

3. Spatial Micro-Level Planning for Rural Development—Explorations into the potentialities of an alternative data base (ICSSR Project) Project Leader—M. Mohandas, Dr U. Ramachandran. The scheme Commenced in September 1986.
4. Role of Co-operatives as agents of rural development—A case Study of Primary Agricultural Co-operative Societies with Project Leader: Dr. KA. Suresh, Commenced in October, 1986.
5. Evaluation of the Self-employment Programme for the Educated Un-employed in Trichur District Govt. of India & Govt. of Kerala with Project Leader: M. Mohandas was sanctioned.

Faculty of Improvement Programme

Sri T. Paranjothi, Assistant Professor, completed M. Phil in Applied Economics at Centre for Development Studies, Trivandrum and rejoined on 1.9.1986.

Details of Scientific Staff deputed to attend Seminars/Workshops/etc.

Dr. CA. Jos served as Guest Faculty for the course on Management of Rural Co-operation at National Institute of Rural Development, Hyderabad on 9/10 December 1986.

Sri M. Mohandas attended the National Workshop on Alternatives to poverty allination through the application of Science and Technology at IARI, New Delhi on 17.9.1986.

Sri K. Sathesh Babu attended the Educational standard on Indian standards, at KAU, Mannuthy on 2/3-12-1986.

Dr N. Rajan Nair attended Educational standards of Indian standards at KAU, Mannuthy on 2/3-12-1986.

Sri P. C. Mathew attended Human Resources Management in Industry in New Delhi on 19.9.86

Dr U. Ramachandran attended Leprosy Health Education at Rajagiri Kalamassery on 19.6 86 to 1.7.86.

Sri A. Sukumaran attended Executive Development Programme at Calicut University on 16-18.12.86. Sri M. Mohanan also attended the same.

Sri Philip Sabu attended National Workshop on Case Development and case method at IIM, Ahamadabad on 23-27.6.86.

He also served as Resource person in district level Agricultural Seminars—Wynad, Ernakulam, Trivandrum, Malappuram.

Sri A. M. Jose attended ICSSR Doctoral Fellowship holders seminar at Delhi on November, 1986.

Smt Molly Joseph attended seminar of Rural Development in College of Rural Home Science, KAU, Trivandrum on 1.2.1987.

Academic Programmes

Course	Date of commencement	Strength		Total
		M	F	
M. Sc. (Co-operation)	16. 6.86	3	3	6
B. Sc. (Co-operation & Banking) (Converted into semester system)	10.11.86	10	16	26

b) UG Programme

No. of students on rolls as on 31-3-87

Course Details	M	F	Total	Foreign students
B. Sc. 1983	14	13	27	—
1984	16	6	22	—
1985	16	14	30	—
1986	7	18	25	—
Total	53	57	104	—

c) PG Course

Students on rolls on 31-3-87

Details	M	F	Total	Foreign
M. Sc. (Co-operation) 1986	3	3	6	—

d) No. of students admitted during the year for U. G. and P. G. programmes from 1-4-86 to 31-3-87

Course	No. admitted		Total	Foreign students
	M	W		
B. Sc.	7	18	25	—
M. Sc.	3	3	6	—

e) No. of students completing various courses

Course	No. of students		Total
	M	F	
B. Sc. (1981)	5	—	5

f) Hostel details on 31-3-87

Course	M	F	Total
U. G. Programme	43	37	80
P. G. Programme	2	—	2
	45	37	82

g) Study Tour

45 students went for All India tour from 13-11-86 to 6-12-86.

B. Sc. 1985 admission-30 students went for All Kerala Tour from 3-12-86 to 11-12-86

College Library

During the time period an amount of Rs. 33,000/-was spent for purchasing books and subscribing for journals

Training

A one month training programme was conducted on Dairy Co-operative Management for the Assistant Directors of Dairy Development Department from 12-1-87 to 11-2-87. Ten trainees attended the programme: Dr N. Rajan Nair was the Course Director.

Other activities

1) N. S. S.

Activity	Date
Visit to Mental Hospital, Trichur	1- 9-86
Rural Cultural and sports meet at the adopted village	20/21-9-86
Visit to the Community Centre of the adopted village	21- 9-86
Human Rights Day Celebrations	10-12-86
Programme for International understanding and peace	19-11-86
Tribal Development Programme Camp at Parambikulam	1-10-86 to 6-10-86
Quami Ekta Week	21-11-86
National Youth Week	12- 1-87 to 18- 1-87

Students took part in National Integration Camps held at Ranchi, Kasargod and Calicut.

2) *Lab to Land Programme*

The programme was carried out in the Madakkathara Village and 99.7% of the funds allotted has been spent. The households in the Village were imparted technology for the making of file boards and another 15 households were imparted know how for the making of paper covers. The households were also provided with inputs like strawboards calico cloths, poster fancy, White papers, Card Colour, Semi-bleached paper and gum materials for undertaking production.

The Thanikkudam U. P. School was selected for the demonstration of Oil Seed Cultivation. During the period two farmer's training programmes, with the participation of 60 Farmers were conducted.

3) *Games and Sports*

Regular practices in sports and Games are going on in full swing. Three of our students got selection to the KAU Cricket team. Inter Class Competitions in sports and games were held in January 87.

4) *Arts Festival*

The College arts festival was conducted on 7/8-2-87 at the Veterinary College auditorium.

5) *College Union Activities*

The College Union 1986-87 was inaugurated by the then Hon. Finance Minister, Thachadi Prabhakaran on 2-8-86 and on the same day Arts Club was inaugurated by Sri. Mullianazhi. The College celebrated her second college day on 3-6-87 in the Veterinary College auditorium at 7 p. m. Chief Guest on the occasion was Hon. Minister of Agriculture, Sri. V. V. Raghavan.

Important Visitors

Dr. N. Mohanan, Deputy Director NIRD, Hyderabad visited College on 12-8-86.

Dr. K. K. George, Professor, Cochin University visited college on 12-8-86.

Dr. P. N. Rajendra Prasad, Professor, Cochin University visited college on 13-8-86.

Mr. Akber, Chief Manager, Agricultural Finance Department, Federal Bank, Alway visited the college on 18-3-87.

1.4 COLLEGE OF RURAL HOME SCIENCE, VELLAYANI

The College of Rural Home Science was started at Vellayani during 1985-87. This college functions under the Faculty of Agriculture.

An Applied Nutrition section was started in 1965 in the College of Agriculture to impart training in human nutrition to the undergraduates of the college and to organise various extension activities for the benefit of farm families. The Department of Home Science was later approved.

The Department of Home Science came into being in October 1983 at the College of Agriculture, Vellayani.

DEPARTMENTS/SECTIONS/PROJECTS

Dr (Mrs) L. Prema, Professor is the head of the institution.

New Projects undertaken

(1) *'Hazards of Food Adulteration in Trivandrum District' funded by the State Committee on Science Technology & Environment.*

Project is of 2 years duration with financial outlay of Rs. 34,000/- The major objectives of the schemes are:

i) to find out the extent of adulterated foods sold in the local market ii) to detect the adulterants used in these foods, iii) to find out the awareness of housewives and their attitude towards food adulteration and to devise simple tests and to devise appropriate methods to educate housewives.

As a first step of the scheme, a detailed interview schedule was prepared to find out the extent of awareness about food adulteration hazards among housewives in Trivandrum district. A pilot study was conducted among 50 housewives, and on the basis of the findings of the pilot study, the questionnaire was modified, and a survey was conducted among 300 housewives. The analysis of the data is in progress.

Food samples of rice, wheat, sugar salt, turmeric, ghee, milk, chilli, dhal, coffee, tea etc. were collected from different shops namely whole sale, retail, petty shop, co-operative stores and ration shops. These were tested in the laboratory to detect the adulterants present in them.

A three day training programme was planned and conducted in six selected centres in Trivandrum district to train housewives to create an awareness of consumer consciousness movement, 130 housewives participated in the training programme.

An adulteration kit was fabricated to conduct detection of adulterants at home level.

2) *ICAR Adhoc scheme on Tapioca consumption and Goitre Incidence in Kerala*

This scheme is of 3 years duration with a financial outlay of Rs. 89,000/-

The study is to be undertaken under three sub projects. One study is on the assessment of the nutritional status of the rural population subsisting on tapioca in Kerala with objectives to identify the common foods included in the daily diet of Keralites along with tapioca; to map out the magnitude and geographical distribution of malnutrition with particular inference to the incidence of goitre among the people subsisting on tapioca; to study the possibility of accumulation of HCN in the body through conferred consumption of tapioca by animal experiments and to suggest appropriate corrective measures.

Another study is on the influence of different methods of processing of tapioca tubers on their hydrocyanic content with objectives to study the distribution of HCN in the commonly consumed cultivars of tapioca and to find out the influence of different cooking methods and media in decreasing the HCN content of cooked tapioca products.

The third study is to be on the "Impact of newly developed tapioca products on the health and nutritional status" with objectives to develop suitable menus with tapioca as main item for low income groups.

Diet patterns of 300 persons suffering from goitre was collected during the last 8 months. Geographical distribution of the disease namely goitre in Kerala is assessed by verification of records available in the Trivandrum Medical College Hospital. So far data from 1000 cases has been collected.

Distribution of HCN content in six different parts of 5 varieties of fresh tapioca tubers have been estimated. Effect of cooking on 2 varieties of tapioca namely M₄ and H 165 has been assessed using different methods of cooking.

Standardisation of recipes with tapioca as base material was done during the period under report.

ACADEMIC PROGRAMMES:

Strength of students under each course:

i) UG Course	Men	Women	Total
I Year	9	18	27
Number of outside students with details of State/ Country/ Programme etc.	NIL	NIL	NIL
Number of students who obtained their degrees during the year	NIL	NIL	NIL
ii) PG COURSE			
Strength of students in each course			
M. Sc. Food Science and Nutrition			
I Year	7	(women)	
II Year	5	(women)	
PG Diploma in Food Science and Nutrition : One (woman)			
Ph. D			

Details of staff deputed/granted study leave/leave for study purpose

Smt N. K. Vimala Kumari, Associate Professor, Food Science & Nutrition is deputed to Kerala University for doing her Ph. D. during the period under report.

Smt N. K. Vimala Kumari, Associate Professor was deputed to attend a training course on 'Research Management in Home Science' conducted by the National Academy of Agricultural Research Management, Rajendra Nagar, Hyderabad.

Smt Mary Mathew, Associate Professor was deputed to attend a training course on management of developmental services for women and children through Agriculture and farm activities at Avinashilingam Educational Trust Institutions, Coimbatore.

Smt Mary Ukkuru, Assistant Professor attended the summer Institute on "Analysis of Food Activities, contaminants Toxicants, and Adulterants in various food products" sponsored by ICAR at G. B. Pant University of Agriculture and Technology, Pantnagar.

Smt S. Chellammal, Assistant Professor was deputed to attend the conference on "Role of Universities in evolving strategies for Health for all by 2000 AD" at Kasturba Medical College, Manipal from 18-2-87 to 24-2-87.

Details of Seminars, Symposia, Extension. Lectures, Training Programmes, correspondence courses conducted by the College:

A National Seminar on "Women and Rural Development was organised and conducted in January 1987 at the College of Rural Home Science, Vellayani. 67 participants from different Agricultural and Traditional Universities attended the seminar.

The Seminar was inaugurated by Smt Margaret Alva, Hon'ble Minister for Sports, Youth, women and child welfare. The function was presided by Smt Kamalam, Hon'ble Minister for Co-operation, Kerala. The keynote address on "Women and Rural Development" was presented by Dr Rajammal P Devadas, Director, Sri Avinashilingam Home Science College, Coimbatore.

A seminar was conducted on world Food Day on 16-10-'86 at the College of Rural Home Science, which was jointly sponsored by the Association of Food Scientists and Technologists of Trivandrum Chapter, Regional Research Laboratory, Civil Supplies Corporation, Save grain Campaign and the College of Rural Home Science.

Workshops conducted by the College

i) One day participatory workshop for rural women was arranged in the College of Rural Home Science to study their day to day problems and to find out their views on the developmental programmes implemented recently. One hundred and fifty three women from various NES Blocks attended the workshops.

ii) One day participatory workshop for field level change agents involved in the implementation of various developmental programmes for rural women was conducted at the College of Rural Home Science to seek short term and long term solutions and to list out negative and positive components of field programmes implemented for the benefit of rural women. About 193 field level officials from various departments such as Social Welfare, Agriculture, Health, etc. attended the workshop.

Training Programmes conducted by the College

Off-campus training on Child survival and Development of Interventions was conducted at Shertallai Municipality for the benefit of Anganwadi teachers of small and medium Town Development Programme.

Off-campus training of First Aid and Home Nursing (three days).

Two batches of the training was conducted in the NES Block, Trivandrum Rural, 42 anganwadi workers participated in the training.

Off-campus training on 'Child Development' was planned and conducted for the benefit of anganwadi workers.

Five batches of the training was conducted at selected centres under Trivandrum urban project area. About 150 anganwadi workers attended this training programme.

Three days training on 'Communication Methods' for the benefit of balwadi teachers of urban Basic Services Project areas of Kayamkulam, Alleppey, Shertallai and Cochin Municipalities were conducted with the following objectives.

The Training was conducted for 210 balwadi teachers in 8 batches.

A training programme on 'Safe Food practices' of one week duration was conducted for the benefit of anganwadi workers of Nemon ICDs Block in 2 batches with the objective of providing knowledge and skill to rural women of Food Safety Measures. 90 anganwadi teachers participated in the training.

Training programmes conducted for the benefit of rural women.

A total number of 284 participants attended the training programme conducted at 9 centres.

One week training on 'Hazards of Food Adulteration' was conducted for the benefit of rural women at NES Block, Parassala with the following objectives.

To make the rural women aware of the hazards of food adulteration.

To provide necessary knowledge and skill to identify adulterated food materials.

To make rural women aware of the possibilities of being cheated by the use of improper weighing and measuring appliances. 225 rural women were the participants of the above training.

Correspondence Courses

Two correspondence courses on 'Better Infant Feeding Practices' one in English and the other in Malayalam were conducted. The courses are of 7 months duration with 14 lessons. 53 candidates registered for the course in English while 277 candidates registered for the course in Malayalam.

Seminars, Training Programmes, Symposia, Exhibitions conducted by other agencies and attended by the staff of the College

The staff of the College of Rural Home Science participated in the following programmes organised by other institutions.

A one day seminar on labour saving devices organised by the State Committee for Science, Technology and Environment at Kanjiramkulam Panchayat for the benefit of rural women.

Nutrition education classes organised by the urban Basic Service Project of Alleppey Municipality.

'Nutrition week' programmes organised by the Department of Soil Welfare.

Exhibition and seminar on National Health Policy Priorities organised by the voluntary Health Association of India at Kottayam.

Exhibition on 'Nutritional significance of Cassava' at CRCRI Sreekariyam in connection with farmers Day.

All Kerala Seminar cum workshop on utilisation of women power for development of Kerala sponsored by Institute of Management in Government and Indian Institute of Regional Development Studies, Kottayam.

Workshop on 'Strategies of quality products of small scale sector, for better marketing organised by small industries Association at Kanakkunnu Palace, Trivandrum.

National Conference on Distance Education at Gujarat Agricultural University, Ahmedabad.

Seminar on 'Educational Utilisation of Indian Standards' in collaboration with Indian standard Institution at Directorate of Extension, Mannuthy.

Annual conference of the Indian society of Pancreatology held at Medical College, Trivandrum.

Womens Seminar conducted by Navabhavan Arts and Sports Club at Chappath, Vizhinjam.

Training programmes for LVEOS and village leaders at Kottarakkara Extension Training Centre.

Visitors to the Institution

Ms Annamma Joseph, Ms Aonor Nachia, Representatives of UNICEF; Ms Else Larsen, Ms Susan Lloyd, Ms Minnie Mathew, Representatives of World Food Programme visited the college during the year.

1.5 REGIONAL AGRICULTURAL RESEARCH STATION, PILICODE

This Agricultural Research Station was established in the year 1916 by the erstwhile Government of Madras to initiate research on all aspects of coconut cultivation. Regular experimental work was started in the year 1930. The KAU took over the station in 1972. The station was reorganised under the NARP in 1980 and the status of the station was raised to Regional Agricultural Research Station. The research activities were reoriented to solve location specific problems in the northern zone of Kerala with the lead function on intensified research on coconut and coconut based farming systems.

The total area of the RARS is 75.12 ha consisting of 57.87 ha at Pilicode and 17.25 ha at Nileshtar.

The important crops grown are coconut (44.9 ha), rice (6.2 ha in 2 season), cashew (1.0 ha), pepper (0.60 ha) and banana (1.50 ha).

Dr R Ravindran Nair continued to officiate as the Associate Director of the station during the year.

Seminars/Workshops/Symposia/Training programmes conducted by the Station

National Seminar on agrometeorology of plantation crops was held at RARS, Pilicode during 12-13 March 1987.

The 9th NARP-KAEP joint regional workshop was convened on 6th-7th August 1986 at the station.

Pre-service training programme of six month duration was conducted for the Demonstrators of the Agricultural Department from September 1986 to February 1987 under which 47 persons participated.

A training programme on Social Forestry was conducted for the benefit of the Village Extension Officers of Kasaragod district. The duration of the training was three days and 30 officers were participated.

Training was also imparted in two batches for the members of the Mahila Samajams in which 60 women participated. Duration of the training was two days.

A one day District Seminar was organised on 12 February 1987 in which more than one hundred elite farmers from Kasaragod, Cannanore and Calicut districts participated.

Seminars/Workshops etc. attended by the staff

Dr N. K. Vijayakumar, Associate Professor participated the National conference on environmental mutagens and carcinogens held at HAU, Hissar from 23-25th February 1987.

Dr Thomas Varghese, Professor of Soil Science, attended the VIII international Soil Classification workshop held at Brazil.

Sri M. Govindan, Junior Assistant Professor attended the workshop Beneficial microbes in tree crop management held at CPCRI Kasaragod on 8-9 September 1986.

Sri A. Rajagopalan, Junior Assistant Professor attended the ICAR Summer Institute on Plant Genetic Resources from 7th-27th September 1986 at NBPGR, IARI Campus, New Delhi.

Dr GSLHV Prasad Rao, Associate Professor (Agromet) attended the VIIth Symposium on Plantation Crops conducted during 16-19th October 1986 at Coonoor.

Extension lectures/Special lectures organised by the station

Sri C. R. Raju, Scientist CPCRI delivered a special lecture on stem bleeding on 9-7-1986.

Dr Rohini Iyer, Scientist gave a talk on yellow leaf disease of arecanut on 23rd December 1986.

Dr Thomas Varghese, Professor, RARS Pilicode delivered a special lecture on 'Crop hazards due to industrial pollution' on 21-1-1987.

Sri M. P. Balakrishnan, Deputy Director of Agriculture (H) Cannanore delivered special lecture on Recent development in fruit cultivation on 17-2-1987.

RESEARCH

Number of research projects as on 31-3-1987 was 53.

RESEARCH REPORTS OF EACH PROJECTS

Concluded Projects

COCONUT

Studies on second generation selfs and sibmated progenies

The object of this project was to evolve inbred lines in coconut and also to find out whether hybrid vigour is met within the crosses between such progenies.

The project was started in the year 1924.

The data gathered from the first generation and second generation selfs and also the sibmated progenies of the first generation has clearly given the indication that inbreeding depression exists in coconut and that hybrid vigour can be exploited by crossing progenies of the same parents.

The project will be continued in the S_3 generation and sibmating of S_2 progenies taken up for evolving inbred lines.

Study of off types of different dwarf varieties

This project was initiated to study the off types of different dwarf varieties of six crosses of coconut. The planting was done in 1973.

Since many of the plants in the experimental field perished and sufficient data could not be generated, the experiment was later treated as vitiating and project dropped.

RICE

Multilocal trial with culture 1727

Culture 1727, Jaya, Bharathi, Pavizhom and Thowan (local tall indica-control) were yield tested for the second year under a fertility level of 90:45:45.

Though the treatments were not statistically significant for grain and straw, Thowan recorded the maximum grain (4226 kg/ha) and straw (5060 kg/ha) yields. Jaya and Cul 1727 recorded grain yields of 3940 kg/ha and 3810 kg/ha respectively. The total duration of these 3 varieties viz. Thowan, Jaya and Cul. 1727 were 115 days, 130 days and 130 days respectively.

Testing the efficacy of flood resistant cultures of paddy under Kerala conditions.

Seven CR lines and 2 BR lines were tested for flood tolerance at Intermediate deep II level (30-50 cm) till flowering stage in the research station (in 7 x 3) at a fertility level of 90:45:45 kg of N.P.K. The seeds were dibbled with a spacing of 20 x 15 cm.

The grain yield was not statistically significant. BR 51 and BR 52 were the highest yielders with 2747 Kg/ha and 2687 Kg/ha respectively. The total duration of BR 51 (125 days) and BR 52 (130 days) also favours these varieties for the tract. The straw yield was statistically significant, BR 51 giving the highest yield of 8364 Kg/ha.

BR 51, BR 52, CR 1009 and CR 1018 were tested under varying flood conditions in 12 locations in Kasaragod, Cannanore and Kottayam districts and the results from 8 locations indicate the suitability of BR 51 and BR 52 in these locations with grain yields of 3000 Kg/ha to 5000 Kg/ha. The total duration also varied from 130 to 140 days. Post flood recovery of all these varieties was quite good in different flooded situations.

It is proposed to recommend the varieties in flood prone areas as follows:

- | | | |
|---------|---|-----------------------------------------------------------------------------------|
| BR 51 | } | For areas where flood prevails till September |
| BR 52 | | |
| CR 1018 | | For areas where flood conditions prevail for longer periods upto October–November |

Soils and Agronomy

Scheduling irrigation for vegetable crops—Cucumber:

Cucumber (local) was grown under different irrigation practices during the summer season in rice fallows. Basin irrigation at frequent

intervals (cultivator's practice) resulted in the maximum mean yield of 24 t/ha followed by pitcher irrigation (20.1 t/ha). The water use efficiency (kg/litre) was 0.33 for pitcher irrigation. Benefit/cost ratio was 2.29, 5.36 and 5.71 for cultivator's practice, pitcher irrigation and irrigation at IW/CPE ratio of 0.50.

Cropping Pattern and Farming Systems

Concluded Projects

Screening different pulse varieties as floor crops in coconut gardens:

Cowpea

CG-28 stood first with a mean grain yield of 887.4 kg/ha followed by Ptb-1 (798 kg/ha) and V.38 (789.2 kg/ha), among the 16 varieties/cultures tested.

Blackgram

LBG-20 recording the maximum grain yield of 852.8 kg/ha followed by LBG-435 (829.4 kg/ha) and M-3 (710.9 kg/ha) occupied the three top positions among the 8 varieties tried.

Greengram

The three varieties, Pusa-106, Co-4 and Pusa-113 were on par with the yield ranging from 431.9 to 475 kg/ha, outyielded the 24 varieties evaluated.

ONGOING PROJECTS

CROP IMPROVEMENT

Utilisation of existing germplasm and description of varieties

The germplasm collection of coconut was started at Pilicode from 1924 onwards. At present the collection consists of 31 exotic and 36 indigenous cultivars.

An evaluation of the cultivars which have attained the stage of stabilised bearing indicated that regarding copra yield spicata (copra out turn of 20.41 kg/palm/year) ranked first followed by Philippines Ordinary (copra out turn of 19.68 kg/palm/year). The result is incongruent with the last year. The cultivar showing the annual yield of above 75 nuts per palm included Spicata (116.62), Philippines Ordinary (83.23) Lakshadweep Ordinary (92.84), Basanda (102.24), Bansa hybrid (81.27) and Andaman Giant (78.56).

In the new germplasm collection planted in the year 1976, the performance of St.Vincent continued to be good in total number of leaves produced closely followed by Borneo.

The experiment is in progress.

Production of New Cross combination

The project aims to isolate the most compatible and productive hybrid through field trials. The hybrids include.

- 1) Philippines x Cochin China
- 2) Cochin China x Philippines
- 3) Laccadive Ordinary x Philippines
- 4) Ayiramkachi x WCT

The experiment was started during 1978. The palms are in the preflowering stage. Regarding leaf production, Cochin China x Philippines performed well followed by Philippines x Cochin China.

Trial of promising seed materials

The experiment was started in 1976 with 13 treatments including Tall, Dwarf and Hybrids to compare the performance of promising exotic and hybrids with West Coast Tall.

Statistical analysis of the data during the year 1986 showed no significant difference among the treatments. However, the hybrids in general were observed to perform better than the cultivars in growth characters.

Evaluation of Tall x Different Dwarfs and their reciprocals

The yield and yield attributes of 15 hybrids involving Tall and Dwarf parents are being studied in comparison with those of the popular cultivar WCT.

The results gathered so far reveals that T x D hybrids are better than D x T hybrids and West Coast Tall. Among the T x D hybrids WCT x MDY and WCT x CDG are performing better than others. In cumulative nut yield for the last eight years (1979 to 86), WCT x MDY (447.20 nuts/palm) ranked first followed by WCT x CDG (443.50 nuts/palm). The other best yielder was WCT x CDO (372.40 nuts/palm).

As the palms in this experiment have not reached the age of steady bearing, their performance has to be watched for a few more years.

Evaluation of Tall x Different Dwarfs

The object of this trial is to study the comparative performances of different Tall x Dwarf hybrids with D x T and WCT.

The trial was taken up in the year 1972 and has not yet reached steady bearing stage.

Annual growth measurements and yield was recorded and tabulated for comparative study. It is observed that in respect of growth and vigour WCT x Green Dwarf was superior to all other treatments whereas WCT x Malayan Dwarf was leading in nut yield closely followed by WCT x Green Dwarf.

The experiment has to be continued for some more years to get stabilised yields.

Study of cross progenies of exotic Tall varieties x Indigenous varieties

The project aims to exploit genetic diversity by intervarietal and inter racial crosses in coconut in order to spot out promising varieties.

The hybrids and cultivars are yet to attain steady bearing stage.

In the production of leaf, female flowers and nuts, the hybrid Java x Tall ranked first and was superior to the rest.

The next best yielder was L. O. x Tall. The experiment will be continued to get confirmatory results.

Crop Management

Common salt as a substitute for potash in the nutrition of adult coconut palms.

In this study for comparing the effect of common salt as a substitute for potash, the maximum number of ripe nuts (240 nuts) was recorded by the treatment receiving Na_2O and K_2O in the proportion of 500 g : 500 g during the year 1986. The data collected so far (1977-86) however, indicate that the maximum percent increase (46.5) in nut yield over pretreatment yield (1971-76) is obtained when Na_2O and K_2O are applied in the ratio 750:250 per palm per annum. Replacement of potassium (K_2O) to the extent of 50% or even 75% by soda (Na_2O) has not reduced the yield of nuts as in previous years. The experiment will be continued to get conclusive results in the long run.

Response of D x T hybrids to common salt application

The study aims to find out the response of D x T hybrids to common salt application.

The results obtained so far show that application of 250 g Na_2O and 750g K_2O per palm per year is the best combination to produce the maximum growth characters and precocity in D x T palms under rainfed conditions in laterite soil in conformity with last years results.

The experimental palms have not so far reached the full bearing stage. The experiment will be continued.

Influence of raising cocoa as an intercrop in coconut garden on the chemical and microbiological characteristics of laterite soil.

The studies conducted so far reveal that the chemical constituents were not much effected by intercropping cocoa under coconut although the pH and available nutrients N, P and K were less near to the cocoa intercrops. The microbiological observations show that the growing of cocoa as an intercrop in coconut garden favoured the population build up of beneficial micro-organisms such as *Diazotrophs*, *Beijerinckia* and *Azotobactor* and also total bacteria and fungi. The experiment will be continued to find out the influences of various seasons on the above characteristics studied.

Nutritional studies on sweet potato grown as a floor crop in coconut garden:

The experiment was laid out to study the nutritional requirement of sweet potato grown as a floor crop in coconut garden.

The highest yield (2487 kg/ha) was recorded in plots receiving 100 kg of N and 75 kg of K and the lowest in $N_0 K_0$ (563.8 kg/ha). This is not in conformity with previous years result. As the crop suffered due to vagaries of nature the experiment has to be continued to get confirmity results.

Oil Technology Project—Varietal and seasonal variations in the oil content of coconut.

Objective of the experiment is to study the varietal and seasonal variations in the oil content. Five coconut hybrids and their parents consisting 43 palms were selected in July 1985.

In all 220 copra samples obtained from the above palms were chemically analysed for their oil content. The measureable characters of nuts harvested monthly were also recorded. As the number of nuts obtained from the selected palms were uneven the analysis of oil of all the palms on month war could not be done. The experiment is continued to get sufficient number of samples.

NPK fertilizer experiment on major soil types in different agroclimatic regions on ordinary tall cultivars of coconut West Coast Tall in laterite soil

Three levels each of N (0.5, 1.0, 1.5 kg/palm), P (0.25, 0.50, 0.75kg/palm) and K (0.75, 1.25, 1.75. kg/palm) in factorial combinations are being applied to young palms of the cultivar WCT grown under rainfed conditions to fix an economic optimal dose of NPK.

The treatment receiving 0.5:0.5:1.25 kg NPK/palm/year continued to produce the highest number of leaves (97.20 per palm so far) and number of functional leaves (22.60 per palm).

Yield characters were recording from 1987 onwards.

Irrigation cum fertilizer trial in WCT x Gangabondam hybrids:

The experiment was laid out in 1981 to find out the optimum irrigation and fertilizer requirements of coconut hybrids WCT x GB.

Irrigation at IW/CPE 1.00 was found influencing significantly the height, girth and number of leaves of the WCT x GB hybrids. The fertiliser dose of 0.5:1.00:2.00 kg NPK/palm per year was superior to the rest. However, the fertilizer level of 0.5:0.5:1.5 kg NPK/palm/year is also on par with the above treatment.

Bearing habit and yield potential under different irrigation and fertilizer levels will be studied.

Investigation on growth and productivity of coconut cultivar West Coast Tall as influenced by irrigation and fertilizer applications:

The experiment was laid out with one year old seedlings of WCT in the year 1983 and the treatments imposed during the summer seasons of 1984-85. The irrigation treatments include pitcher irrigation, basin irrigation and drip irrigation.

The treatment $I_4 F_1$ (Drip irrigation 8 litre/day and fertilizer dose of 0.5:0.32:1.2 kg NPK/palm/year) had good influence on the girth at collar, number of leaves produced during the year as well as cumulative leaf production of the seedlings. This is in conformity with previous years result.

Preliminary studies on the performance of coconut hybrid during drought years under rainfed condition:

The overall decline in annual nut yield was estimated as 28.48%. The adverse effect of drought on annual nut yield was less pronounced on low yielders. The total number of leaves on the crown and the number of leaves dropped due to soil moisture stress are positively correlated.

Plant Protection

Investigations on stem bleeding disease:

An experiment was laid out with seven treatments employing Bavistin, Calixin, Benlate, Aureofungin sol, Neem cake and Bordeaux mixture to determine an effective control measure for stem bleeding.

The intensity of the disease observed revealed that the treatments were not significantly different. However, it was found that Calixin treatment has an increase of only 2.203% and Neem cake treatment 5.35%. Observational trial on root feeding using the same chemicals were taken up during the year. Observations are being taken.

Button shedding in coconuts

Shed buttons and tender nuts were collected and isolated the pathogen *Pestalotia* sp. from shed buttons. On pathogenecity studies it was revealed that the pathogen could infect healthy buttons with injury and the spread of the organism was slow.

*Biological control of *Oryctes rhinoceros**

Object is to study the efficiency of the exotic bio-control agent *Platyeris laevicollis* and to establish their suppressive potential.

The experiment was started during November 1985 at RARS, Nileshwar.

The data gathered were statistically analysed. Significant difference could be noticed between the first and the last observation on the pest attack. The spread of the predators as well as their multiplication and establishment under field condition has to be further investigated.

Survey and identification of soil and air borne diseases affecting different crops in coconut based farming system

Survey was conducted only in RARS Pilicode and surrounding area. One is known as "Pottan" disease and other leaf fall or petiole rot disease. Observational trials on control measures of these two diseases were laid out. Additional doses of potash was found beneficial in controlling the leaf fall disease. In the case of 'Pottan' disease application of Calixin and Furadan checked the spread of symptoms and controlled the disease severity and obtained better bunches than the control plots.

ONGOING PROJECTS

Breeding high yielding varieties of rice for the saline areas of Kerala

Five mutant lines of Odacheera in the M 11 generation (OD 15, 16, 24, 42, and 72) were grown in a saline area and studied for their performance. The line OD 24 recorded the highest yield of 2712 kg/ha.

Evaluation of rice germ plasm collection for the northern region

Twenty three high yielding varieties and 9 local varieties were tested for yield. Among the local varieties Chitteni was found to be better than others. Out of the 23 high yielding varieties/cultures 15 were advanced for further studies based on duration group of 110, 115 and 120 days. They are being tested in different comparative yield trials.

Evolving high yielding varieties of rice suitable for northern region of Kerala

The project aims to evolve high yielding pure lines from the most popular tall cultivars in the region viz., Allikannan and Thowan.

Twenty one superior lines were selected from Thowan and 46 lines from Allikannan (13 straw coloured and 33 black coloured grains) and were advanced to a PYT. Superior types will be further selected for comparative yield trials.

Varietal trial on rice in the first and second crop season

Five varieties of rice viz., Jaya, Karthika, Pavizhom, Swarnaprabha and the Culture 23332-2 were tested for their yield potential and adaptability. The results on the study revealed that Culture 23332-2 gave maximum grain yield of 3705 kg/ha followed by Karthika (3167 kg/ha).

The trial is being repeated during 1987-88 also.

District trial on Moncompu cultures of rice

Three rice cultures in the pre-release stage received from the RRS, Moncompu were yield tested with Jyothi, Bharathi (high yielding) and Thowan (local) during the first crop season.

Thowan, the local check gave the maximum grain yield of 3670 kg/ha followed by Jyothi (3055 kg/ha). The trial is being repeated during the first crop season of 87-88 also to get confirmatory results.

Fertilizer management and economics of Koottumundakan Practice in paddy

The results were similar to that of 1985-86. During the first crop season when Thowan received 40 and 30 kg N/ha, it was seen that both the levels did not differ significantly, indicating that 30 kg N level in the case of a broadcast crop of tall indica variety. During the second crop season when the results were statistically analysed, it was seen that the Mundakan variety needed only a fertility level of 20 10:10 (NPK) kg/ha to give a grain yield of 3017 kg/ha. The benefit cost ratio was the highest (1.75) in the case of 40:20:20 (virippu) plus 20 10:10 (mundakan), followed by Tr.3 30:15 15 (virippu) + 40:20:20 (mundakan) and Tr. 1 (40:20:20 each for virippu and mundakan) with benefit cost ratios of 1.65 and 1.64 respectively.

Ratooning studies in paddy in single crop lands:

In an attempt to identify photoinsensitive, dwarf autumn varieties with ratooning ability so as to grow them in the single crop wet lands during viruppu season and get a ratoon by November, 45 varieties and pre release cultures were screened for ratooning ability. Out of the first batch, 3 entries which gave a ratoon grain yield of more than 0.5 t/ha were selected for subjecting them to different ratoon management practices. the varieties being Cul 1727, BR 51 and BR 52.

Effect of graded doses of lime and forms of phosphorus on the growth, incidence of disease and yield of rice in degraded acidic oxisols of northern Kerala:

The results indicate that:

Lime at the recommended doses of 600 kg/ha or double the dose, did not have any significant effect in increasing the yield of rice in the degraded acidic oxisol of Pilicode.

Application of P at 45 kg/ha as superphosphate gave significant increase in the yield of rice in the acidic oxisol.

Application of mussorie rock phosphate does not have any effect in raising the soil pH or increasing the yield of rice in the current study.

There was no marked difference in reaction to incidence of diseases between treatments.

The experiment is in progress. The effect of these treatments on the soil microorganisms is also being studied.

Plant Protection:

Screening rice varieties for disease resistance:

136 1st crop varieties/cultures and 84 2nd crop varieties/cultures were screened for all major diseases during the previous years. From

the above 42 1st crop entries and 48 2nd crop entries were identified as moderately tolerant to sheath blight disease. These entries were put under yield trial. None of these showed complete resistance to sheath blight disease. In the 1st crop season Mala a short duration variety gave maximum yield of 5308 kg/ha followed by Jyothy (4929 kg/ha) and Triveni (4378 kg/ha). During the 2nd crop season IR 8-68 a medium duration culture gave maximum yield of 4380 kg/ha followed by IR 22 (4311 kg/ha), Ratna (4274 kg/ha) and Triveni (4148 kg/ha).

Screening rice varieties against major pests:

An experiment was conducted during the Kharif season 1986 using a total number of 80 entries comprising of 17 indigenous and 63 modern varieties of rice to study their reaction to the major pests and to evaluate their tolerance/resistance.

The data recorded on the percentage of silver shoots revealed that the reaction of gall fly was minimum in Sakthi and Bhadras.

Survey of disease of pulses, gingelly, sweet potato and vegetables grown in rice fallows:

Survey was conducted in 2 places in Cannanore district and the common diseases were observed. A new disease "bacterial wilt of gingelly" was reported.

An observational trial on control of downy mildew disease of bitter melon was laid out in farmer's field. Bordeaux mixture 1% was found superior in controlling the disease. The plot sprayed with Bordeaux mixture 1% gave better yield than Dithane M 45, Rodomil and Bordeaux mixture 0.5%. There was no symptom of phytotoxicity on Bordeaux mixture sprayed plots.

PULSES

Weed control in pulses (observational trial)

The experiment was conducted to identify a herbicide having the least toxicity to pulses and to evolve an effective control measure against *Leucas aspera* and other weeds in pulses. It was conducted at two locations.

The result indicated that none of the weedicides applied (Thio-bencarb, Butachlor, Fluchloralin, Anilofos and Penoxalin) was able to control the weed growth significantly, although they were not harmful to the crop plants.

SPICES

Screening pepper varieties for shade tolerance in coconut garden

Eight varieties of pepper viz., Karimunda, Balankotta, Poonjar-munda, Kuthiravaly, Arakulamunda, Kottanadan, Panniyur-1 and Narayakodi were screened for their yield performance under the partial shade of coconut. The standards used were Moringa and Subabul.

During the summer months of 1986 due to the severe drought, a large number of vines in the experimental plots perished and vines failed to flower uniformly. Among the varieties flowered Kottanadan yielded the maximum with a per vine yield of 841.25 gms followed by Panniyur-1 (286.7 g).

In the light of the recommendations made in the Xth Regional Workshop of NARP, the experiment is proposed to be revised taking more number of standards and planting the pepper vines in a young coconut plantation to get more shade.

VEGETABLES AND TUBERS

Screening varieties of Cucurbitaceous summer vegetables suitable for northern region of Kerala

A large number of accessions of ridge gourd, cucumber, bitter gourd and snake gourd were screened to identify high yielders.

The accession number of 64/3 gave a maximum yield of 23.15 t/ha (Benefit cost ratio 2.43) followed by 19/2 with an yield of 23.11 t/ha (Benefit cost ratio 2.43). The other selected accessions include 41/3 (22.52 t/ha; Benefit cost ratio 2.37), 75/1 (20.09 t/ha; Benefit cost ratio 2.11) and 40/4 (19.96 t/ha; Benefit cost ratio 2.09). These five accessions are proposed to be advanced.

Snake gourd

Among the snake gourd accessions 13/2 gave maximum yield, 18.20 t/ha which was found to be significantly superior to the local check with an yield of 10.89 t/ha. Based on the CD value an index was fixed and the accessions which yielded over this have been selected. The selected accessions included 14/4 (15.3 t/ha), 14/2 (17.7 t/ha), 13/1 (15.39 t/ha) and 15/2 (15.10 t/ha).

Bitter gourd

Out of the ten accessions studied seven accessions were found to be good with respect to yield. The selection index was fixed based on the C.D and the entries 3/3 (6.98 t/ha), 66/3 (6.80 t/ha), 17/3 (6.37 t/ha), 67/3 (6.37 t/ha), 67/2 (5.17 t/ha) and PLC 5.02 t/ha) were proposed to be advanced for the next season.

Ridge gourd

Among the fifteen ridge gourd accessions, based on the benefit cost ratio of 1.0 and above the accession No. 26/2 was found to be the best recording an yield of 11.67 t/ha followed by 2/3 with an yield of 10.91 t/ha. The other accessions advanced for the next season trial include 4/4 (10.35 t/ha), 4/3 (8.15 t/ha), 11/2 (9.87 t/ha), PL (9.48 t/ha) and 5/1 (9.61 t/ha).

Since two seasons have been completed under preliminary yield trial, these selected accessions will be advanced for the comparative yield trial during the ensuing season.

FRUITS AND FLORICULTURE

Scheduling irrigation for banana cv. Nendran

Basin irrigation, sub soil injection of water and drip irrigation are included in this experiment. Basin irrigation of 20 mm water on alternate days gave the maximum yield of 28.1 t/ha followed by basin irrigation at IW/CPE ratio of 0.75 (24.1 t/ha)

Control of leaf spot disease of banana (observational trial)

Removal and destruction of badly spotted leaves and addition of extra potash accompanied by spraying 0.1% Bavistin once in two months was found to be beneficial in checking the spread of the disease.

Studies on diazotrophic rhizocoenosis in pepper

Azospirillum inoculation was found to enhance rooting and root and shoot developments and leads to the recovery of quality planting materials. The effect of certain plant protection chemicals on *Azospirillum* was studied. The microorganism was able to grow successfully in media incorporated with Carbofuran even upto a concentration of 0.2%. The population of *Azospirillum* in the root environments of black pepper treated with Bordeaux mixture showed population reductions in the surface soil and soil up to 4 cm depth. Influence was comparatively lesser in soil at 24 cm depth and also in the rhizosphere soil.

Developing methods for the rapid multiplication of Azolla spores

The objective of the trial is to understand the factors triggering the sporulation of azolla so that they can be manipulated to increase sporulation.

The sporocarp production under field conditions was studied. It indicated that *Azolla pinnata* PIL-1 produces reasonably good number of sporocarps. Studies on the viability of sporocarps under in vitro conditions revealed that sporocarps collected on 10.9.85 were able to germinate upto 25.9.86.

Screening of fodder grasses and legumes for the Northern region of Kerala and to screen suitable species for cultivation under rainfed conditions in coconut gardens

In order to identify suitable species of fodder grasses for mixed cropping under rainfed conditions 17 varieties of grasses and 10 varieties of legumes were screened under the partial shade of coconut.

In fodder grass maximum yield was recorded by *Panicum maximum* cv. Riversdale and Makueni. These species and also *Brachiaria humidicola* were able to withstand the dry summer months better than all other grass varieties.

Regarding legumes *Stylosanthus guianensis* and *Stylosanthus scabra* gave the highest yield and showed better survivability than all other legume species.

The trial will be repeated for conclusive results.

Evaluation of repellancy of some plant products against the major pests of cowpea (Kanakamony)

Plant products viz., 2% infusion of Lemon grass leaf, Neem leaf, Karinochi leaf and Tobacco decoction were tested along with need based application of Ekalux (0.05%) for their comparative efficacy in controlling the aphids and pod borers.

Karinochi leaf infusion and tobacco decoction were found to be superior in controlling the aphids and pod borers.

Statistical analysis of the data recorded that Ekalux 0.36, Karinochi leaf infusion and tobacco decoction are on par.

Evaluation of insecticides on the control of pod bugs (Observational trial)

Four chemicals viz., Quinalphos (0.05%), Fenthion (0.05%), Dimethoate (0.05%) and Fenvalarate (0.02%) were tried. The data collected revealed that Fenthion, Dimethoate and Fenvalarate were equally effective in controlling pod bugs.

Studies on the control of Black shank and Frog-eye leaf spot disease of tobacco (Nicotiana tabacum)

The experiment was laid out to conduct detailed studies on disease of tobacco and to find out suitable control measures.

Black shank disease:

Incidence of the disease was started during the 2nd week of December 1986. Maximum incidence was noticed during the second week of January 1987.

Frog eye leaf spot:

Minimum incidence noticed during the second week of December 1986 and maximum during the second week of January 1987.

Three times of drenching and spraying of Bordeaux mixture was found to control both the diseases effectively. The next best treatment was spraying alone of Bordeaux mixture.

ECONOMICS & STATISTICS

Economics of tobacco cultivation in Kanhangad block in Kasaragod district

The project was taken up with a view to study the cost returns structure of tobacco cultivation in Kanhangad block in Kasaragod district.

The cost of cultivation of tobacco was worked out to Rs. 75,526.78 per hectare. 51.87 per cent of the total expenditure was on manures and fertilisers. One hectare of field yielded on an average 2004.15 kg of gruff tobacco or 4990.40 kg of chewing tobacco. The wide fluctuations of tobacco prices in Mangalore market affect the profitability of tobacco

cultivation. The profit per hectare ranged from Rs. 4,580.92 to 18,850 during the years 1984-85 and 1985-86 for chewing tobacco. For gruff tobacco the profit was at the rate of Rs. 5,073.82 and Rs. 20,818.75 during 1984-85 and 1985-86 respectively.

Basic socio-economic survey

Some of the salient findings are given below. About 54% of the farmers have an area of more than 3 ha whereas the percent of those having less than $\frac{1}{2}$ ha is only 4. Very few farmers are illiterate (8%). 43% have secured secondary education. Big farmers are comparatively literate. Agriculture is the main occupation (82%). 8% are business men who are also good farmers. Servicemen are 6%. Very few agricultural labourers are farmers themselves. 19% of the farmers have business as a subsidiary occupation. Maintenance of cows and poultry are very popular. Rearing pigs is very rare. With the introduction of tractors, the number of farmers keeping bullocks and buffaloes dwindled. Improved poultry is not very common. Fish culture is also very rare.

Coconut is the main crop of the region which is grown in 38% of the area. More than half of this is in garden lands. It is also grown on bunds in paddy fields. Coconut-arecanut combination is seen in Malappuram District and some parts in Kasaragod District. Arecanut alone is grown in 6% of the area. Paddy is the next important crop which occupies one fourth of the land. Only first crop is raised in half of the paddy fields. Growing vegetables in paddy fallows is not wide spread. Other important crops of the region are rubber, cashew, pepper, tapioca and banana. One or two plants of jack, mango, plantain, tamarind, muringa, pappaya, chilly can be seen in almost all of the homesteads which are raised mainly for home consumption.

The bulk of the area is rainfed. Wet land forms 25% of which 15% is irrigated. 68% of the soil is laterite and 13% clayey type. The percentage of the sandy area is 2 which is confined mainly to the coastal belt. 62% of the farmers have irrigation facility who irrigate an area of 31%. Well is the main source of irrigation followed by public tank. Canal water account for 13% and river water 8%.

The main method of irrigation is by mechanical means. An area (18%) is also irrigated manually by the farmer. Using bullock for irrigation is non existent.

METEOROLOGY

Crop weather studies of paddy

The cultivar Allikannan out yielded (37.9/ha) all the other varieties viz., Jaya, IR-8 and Thonnooran when planted during the 1st week of June. The high rainfall, relative humidity and low sunshine hours adversely affected the number of tillers.

Seasonal influence on nut size and its characteristics of coconut (Observational Trial)

All the three hybrids viz., WCT x CDO, CDO x WCT and CDO x LO showed higher copra content in the summer. The fall in nut weight and copra yield was conspicuous in the south-west and post-monsoon periods. A significant negative correlation was seen between the heat units during the second phase (4-8 months) of nut development and the husked nut weight.

Effect of drought on coconut production (Observational Trial)

The effect of drought on annual nut yield was seen only in the subsequent year under the good management conditions. The effect of drought on monthly nut yield was seen in the eighth month after the drought period was over and continued for twelve months (February 1984 to January 1985). The maximum reduction was noticed in the thirteenth month after the drought period was over.

Vertical profiles of air temperature and vapour pressure in coconut gardens and open space (Observational Trial)

The air temperature in the open space decreased with height whereas no definite pattern was seen in coconut garden due to its canopy structure. The difference in temperature was high between the open and inside the garden at the ground level and low at 7 metres height. The vapour pressure was high inside the crop and tended to increase in the afternoon due to high rate of transpiration.

OTHER MATTERS

Exhibition

The station participated in the exhibitions conducted at Rajas High School, Nileshwar on 13-12-86. The exhibition was visited by the Hon. Minister for Forests, Local MP, MLA and other distinguished personnel in addition to large number of cultivators numbering about 1000.

The station also participated in the exhibition conducted at Madakkara during 12th—13th March 1987. It was organised by Vikas Vahini Volunteer Programme of North Malabar Gramin Bank.

Farmers seminars

A one day district seminar was organised on 12th February 1987 in which more than one hundred elite farmers from Kasaragod, Cannanore and Calicut Districts participated.

Visitors

Dr. K. K. Tyagi, Dy. Director (Econ), Ministry of Agriculture, Dr. G. Rangaswami, Chairman, KAU Commission, Dr. K. Venkateshwarlu,

Professor, NAARM, Dr. K. G. Shanmugavelu, Dean (Hort.), Tamil Nadu Agricultural University and sixty eminent Scientists from various parts of India visited the station during the year.

RESEARCH HIGHLIGHTS

Coconut

T x D hybrids have been found to be superior to D x T and WCT under rainfed conditions. In cumulative nut yield over a period of 8 years (1979-86) WCT x MDY ranked first followed by WCT x CDG.

Preliminary study on WCT x GB showed that application of 0.5:0.5:1.5 kg NPK/palm/year and an irrigation level of 600 l/palm/at IW/CPE 1.00 is best for vegetative growth of the 5 years old hybrid.

Leaf drooping of coconut caused by *Diocalendra frumentii* was found to occur in a severe form in northern parts of Kerala.

Rice

Two flood tolerant cultures of medium duration viz. BR 51 and BR 52 have been identified as suitable for the flood prone area of the northern zone.

Culture 1727 gave equally good grain yield as Jaya in Kasaragod district.

In the fertilizer management of the mundakan partner (II crop) in the koottumundakan practice of rice cultivation, a fertility level (NPK) of 20:10:10 kg/ha was found to give the maximum benefit cost ratio.

Pepper

Drying up of pepper vines by the attack of a stem borer has been observed in the pepper plantation of the northern zone of Kerala. The organism responsible have been identified to be *Cylas formicaris* (family: apionidae) and *Pterolophia griseovaria* Breuning (Cerambycidae).

Drenching Bordeaux mixture in the basin of black pepper showed reduction in the population of *Azospirillum* in the surface soil and soil upto 4 cm depth. Its influence was comparatively lesser in soil at 24 cm depth and also in the rhizosphere soil.

Pulses

Among pulse varieties suitable as floor crops in coconut gardens, CG-28 variety of cowpea, LBCs-20 variety of blackgram and Pusa-106 variety of green gram were found to be the best.

Vegetables

Pitcher method of irrigation was found to be a water saving technique for cucumber grown in rice fallows during summer season.

Drenching (three times) and spraying of bordeaux mixture 1% was found to check the two major diseases effecting tobacco viz. black shank and frog eye leaf spot.

A new wilt disease in sesamum has been observed to be prevalent in this area. The organism responsible for this has been identified to be *Pseudomonas solanacearum*.

Colletotrichum gleosporioides is found to induce a new type of leaf spot disease in *Piper longum*.

A new disease on nutmeg was found to be caused by *Pestalotia palmarum*.

1.6 PEPPER RESEARCH STATION, PANNIYUR

The Pepper Research Station, Panniyur is located in the Village of Panniyur in Taliparamba Taluk of Cannanore District. The nearest Railway Station is Cannanore (31 km) from where the station can be reached by taking the road to Alakode (Via) Taliparamba.

The station was started in 1952-53. With the acquisition of additional area in 1981, the total extent of the area of the farm has become 26.13 hectares.

The station is a sub centre of the NARP Project of the Northern Zone under the control of the Associate Director, RARS, Pilicode and has the lead function of research on pepper.

The Station had its beginning with a small scheme started on 23-12-1949 under the Madras Department of Agriculture, partly financed by the ICAR. The scheme started functioning at Mattannur with the intention of starting a research station in that area in due course. But the idea had to be dropped and the scheme was temporarily shifted to the Agricultural Research Station, Taliparamba during 1950-51. Acquisition of land for the present site of Pepper Research Station, Panniyur was done later, in 1952-53 which is considered as the year of establishment of the station. Reorganisation of the states brought the institution under the Kerala Department of Agriculture on 1-11-1956. Consequent to the formation of the Kerala Agricultural University the station became a constituent institution of the University from 1-2-1972.

It is the only station solely devoted to the research on pepper. The station has celebrated its Silver Jubilee in December, 1978.

Prof. V Sukumara Pillai continued to be in charge of the station.

Scholarships, awards, fellowships, grants received by the members of the staff

One staff member of the station attended the VIII workshop of All India Co-ordinated Spices Improvement Project held at RARS, Guntur from 30th, 31st January and 1st February, 1987.

Scientists of the station attended the IX NARP-KAEP Regional Workshop held at RARS, Pilicode on 6th and 7th August, 1986.

One scientist of the station attended the state level Seminar on Cashew held at Koodali High School, Koodali on 8-11-1986. All the four scientists of the station attended the National Seminar on Agrometeorology of Plantation Crops held at RARS, Pilicode on 12th and 13th March, 1987.

Two scientists of the station attended the Kisan mela held at RARS, Pilicode on 12th February, 1987.

One staff member of the station has regularly attended the T&V workshop of Cannanore and Kasaragod Districts during the year under report. One staff member of the station is the Chairman of the diagnostic team of Cannanore District and has regularly conducted the diagnostic team visit in collaboration with the Departmental staff.

Besides the above workshops, training programmes, seminars etc. organised by the various extension agencies were attended by the scientists of the station.

HIGHLIGHTS

Crop Improvement

Three pepper cultures viz. No. 4180, 4307 and 5621 showed promising yield during this year and has given 692, 1475 and 1080 g. of green berries respectively. These three cultures are now proposed to be put under comparative yield trial in 1988. Seventy cultivars and 117 wild and are maintained in the germplasm. Two advanced cultures viz. 239 types 331 are undergoing multilocational trials.

Crop management

The beneficial effect of irrigation over unirrigated control is significant (46.7%) showing that irrigation increases pepper yield. All the irrigation treatments are on par and hence the lowest intensity of irrigation i.e. irrigation at IW/CPE ratio of 0.25 upto the end of March can be recommended to be adopted.

Plant Protection

The study has revealed that foot rot disease incidence was high during the south west monsoon period (June-September) and less in summer (March-May). There was a drastic decrease in the disease incidence after the monsoon ceases. A positive significant correlation was noticed between the weakly incidence of disease, relative humidity, rainfall and number of rainy days while the maximum temperature and sunshine hours have a significant negative correlation with the disease incidence. It also indicates that high relative humidity favours the high incidence of disease under the continuous wet spell. Multiple linear regression equation using the different combinations of weather variables, worked out gives a good model for the prediction of foot rot disease incidence on pepper.

Crop-Mango

Studies on the control of pink disease of mango has revealed that removal of dried twigs and branches and scrapping off of the pink encrustation on live branches and cutting off of the infected part, if it is a small twig and application of wound dresser (Bordeaux paste) on the cut surface, scrapped area and to the fork region in the last week of June and first week of December are found to be effective in combating the disease.

Other matters

Kisan mela of Lab-to Land programme was conducted at Vattakool on 21-9-1986 in which 40 farmers participated.

Krishi Dharsan Programme of this station was conducted on 14-11-86 and 12-12-1986.

Visitors to the Station

Sri K. R. Viswanath, Deputy Director. (Extension), Coffee Board, Madikere; Sri B. R. Natesh, Senior Laison Officer, Coffee Board, Virajpet; Sri Kunhappa, Senior Laison Officer, Coffee Board, Somwarpet, Sri M. M. Bheemaish, Senior Laison Officer, Madikere; Sri C. C. Chunjappa, Junior Laison Officer, Coffee Board, Virajpet; Sri K. M. Ramprasad, Junior Laison Officer, Coffee Board were visited the station on 17-7-86 to study the various aspects of pepper cultivation and to clear the doubts.

Dr K. C. Shanmughavelu, Dean (Hort), Tamil Nadu Agrl. University, Coimbatore; Dr Chokhey Singh, OSD, (NARP); Sri N. P. Jayasankar, Joint Director, CPCRI, Kayamkulam were visited on 11-2-1987 of Appraisal Team on NARP Phase II.

Sri. J. Suresh Pandian and others, Planters Club, Pattiveeranpatti, Tamil Nadu-24 211 visited on 5-3-87 to study the various aspects of pepper.

RESEARCH REPORTS

Germplasm collection and Screening of Pepper varieties

Objectives is the collection and maintenance of germplasm and evaluation and utilization of cultivars and wild types in crop improvement programme.

Seven more cultivars were added to germplasm to make it 70 Nos. During the year under report, no wild types were planted. At present 117 wild accessions are in the germplasm. 50 cultivars in the germplasm have flowered and were harvested.

The period required for attaining berry maturity varied greatly with the cultivars. The cultivars like Arakkulam Munda, Arivally, Cheriya kaniakadan, Chumala etc. showed darly maturing habits. The maturity

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period in the other cultivars was longer by a few days to several weeks. In extreme cases like Kumbhakodi, Kuthiravaly and Neelamundi, the maturity period was about two months more than that of early maturing types.

The project is to be continued.

Breeding-Hybridization in Pepper

Objectives is evolution of high yielding varieties of black pepper with resistance to pest disease and adverse conditions.

290 seedlings obtained from previous year's sowing were planted in June, 1986 thereby making the total cultures so far put under initial evaluation to 6905 Nos.

213 seedling vines have flowered and were harvested during this year.

The project is to be continued.

Morphological Studies on Pepper Varieties

Objectives is morphology of all the genotypes in the germplasm in order to prepare a key for identification.

The spike and berry characteristics of pepper cultivars in germplasm were tabulated.

It was seen that the spike length and number of developed berries per spike was low when compared to previous three years.

Standardization of Nursery Techniques for Raising Bush pepper

Objectives is to study of the effect of dipping lateral cuttings of pepper in Indole Butyric Acid and standardization of optimum concentration of chemical and duration of dipping for maximum rooting of laterals.

No. of cuttings potted per treatment were 75 each. The experiments was repeated every month to find the effect of time of planting.

The No. of treatments were increased to twelve from August, 1986 onwards by using IAA also for synergistic action, if any, with no. of cuttings per treatments reduced to 25 Nos.

Monthly planting of laterals for raising bush pepper has shown that only the lateral which were planted on 29-4-86 and 28-5-86 registered some recovery.

The laterals planted in all the other months of the year completely perished.

The establishment of lateral cuttings by the various treatment given about was not appreciable. It was decided in the meeting of Research Co-ordination Group on Spices held on 3-6-87, to defer the experiment until the completion of an ongoing P. G. Research Project with the same objective.

Evolution of Shade Tolerant High Yielding Pepper Varieties

The promising types in the existing germplasm and the promising cultures will be evaluated in natural shade. The promising genotypes then identified will be tested in further trials at RARS, Pilicode or Nileshwar.

48 genotypes with 15 vines each were planted in this experiment i.e. a total number of 720 vines of which 289 vines had to be gapfilled in 1986 and 1987. Of the balance 431 vines, 162 nos. flowered during June–July 1986 and were harvested during January–March, 1987. Yields were generally low. Only 20 vines yielded green spikes of 100 grammes.

Since experiment was started only in 1982 and good No. of vines had been gap-filled in subsequent years, the yields during the year under report were generally low.

Screening of germplasm collection and promising hybrid lines grown under shade for disease tolerance and pest resistance

The data is being recorded. It is too early to draw any results from the data.

Evaluation of black pepper Genotypes in Arecanut Garden for Yield

The vines were planted only in 1984 and results are awaited.

Screening of black pepper Genotypes in arecanut garden against pests and disease

The experimental planting was done during June, 1985 and the project has to be continued.

Multilocation trial of Promising Cultures of Black Pepper

Objectives is the evaluation of seven pepper cultures viz. Nos. 54, 211, 239, 331, 406, 1171 and 1199 produced at this station, with Karimunda and Panniyur 1 as check varieties.

The project has to be continued for a few more years to understand the performance of selected cultures in comparison with check varieties.

Multilocation Trial of Black pepper cultivars

The Project has to be continued for a few more years to evaluate the performance of these various cultivars.

Irrigation experiment on Pepper

Objectives is to find out the effect of summer irrigation on the growth, flowering pattern, berry setting and yield of pepper (variety Panniyur-1).

The data from the experiment for the period from 1981-82 to 1986-87 and the results of statistical analysis are presented.

First of all, the pepper yields varied considerably and significantly from year to year showing the pronounced effect of season on Pepper production as has been reported by Ibrahim *et al.* (1985). Further, the treatments interacted significantly with the seasons.

Analysis of data for individual years showed that the treatment effects were not significant except during a single year (1982-83) i.e. the second year of the experiment. During this year, all the treatments receiving irrigation only upto the end of March registered significantly higher yields than those receiving continuous irrigation till the commencement of monsoon. Continuously irrigated plants have lesser yields than even the control plants. However, this trend in difference in yields between plants receiving irrigation upto March end and those continuously irrigated, subsequently reversed and later evened up. This, probably shows that the plants have a capacity to adjust themselves to the moisture regime prevailing continuously for a few years.

Another important finding brought out by the study is that though the effect of various irrigation treatments are not significantly different the beneficial effect of irrigation over unirrigated control is significant (46.7% increase) showing that irrigation increases pepper yields.

As all the irrigation treatments are on par, the lowest intensity of irrigation i.e. irrigating at IW/CPE ratio of 0.25 upto the end of March can be recommended to be adopted.

Ecological studies on quick wilt disease of pepper

The study has revealed that foot rot disease incidence was high during the south west monsoon period (June-September) and less in summer (March-May). There was a drastic decrease in the disease incidence after the monsoon ceases. A positive significant correlation was noticed between the weekly incidence of disease and relative humidity rainfall and number of rainy days while the maximum temperature and bright sunshine hours have a significant negative correlation with the disease incidence. It also indicate that high relative humidity favours the high incidence of disease under the continuous wetspell. Multiple linear regression equation using the different combinations of weather variables worked out gives a good model for the prediction of Foot rot disease incidence on pepper.

Evaluation of newer fungicides against quick wilt (Foot rot) disease of pepper

Results obtained during the year showed the minimum disease incidence in treatment receiving bordeaux mixture spraying and pasting and drenching.

Field experiment for the control of slow wilt

No clear indication on the superiority of any treatment is seen from the observations collected during the year. This is probably due to

the fact that the treatments were administered during a single season only. Also, the prolonged and severe drought of 1986-87 has affected the plants adversely.

Observational trial for the control of quick wilt disease of pepper

The experiment was laid out in two locations. The application of neem cake and lime reduces the incidence of foot and root infection, though the treatments do not appear to have any effect on branch and leaf infection by the pathogen. The general vigour of the plants receiving neem cake has improved.

Studies on the control of Nursery disease of pepper (*Piper nigrum*) cuttings

1% Bordeaux Mixture was found to be effective in reducing the incidence of the disease in the nursery to the minimum followed by 0.1% Difolatan.

Studies on the control of Pink disease of Mango

Plant sanitation is essential for the effective control of the disease. At the onset of Monsoon (June) remove all affected plant parts and tissues by scrapping or cutting and apply wound dresser (fungicide) to the cut portions and fork regions. This should be followed by two foliar applications of fungicides one in last week of June and the second in the first week of September. Bordeaux mixture (10%) is the best wound dresser followed by 3% calyxin in latex. So also, 1% Bordeaux Mixture and 0.01% (1ml. in 1 litre) calyxin in that order is effective when used as foliar spray.

1.7. REGIONAL AGRICULTURAL RESEARCH STATION, AMBALAVAYAL

The Research Station was established in 1946 as a part of Wynad Colonisation Scheme to carry out research on various aspects of improvement of Agriculture in Wynad in general and the colony area in particular. Other objectives were to make available quality seeds and planting materials for distribution to the cultivators and to render scientific advice to the farmers on improved agricultural technology. The station was upgraded as Central Horticultural Research Station in 1966 to conduct intensive research on major horticultural crops especially fruits, spices, essential oils, vegetables etc. In 1972 the station was transferred to the Kerala Agricultural University. It was brought under the National Agricultural Research Project in November 1983 and upgraded to the status of a Regional Agricultural Research Station for High Range Region with lead function for research on citrus, mango and other fruits, paddy based farming system and verification function for

crops like pepper, essential oils, medicinal plants, vegetables etc. The Cardamom Research Station, Pampadumpara is a sub station with lead function for research on cardamom and verification function for pepper and hill rice.

A Krishi Vigyan Kendra was started in 1983 with the objective of imparting training on scientific technology in agriculture and animal husbandry to the farmers of Wynad especially the tribals. Lab to Land and Village Adoption programmes are the other extension activities in the station.

The station is situated at an elevation of 974 m. above MSL in Sultan's Battery Taluk of Wynad district and has a net area of 87.03 ha. The gross cultivated area is 98.0 ha. The geographic location is 11°37' N latitude and 76° 12'E longitude. The soil is loam and rich in humus.

Prof. K. Kannan continued to be in charge of the Associate Director till his retirement on 3-3-87, when P Chandrasekharan, Professor of KVK, took additional charge as Associate Director and continued till 31-3-87.

Details of seminars/symposia/workshops/summer institutes/training programmes conducted by the Department/station/scheme

The fourth zonal workshop for High Range Region was conducted at the Regional Agricultural Research Station, Ambalavayal on 21st and 22nd October, 1986. Sixty scientists and extension workers from Kerala Agricultural University, National Research Centre for Spices, C.P.C.R.I, Agricultural Department, N.A.B.A.R.D. Coffee Board and farmers participated in the workshop.

The staff of the station conducted a number of classes in the farmers training camps, especially for the Tribal farmers, organised by the Krishi Vigyan Kendra.

Monthly T&V workshops were conducted regularly. Diagnostic team visited problem areas in various parts of the district along with Departmental staff.

Details of seminars/workshops etc. attended by the staff:

Shri. VS Devadas attended the Summer Institute on Fruit Crop Improvement at Punjab Agricultural University, Ludhiana from 16-6-1986 to 9-7-1986. Prof. P. Chandrasekharan and Shri. VS Devadas attended the National Seminar on Agrometeorology of Plantation crops from 12-3-87 to 13-3-87 at Regional Agricultural Research Station, Pilicode and presented a paper.

Research:

Number of Research projects as on 31-3-1986 was 35.

RESEARCH REPORT

Ongoing Projects:

Crop improvement:

Evolution and screening of rice varieties suitable for high altitudes

Performance evaluation of rice cultivars and varieties for the first and second crop seasons:

The experiment started during 1984-85 was continued during the year under report. During the second crop season of 1985-86, 12 varieties/cultivars viz. MO-4, MO-5, MO-7, Baroda, Cul. 745, Cul.796, Cul. 1-5-4, MDU-2, Edavaka, Jyothi, IR-20 and cul-23332-2 were tested and Edavaka gave the highest grain yield. (3397 kg/ha) followed by MO-5 (3111 kg/ha). During the first crop season of 1986-87, 12 varieties/cultivars were tested as one set and in a second set 10 varieties/cultivars viz. VL Dhan-16, Cul-No.88-3-50, Cul. No. 88-8-55, HP-1, HP-2, HP-3, HP-4, HP-5, Sabari and Cul. No. 88-12-59 were tested. In the first set MO-5 gave the highest grain yield (5638 kg/ha) followed by IR-20 (4639 kg/ha). This agree with previous year's result. In the second set Sabari recorded the highest grain yield (4211 kg/ha) followed by HP-4 (3641 kg/ha).

Germplasm collection of rice varieties:

During the first crop season of 1986-87, a germplasm of 23 local varieties were collected and maintained.

The varieties are:-

- 1 Peruva
- 2 Mannuveliyan
- 3 Chenthondi
- 4 Chettuveliyan
- 5 Velumpala
- 6 Gandhakasala
- 7 Veliyan
- 8 Chennellu
- 9 Ambalavayal-I
- 10 Ambalavayal-II
- 11 Kothandan
- 12 Paluveliyan
- 13 Thondi
- 14 Kannikayama

- 15 Mullanpuncha
- 16 Kuruva
- 17 Mashuri
- 18 Rajameni
- 19 Punnadan thondi
- 20 Kalladi Aryan
- 21 Thonnuramthondi
- 22 HR-35
- 23 Kodakuveliyan

The maximum yield was obtained from Paluveliyan (6900 kg/ha) long duration variety.

Pureline selection in the local paddy variety Edavaka:

During the second crop season of 1985-86, 125 single plants were selected based on the plant height, number of effective tillers, panicle length and number of grains/panicle from Edavaka bulk and raised separately and transplanted in three rows for further selection. The trial is being continued.

Crop Management

Agro-techniques for rice in the high ranges:

Evaluation of herbicides for weed control in the rice fields of Wynad

The experiment modified with twelve treatments during the first crop season of 1985-86. During the second crop season of 1985-86, the yield and other biometric data were not statistically significant. However the highest yield was recorded by Benthicarb @ 1 kg ai/ha + 2, 4-D ethyl ester 0.63 kg ai/ha 16 DAP (3974 kg/ha) followed by Benthicarb @ 1 kg ai/ha + 2, 4-D sodium salt @ 1 kg ai/ha 16 DAP (3454 kg/ha). The yield was low due to scarcity of water.

Weed growth was comparatively less in the treatment Benthicarb 1 kg ai/ha + 2, 4-D ethyl ester 0.63 kg ai/ha 16 DAP and Basalin + 2, 4-DEE @ 1.5 kg ai/ha 12 DAP at all stages of growth, except at harvest.

During the first crop season 1986-87 the highest grain yield was recorded by the treatment Basalin + 2, 4-DEE @ 1.5 kg ai/ha 12 DAP (5050 kg/ha) followed by 2, 4-D ethyl ester 0.9 kg ai/ha 4 DAP (4959 kg/ha) and Basalin + 2, 4-DEE @ 1.25 kg ai/ha 12 DAP (4755 kg/ha). The above treatments were on par with hand weeded plots at 20 and 40 DAP. With regards to weed control effects 2, 4-D ethyl ester @ 0.9 kg ai/ha and 0.72 kg ai/ha 4 DAP and Basalin + 2, 4-DEE @ 1.5 kg and 1.25 kg ai/ha at 12 DAP in general recorded lower weed growth at various stages of growth.

Standardisation of time of application of fertilizers for rice in the high ranges:

The objective of the trial is to standardise the time of application of fertilizers to long, medium and short duration rice varieties during the first and second crop seasons. The trial was taken up during the second crop season of 1984-85.

The crop raised during 1985-86 second crop season was affected by water scarcity at the flowering stage. The general yield level was very poor and the duration was prolonged. However, $1/2$ N + Full P + $1/2$ K at tillering and $1/2$ N + $1/2$ K at panicle initiation stage of the recommended dose, recorded maximum grain yield in IR-20 (2945 kg/ha) as Jyothi (2440 kg/ha).

During the first crop season 1986-87 the highest yield was recorded by the application of $1/2$ N + Full P + $1/2$ K at tillering and $1/2$ N + $1/2$ K at panicle initiation (5240 kg/ha) followed by full P basal, $1/2$ N + $1/2$ K at tillering and $1/2$ N + $1/2$ K at panicle initiation (4613 kg/ha) in the case of IR-20. Application of 50% of the recommended dose of N, K and full P at tillering and the remaining 50% N and K at panicle initiation stage was superior to all other times of application and no fertilizer control was inferior to all others. The treatments were not significant for grain yield in the case of Wynad-2. However, maximum yield was recorded by the application of $1/2$ N + full P + $1/4$ K basal, $1/4$ N at tillering and $1/4$ N + $1/2$ K at PI recorded the maximum yield (4188 kg/ha).

Observational trial on vegetative propagation of rice:

An observational trial was conducted during the second crop season with two rice cultivars Edavaka and Sabari, to find out the feasibility of vegetative propagation of rice. After the harvest of the preceding crop the stumps of these varieties were pulled out and planted dividing each clump into 2 or 3 bits. The initial performance of the crop was satisfactory and there was good tillering. An average number of 11 tillers was produced by the cultivar Edavaka and 9 tillers by the cultivar Sabari. However, on account of the damage caused by drought the harvest details were not recorded.

Evaluation of cole crops for High Ranges:

Objective of the experiment is to find out the best variety and period of cultivation of cabbage and cauliflower for the High Ranges of Kerala.

Eight cabbage varieties (Early Flat Dutch, Special Eclipse Drum Head, Late Amercian Monarch, September, Golden Acre, Pusa Drum Head, August and Pride of India) and ten cauliflower varieties (Selected Tight Maghi, Snow Main Crop, Patan, Main Crop Veneras, Special Autumn Giant, Pusa Deepali, Pan Subhra, 236-S, Kartika, Early Patna,

and Second Early) selected from the initial evaluation trials of the previous years were grown in this experiment. Sowing was done on five dates at fortnightly intervals starting from 17-7-1986 and the seedlings were transplanted after one month.

There was not much variation with respect to first four sowings for cabbage, but the performance of last crop, sown on 4-10-1986 was very poor.

Among the cabbage genotypes, Special Eclipse Drum Head gave the highest yield and biggest heads followed by Late American Monarch, September and Pusa Drum Head.

With respect to cauliflower, the last two sowings (22-9-1986 and 4-10-86) were inferior. The promising genotypes were selected tight maghi, snow main crop patna and pusa deepali.

Collection, evaluation and selection of different tubercrops including wild edible forms suitable for growing in the High Range region:

An experiment *Dioscorea alata* started in 1985-86 was repeated for the second time in 1986-87. The varieties were DA No. 30, DA No. 62, DA No. 100, DA No. 61, DA No. 10, DA No. 20, DA No. 231, DA No. 32, DA No. 25 and DA No. 3.

During 1986-87 season DA No. 61 gave the maximum yield (47.025 t/ha).

Evaluation of colocasia types

Six local colocasia types namely Cheruchempu-I, Cheruchempu-II, Cheruchempu-III, Cheruchempu-IV, Thallelotti and Palchempu were evaluated for their quantitative and qualitative characters.

The varieties did not show any significant difference.

Evaluation of coconut cultivars and hybrids in the high ranges of Kerala:

The evaluation trial consists of 18 cultivars/hybrids.

All the varieties have been planted and biometric observations were recorded. The seedlings were affected by the severe drought experienced during the year.

FRUITS & FLORICULTURE

Crop Management:

Varietal-cum-rootstock trial in Mandarin Orange:

This trial aims at finding out the best rootstock-scion combination suited to Wynad conditions. Twenty scionic combinations with five varieties (Kinnow, Satsuma, Nagpur, Khasi and Coorg mandarins) and four rootstocks (rough lemon, trifoliate orange, troyer citrange and

cleopatra mandarin) were planted in 1979 and the biometric and yield characters were observed in 1986-87 season also. During this year, the treatments were significantly different with respect to their height, spread and the quality parameters of fruits. As in the previous years, Coorg mandarin was the most vigorous among the scions and rough lemon, among the rootstocks induced more vigour to scions grown on them. Troyer and trifoliolate orange stocks had a dwarfing effect on the scion.

With respect to the quality of fruits, the T.S.S. was maximum for Kinnow mandarin followed by Coorg mandarin; similarly acidity was also maximum for Kinnow mandarins. The non-reducing sugar was maximum for Nagpur on Trifoliolate; Satsuma on rough lemon had the maximum total sugars.

Rootstock trial on Coorg mandarin:

The trial aims at finding out the best rootstock for Coorg mandarin orange under Wynad conditions. Six rootstocks viz., Rangpur lime, Rough lemon, Trifoliolate orange, Cleopatra mandarin, Troyer citrange and Carrizo citrange are tried. Planting was done in 1974.

There was no significant difference between treatments.

No yield was obtained in this season.

Evaluation of limes and lemons suited for high ranges of Kerala:

Among the twenty types tried malta and seveli lemons started yielding fruits. First harvest was done in November, 1986.

More types will be added to the collection

Comparative evaluation of banana cultivars under irrigated and rainfed conditions of high ranges:

This trial aims at selection of the best economic cultivars of banana for growing under rainfed as well as irrigated conditions of high ranges.

Under irrigated conditions

Rasthali, Karpooravalli, Njalippoovan, Chenkadali, Nendran (Kannara), Gros Michel, Kunnan, Nendran (Local) and Bodles Altafort are the cultivars tried. Planting of the first crop was done in December 1984. The harvesting was completed in 1986. Chenkadali, Gros Michel and Karpooravally had the longest duration; Nendran (Ambalavayal) and Nendran (Kannara) were the earliest cultivar. Maximum bunch weight was obtained from Bodles Altafort and Gros Michel and the lowest from Njalippoovan.

The second season's and third season's crop were planted on 18-1-1986 and 7-3-1987 respectively.

Under rainfed conditions:

Rasthali, Karpooravally, Chenkadali, Njalipoovan, Gros Michel, Bodies Altafort, Poovan and Kunnan are included in this experiment. Planting was done on 14-11-1985. Harvesting and recording observations are continued. The second crop was planted on 17-11-1986.

Multilocational trial on Nendran clones:

A multilocational trial with five Nendran clones supplied from Banana Research Station, Kannara along with a local clone was planted.

Harvesting of the crop is in progress.

Introduction and trial of Mango in the high ranges of Kerala (Ambalavayal)

Screening mango varieties for growing in the high ranges of Kerala

Objective of the experiment is to select table and pickle varieties of mango suitable for large scale cultivation under the agro-climatic conditions of High Range Region of Kerala. Twenty seven mango varieties available in the farm are being studied for yield, fruit quality and other characteristics. Based on the yield of 1986 season, the varieties were grouped into high yielders (above 25 kg/tree), medium yielders (10-25 kg) and low yielders (below 10 kg/tree.) Kalapady, Amritham, Benganapalli and Himayuddin, Bennet Alphonso, Neelum, Kalapady x Himayuddin, Chittur Bumani, Raneshan, Kalapady x Neelum. Allumpur Baneshan, Jahangir, Banglora, Himam Pasand and Amini were the medium yielders and Dasherri, Olour, Kalapady x Allumpur Baneshan, Neelum x Baneshan, Prior, Pairi, Chandrakaran, Nasipasand, Mundappa and Nadasala were the low yielders.

New Introductions

Mallika, Amrappalli and two hybrid varieties were introduced in July 1986 from Indian Agricultural Research Institute, New Delhi.

Standardisation of technique of simple methods of vegetative propagation of fruit crops—Mango

Three methods of grafting viz-stone grafting, soft wood grafting and approach grafting were tried with scions of various varieties. Stone grafting was done in the second week of August and third week of September 1986; Soft wood grafting was done in the second week of July, third week of July, first and second weeks of September and in the second week of October, 1986. Approach grafting was done in the last week of September 1986.

Maximum percentage of success was obtained by approach grafting in Kalapady, Neelum and Pairi done in the last week of September. With respect to stone grafting, the second week of August and third week of September were found to be the best; in soft wood grafting, maximum success was obtained in July.

The trial with five-methods of grafting (Stone, side, veneer, soft wood and approach) in three varieties (Neelum, Pairi and Kalapady) would be done at monthly intervals starting from July in 1987 season; soft wood grafting will be done at fortnightly intervals.

CROP MANAGEMENT

Studies on the dosage and split application of fertilizers for banana cv. Gros Michel under irrigated conditions:

An observational trial to find out the optimum requirement of fertilizers and number of split doses for Gros Michel banana was planted on 12-8-85 with two fertilizer levels (NPK @ 200:200:400 and 300:300:600 g/plant and three methods of split application (in two splits, three splits and four splits at two months interval).

The harvesting was completed in 1986-87. Total duration, days to bunching and days to fruit maturity were delayed as the fertilizer doses and number of splits increased. Total duration, days to bunching and number of fingers significantly varied between treatments. Yield, no. of hands, plant height, girth of Psuedostem, no. of suckers and days to bunch maturity were not significantly different. However earliest bunching and shortest crop duration were seen in treatment, NPK @ 200:200:400 g/plant applied in two split doses and hence this treatment seems to be more economical.

Manurial trial on Coorg Mandarin orange

The objective of this trial is to determine the optimum economic dose of N and K_2O at constant levels of P_2O_5 .

Planting was done in 1980 at a spacing of 6m x 6m and the crop was uniformly maintained for 4 years. Fertilizer application as per schedule was started in 1984.

Growth measurements and yield data for 1986-87 season showed that there was no apparent differences among treatments.

Micro-nutrient trial on Coorg Mandarin

The main objectives of the experiment are to study the effect of different micro-nutrients on Coorg Mandarin oranges and also to study the role of micronutrients in citrus decline.

The experiments was started in 1985 as per the revised technical programme in a 9 year old plantation. Sprayings of micro-nutrients were done in March 1985 and September 1986. The observations showed that there was no significant difference between treatments due to sprayings.

No yield was obtained from the plants during 1985 or 1986. The plants are now severely affected by citrus decline.

Studies on Arecanut + Cardamom + Pepper mixed cropping system in the High Ranges

Arecanut (Var. Mangala) seedlings were planted on 7-5-1985 at different spacings. Only management aspects of this crop has been done during 1986-87. Cardamom (PV-1) will be planted in 1988. Pepper will be planted when the arecanut attains 3 metre height. The arecanut crop is coming up well.

Standardisation of rice based cropping system for Wynad

The trial is aimed at studying the viability of different multiple cropping patterns in the rice fallows where there is no irrigation facility for taking a second crop paddy. During 1985 and 1986 the performance of horsegram, greengram, blackgram and sesamum was very poor. During 1986 though they germinated satisfactorily, growth was stunted and practically no yield has obtained. Adverse weather conditions also have affected other crops like cowpea, sweet potato, cucumber, ginger and groundnut.

The fourth zonal workshop held on 21-22 October 1986 has decided to revise the technical programme with the following treatment viz., Cowpea, ginger, elephant foot yam, tapioca, chillies, bittergourd, watermelon, sweet potato and colocasia. The trial was laid out with the modified technical programme during 1987 summer.

Nutritional requirement of West Coast Tall Coconut cultivar in the High Range Region of Kerala

The experiment aims at finding out an economic optimum dose of nutrients for coconut for maximum production in the high ranges. The seedlings were planted in 1984. Gap filling had to be done during 1986 and 1987. The seedlings are coming up well. The differential treatments can be started after the gap filling is over. The treatments consists of all possible combinations of three levels each of N (250g, 500g and 750g/plant/year), P (125, 250 and 375 g/plant/year) and K (500, 1000, and 1500 g/plant/year) with three controls viz., no fertilizer, NPK + 500 g Mg SO₄ and 100 g lime/plant/year and N₂ P₂ K₂ + 500 g Mg SO₄ and 100 g lime/plant/year.

Crop improvement

Multilocational comparative yield trial with pepper varieties

The project aims at screening pepper varieties for commercial cultivation in the high ranges. The varieties included are Panniyur-I, Karimunda, Kuthiravally, Kottanadan, Aimpirian, Neelamundi, Arakulamunda, Narayakodi and Kalluvally. Planting was done in 1984. Gap filling was completed. The vines have not started yielding.

Crop Management

Observational trial on the effect of VIPUL on growth and yield of ginger

This observational trial was laid out with the objective of assessing the efficacy of VIPUL, a plant growth promoter, marketed by Godrej Soaps India Ltd., on the growth and yield of ginger. The chemical was applied at 3 different concentrations namely, 500, 1000 and 1500 ppm thrice at monthly interval during the growing period of the crop commencing from the stage at which 50% of the crop has germinated.

Though the application of VIPUL at all concentrations have slightly increased the biometric characters such as number of tillers/plant, height and total number of leaves per plant, it has not increased the yield of rhizome.

Observational trial on the effect of storing seed rhizomes of ginger after cutting into pieces, on germination growth and yield of the crop

The objective of the trial was to find out whether the practice of storing seed rhizomes of ginger after cutting into pieces before planting followed by some cultivators in the district has got any beneficial effect on growth and yield of ginger. This study has been taken up as per the decision of the T & V monthly workshop.

The trial was laid out using two popular cultivars namely Maran and Rio-de-janeiro. Seed rhizomes were cut and stored for different periods such as 1½ months, one month and two weeks before planting. The usual practice of cutting the seed rhizomes just at the time of planting was included as the check.

Sprouting of seed rhizome was hastened by storing them for 1½ and one month after cutting. Early and fairly uniform germination was also observed in plots planted with seed rhizomes cut and stored for 1½ and 1 months before planting. While it took 9 weeks for the plots planted with seeds cut at the time of planting and seeds cut and stored 15 days before planting to achieve 100% germination while it took only 8 weeks for those planted with seeds cut and stored for 1½ and 1 months before planting.

However, the differential treatments did not significantly influence the yield biometric characters and to the incidence of bacterial wilt.

Early fairly uniform germination is the only beneficial effect associated with this practice.

Trial on fertilizer requirement of pepper var. Panniyur-1 under the agro-climatic conditions of Waynad

The experiment was started in a pepper garden planted in 1972; treatments application started in 1982.

Yield and yield parameters were recorded in 1987 season, as in the previous years.

Maximum yield of dry pepper was obtained from vines applied with 50g N+20 g P₂O₅+150g K₂O/year followed by 25g N+40g P₂O₅+150g K₂O/year.

Statistical analysis of yield data from 1983 to 1986 seasons did not show any significant difference between treatments. The trial will be continued for three more seasons.

Crop Improvement

Establishment of demonstration-cum-multiplication plots with different recommended types of cashew adopting efficient propagation techniques (MSCRP)

The objective of the trial is to select the best type and planting material of cashew for commercial cultivation in the high range region. BLA-139-1 BLA-39-4, H-3-17, H-3-13, NDR-2-1 and K-22-1 are the types tried with three planting materials air layers, stone grafts and seedling.

Planting was done in August 1983.

Mortality, percentage of flowering, biometric characteristics and yield were recorded in 1986 season. All the air layers of BLA-139-1 were flowered in the season. The next precocious types were K-22-1 (air layers and stone grafts) followed by H-3-13: None of the seedlings of NDR-2-1 flowered. In general, air layers and stonegrafts flowered earlier. Juvenile period was maximum for seedlings.

Seedlings were the most vigorous with respect to height, air layers of BLA-139-1 and BLA-39-4 and stone grafts of H-3-13 had the maximum spread.

During the first year of bearing, in this season, maximum number of nuts were obtained from stone grafts and air layers of K-22-1.

Plant Protection

Investigations on major diseases of ginger

Study of epidemiology and control of bacterial wilt of ginger:

This experiment was commenced in April 1984. The results of 1984 and 1985 season showed that none of the treatments included in the technical programme was effective in giving effective control of bacterial wilt disease. Hence the technical programme was modified. Accordingly the experiment is laid out in 1986 season with the adhoc technical programme suggested.

Foliar spraying and drenching the beds with 1% bordeaux mixture 4 times in the growing period at monthly intervals commencing from June

to October was found to reduce the incidence of bacterial wilt. The disease incidence was the lowest (33.61%) in bordeaux mixture treated plots and the highest (96.95%) cowdung slurry treated plots.

Studies on the control of soft rot of ginger incited by *Pythium* spp. with newer fungicides including systemic fungicides

Effect of seed treatment on rhizome rot of ginger

The technical programme of this project has been chalked out at a meeting of the scientists of KAU and CPCRI held at Vellanikkara in March 1985. The experiment was commenced in April 1985 and continued in 1986 and 1987 seasons.

The results of 1985 season shows that seed treatment with captan @ 0.2% ai is very effective in checking the pre emergence rhizome rot of ginger. However this treatment was on par with that of Captafol 0.2% ai. and Dithane M-45 @ 0.3% concentration. The results of 86 season also reveals the same trend.

A field control trial on the rhizome rot of ginger

The experiment was laid out in April 1985 and continued in 1986 and 1987 seasons.

There was little incidence of rhizome rot in any of the treatments including control.

In 1987 season the experiment was laid out in the same land (sick plot) as that on 1986 season, It has to be continued for one more season to draw conclusive results.

Plant Protection

Observational trial on the evaluation of the efficacy of the shell rodenticide WL-108366

The chemical is tested on 3 spp. *Rattus rattus*, *Bandicotta bengalensis* and *B. indica* at 2 concentrations 50 ppm and 100ppm. The study is not yet completed.

Other matters

The scientists of this station participated in 8 programmes of the Farm and Home of the All India Radio, Calicut on various aspects of crop and animal husbandry.

The station participated in the Science Fair Exhibition held at Sultan's Battery from 19-10-86 to 21-10-86. It also took part in the Kalpetta Flower Show from 13-12-86 to 14-12-86 and the Calicut Flower Show-87 from 20-2-87 to 24-2-87 organised by the Agri-Horti-Society of Wynad and Calicut respectively and bagged a number of prizes.

The station maintained a rose collections consisting of more than 400 varieties. Large scale production and sale of rose budlings are being done with a view to enhance farm revenue.

Visitors

The Kerala Agricultural University Commission headed by Dr. G. Rangaswami on 8-5-86, Shri Narendra Dutta, Assistant Agricultural Marketing Officer with 10 cultivators from Assam on 31-1-87 and the NARP Phase-II appraisal team headed by Dr Chokey Sing (ICAR), visited the station on 12-2-1987.

1.8 CASHEW RESEARCH STATION, ANAKKAYAM

The Cashew Research Station at Anakkayam was started in 1963 under a scheme included in the Third Five Year Plan. Research station is situated in Anakkayam Village in Ernad Taluk in Malappuram District. It is located on the western side of the Malappuram—Manjeri Road at a distance of about 9 km from Malappuram. Station occupies an area of 9.92 hectares. Out of which 8 hectares are under cashew and 0.5 ha. under coconut cultivation. Rest of the area is occupied by buildings and roads. The elevation of the location is 106.8 m above MSL. Soil is red laterite. The land is sloppy and of uneven terrain. Soil is deep at some places and rocky in many places.

The prime objective of the station is to evolve materials, methods and means to increase the yield of cashew. This is achieved by breeding, selection to evolve promising varieties and recommending proper manurial schedules, cultural practices and measures to control pests and diseases. The evolution of suitable vegetative propagation methods and distribution of quality planting materials also form part of the activities of the station.

In the year 1980-81, a close planted progeny nursery consisting of 184 plants belonging to 16 superior cashew types was established. This is utilised for the production and distribution of air-layers, budwoods etc. for vegetative propagation of cashew. During the year 1986, 0.4 ha. were newly planted with epicotyl grafts of Anakkayam-1 type for multiplication purpose.

Smt PV Nalini continued to be in charge of the station during the Year.

RESEARCH

Number of Research Projects as on 31-3-1986 was five.

Research reports

Collection and maintenance of types

Objective is to maintain types and varieties to isolate superior ones for further multiplication or for breeding work.

47 clonal and 43 seedling types already collected and planted in the station are under observation.

On analysing the yield data of this season (1986-87) it was found that 26 types among the clonal types and 6 types out of the seedling types have produced yield above 10 kg/tree/year.

During this season the highest yield was recorded by K-19-1 (26.060 kg) followed by K-10-2 (25.620 kg). In seedling types BLA-139-1 continued to be outstanding in yield. It gave an yield of 19.78 kg followed by UL-15-1 which gave an yield of 13.96 kg.

Breeding improved varieties of cashew by hybridization

Objective is to evolve superior varieties having desirable characters by hybridization and further selection.

The breeding work was started in 1963 by evolving 216 progenies of 18 parental combinations.

On analysing the yield data of the hybrids during the season (1986-87), it is found that some hybrids have produced good yield. During this season, H-3-13 among the old hybrids recorded the highest yield of 1970 kg followed by H-3-7 (18.48 kg). In the new hybrids H-15-6 produced the highest yield of 17 kg followed by H-8-10 (16.56 kg).

Comparative yield trial of clonal progenies

Objective is the performance of the clonal progenies of the 16 promising selections of this station is studied in this experiment.

The yield data from 1978 to 1984 were statistically analysed and it was found that there is no significant difference in yield due to different types, except for the year 1979.

Study of promising clonal progenies of cashew

The performance of the progenies of promising germplasm collection and the first set of hybrids planted during 1963-64 are evaluated in this trial.

Progenies of 12 types H-3-6, H-3-9, H-4-10, H-3-3, Tree No.52, H-3-13, H-3-15, H-3-8, CRPT-1, ALGD-1, Tree No.34 and Tree 24 were planted during 1967.

Progenies of 9 types were planted during 1968. They are K-10-2, H-4-7, K-22-1, H-4-10 K-27-1, H-3-17, ABD-2-1, H-3-13 and Tree No.20.

Five plants each of 10 types viz. K-22-1, UL-28-1, BLA-273-1, K-25-2, BLA-139-1, K-28-2, H-3-17, K-10-2, H-4-7 and Tree No.20 were planted during 1975.

Out of the 12 types of clonal progenies planted during 1967, the type H-3-9 recorded the highest yield of 9.94 kg followed by CRPT-1-1. In the 1968 planting K-10-2 recorded the highest yield of 7.45 kg followed by K-22-1. In the 1974 planting, highest yield of 4.38 kg was obtained from K-25-2 followed by K-10-2.

Cultural trial on cashew

The effect of various cultural treatments on growth and yield of cashew are studied in this experiment.

It was observed that this trial has not shown any useful results so far. Most of the trees gave an yield below 1 kg/tree. Based on the results the Cashew Research Review Committee suggested that this trial can be discontinued.

Intensive selection work done has resulted in the identification of the following high yielding varieties and hybrids.

- 1) BLA-139-1-released as Anakkayam-1
- 2) BLA-39-4
- 3) BLA-273-1
- 4) K-19-1
- 5) K-10-2
- 6) NLR-2-1
- 7) H-3-19
- 8) H-3-17
- 9) H-3-12
- 10) H-3-13

These selections have recorded the nut yield/tree ranging from 15 to 40 kg as against 3 to 10 kgs. obtained on an average from the cultivated varieties by the farmers.

During the period the following quality seed materials have been distributed from this station.

Seeds	: 1780 kg
Seedlings	: 1500 nos.
Layers	: 200 Nos.

1.9 REGIONAL AGRICULTURAL RESEARCH STATION, PATTAMBI

Regional Agricultural Research Station, Pattambi is situated in Palghat District along the Palghat—Calicut Trunk Road. It is located at 10°N latitude and 76°E longitude at an elevation of 25 m above MSL. This station was started as Paddy Breeding Station in 1927 to evolve high yielding rice varieties suited to the different agroclimatic condition of the state. In 1930, the name was changed to Agricultural Research Station and in 1962, it became the Central Rice Research Station with regional centres at Mannuthy, Moncompu, Kayamkulam, Karamana, Chalakudy and Vyttila under the Government of Kerala. With the establishment of the Kerala Agricultural University this station was brought under its control as one of the major station for research on rice and for post graduate work. Consequent on the implementation of National Agricultural Research Project, the station was made the Regional Agricultural Research Station for the Central Region with centres at Mannuthy, Chalakudy and a Sub Centre at Eruthempathy. It undertakes

intensive research with multi-disciplinary approach on the production and protection technology on rice. This station has been allotted the lead function for research on rice, pulses and oilseeds, tuber crops and vegetables and rice based farming systems. A seed Technology Laboratory is attached to the station for the analysis of seed samples for the benefit of the Department of Agriculture. A Dairy Unit with 16 cows and 8 buffaloes is also attached to the Station.

Sri N Rajappan Nair, Associate Director continued to be in-charge of the station.

Scholarships, awards, fellowships, grants received by the members of the Staff:-

Dr L Nadarajan, Associate Professor, Entomology has joined on 20.9.86 after leave for study purpose for three years' Post Doctorate Programme in France.

Sri Baby P Skaria, Assistant Professor of Entomology has joined on 20.6.1986 after study leave.

Sri T Selvin Jebaraj Norman, Junior Assistant Professor, Agrl. Economics has entered on leave for study purpose for Ph. D Programme in Agrl. Economics at Tamil Nadu Agrl. University, Coimbatore.

Conducted VIIIth Zonal Workshop of NARP (C.R) and KAEP on 5th & 6th September at Regional Agricultural Research Station, Pattambi.

Sri N Rajappan Nair, Associate Director attended the International Workshop on Impact of weather parameters on Growth and Yield of Rice held at I. R.R.I, Manila, Philippines from April 7th to 10th 1986.

Dr K Karunakaran, Professor of Botany attended the All India Rice Workshop at Faizabad from 13.4.86 to 17.4.1986.

He participated and presented a paper at the Rice Ratooning Workshop held at Bangalore from 21.4.1986 to 25.4.1986.

Sri VP Sukumara Dev, Professor of Plant Pathology attended the Annual All India Rice Workshop of the AICRIP held at Kumarganj, Faizabad, Utter Pradesh from 13.4.1986 to 17.4.1986.

He attended the IVth Workshop of All India Co-ordinated Rice Project on Seed Borne Diseases held at Tamil Nadu Agricultural University, Coimbatore from 25th to 27th November 1986.

Sri Baby P Skaria, Assistant Professor, Entomology has attended the National Symposium on Resurgence of sucking pest during July 1986 at Tamil Nadu Agricultural University, Coimbatore.

Smt K Santha, Assistant Professor attended the Orientation Training in Social Forestry at Mannuthy from 29.6.86 to 3.7.86.

Sri N Rajappan Nair, Associate Director chaired the Monthly Workshops of T & V Programmes of Palghat District.

Prof. KJ James chaired the T & V Monthly Workshop of Malappuram District.

Sri PJ Tomy and Sri D Alexander, Associate Professors of Agronomy were the Chairmen of Diagnostic Team of Palghat and Malappuram Districts respectively.

Professor VP Sukumara Dev and Dr L. Nadarajan, Associate Professor of Entomology attended the Monthly Workshops of T & V Programme of Palghat District and Smt. K. J. Alice, Associate Professor of Plant Pathology attended the Monthly Workshops of Malappuram Districts.

Trainings conducted by the Station:-

<i>Particulars</i>	<i>Duration</i>
1 Training on Bio-fertilizer for farmers	4 days
2 Field Training for D. A. Sc. (Tavanur) Students	18 days
3 Field Training for D. A. Sc. (Tavanur) Students	18 days
4 State level Training on Rice Production Technology for Agricultural Officers	4 days
5 Pre-Service Field Training for Agrl. Demonstrators	1 week
6 -do-	"
7 -do-	"

RESEARCH:

Number of Research Projects as on 31.3.1986 was 73.

RESEARCH REPORTS:

Crop Management:

AGRONOMY:

Fertilizer requirement of rice-rice-kolingi cropping system:

The experiment was formulated to find out the fertilizer requirement of rice-rice-kolingi cropping system and the extent to which these inputs could safely be reduced without affecting the total yield. The trial was conducted from 1984-1986.

From the analysis of the data for three years it can be concluded that in places where rice-rice-green manure cropping system is the practice, the kharif and rabi rice need to be given 75 per cent of the fertilizer dose only for each season instead of giving 100 per cent of the dose (90:45:45 kg N, P₂O₅ and K₂O/ha) for both the seasons.

Fertilizer requirement of rice-rice-fallow cropping system

To assess the correct fertilizer requirement of a rice-rice-fallow cropping system prevalent in the central region and to study the extent

to which these inputs could safely be reduced without causing significant reduction in total yield, the trial was started in 1984 and completed by 1986.

The result revealed that in locations where rice-rice-fallow cropping system is followed, application of 50 per cent of the fertilizer dose for Kharif and 100 per cent of the dose for the Rabi crop or 75 per cent of the dose for the Rabi crop or 75 per cent for both the seasons, is sufficient instead of giving 100 per cent of the dose (90:45:45 kg N, P_2O_5 and K_2O /ha) for both the seasons. In places where application of fertilizer is found to be difficult due to local field conditions, the former can be preferred.

Fertilizer requirement of medium duration transplanted rice for the Rabi season

To find out the optimum dose of major nutrients for the high yielding medium duration, transplanted rice grown during the Mundakan season, (Variety Jaya) an experiment was conducted from 1984-86.

The result showed that higher levels of N, P_2O_5 and K_2O (90, 45, 45 kg respectively) could not exert significant influence on yield of rice. So it was inferred that in a soil which is medium in nutrient status, N, P_2O_5 and K_2O dose of 50:25:25 kg/ha is sufficient for getting reasonable yield.

Response of short duration summer rice to different water management practices

To formulate an economic irrigation schedule for the short duration rice grown in summer season, the trial started in 1984 was completed in 1986.

It can be inferred that for Summer rice, 5 cm irrigation two days after the disappearance of ponded water from one week after planting, is sufficient instead of giving 5 cm continuous submergence throughout the crop period when the groundwater table is within 1 metre from land surface. By adopting this practice, the number of irrigation required can be reduced to 1/3 of conventional practice. The saving of water (200 mm) can be used for irrigating an additional area of 0.2 ha.

Micro meteorological studies on rice

With the objective of evaluating the water requirement of rice by energy balance and aerodynamic approaches and to evolve crop coefficients the trial was started in 1983 and completed in 1986.

The total water requirement of Thriveni crop were 1150 and 1500 mm for the Kharif and Rabi crop respectively. A simple regression model was developed between weather variables and grain yield.

PLANT PROTECTION

Entomology

National Screening Nursery

This trial was conducted to evaluate the elite breeding materials generated at various co-operating centres of IACRIP for insect resistance. 164 entries were tested against gall midge, leaf folder and stem borer at a fertilizer dose of 100:50:50. The results indicated that 46 entries were highly resistant to gall midge and against leaf folder and stem borer most of the varieties were highly susceptible. NDR-118 was found moderately resistant to stem borer and OR-142-93 and RP-1832-53-2-4 was moderately resistant to leaf folder.

Multiple resistance Screening Trial

Ninety six entries were scored against thrips, whorl maggot, gall fly, leaf folder and stem borer in the field with a fertilizer dose of 100:60:50. The varieties showed high resistance to thrips, gall fly and whorl maggot but were susceptible to leaf folder and stem borer. Among the varieties IR 32429-46-3-2-6, Co-18 and OR-367-SP-11 are showing good resistance to all the major pests.

Stem borer screening

Nineteen entries were screened for stem borer resistance in this trial. In all the scorings majority of the varieties were found highly susceptible to stem borer attack.

Spray volume evaluation trial

This was a trial laid out to evaluate the effect of different volume of spray fluid on the insecticidal efficacy using hand compression knapsack sprayer at different stages of crop growth. The spray volumes ranged between 100 to 650 L/ha at different stages (low, medium and high) and the insecticides tested are Ekalux and Nuvacron at 0.5 kg ai/ha. The results indicated that Nuvacron was more effective than Ekalux in controlling pests and also increasing yields. The low, medium and high volume sprays tested were found equally effective against major insect pests in the case of both the insecticides tested.

Observational trial with Deltamethrin formulation K-Othrine-2.5% against pests of unhusked paddy

Three doses of K-Othrine viz. 0.5, 0.75 and 1.0 ppm were sprayed to lots of paddy grains under a potters spraying tower and were kept in the godown along with two control treatments. Observations were taken every two months on the damage by different pests in storage. Higher damage was seen by angumois grain moth, *Sitotroga cerealella* and the chemical was not found effective at the doses tried. The lesser grain beetle, *Rhizopertha dominica* was found to increase the population by the chemical treatments. The percentage germination in the treated samples was found to be better since the general pest attack was lesser and lesser percentage loss of weight.

Plant Pathology

Screening for leaf blast resistance

In an attempt to identify the reaction of rice varieties to leaf blast 151 entries under National screening nursery were tested. None of the entries was found resistant to leaf blast while 24 entries were rated as moderately resistant.

Screening for sheath blight resistance

The project was to evaluate NSN entries for sheath blight reaction under transplanted field conditions. Among the 151 NSN entries evaluated, no entry was found highly resistant to sheath blight disease. Out of 122 NSN (Special) entries, 13 stress indicators, 13 local cultures and two local checks, two NSN (s) entries were found showing low score (3).

Multiple disease resistant screening trial for sheath blight

The project was to identify entries showing multiple resistance to blast, sheath blight, bacterial leaf blight and Rice Tungro Virus in hot spot locations. Out of the 96 MRST entries and 13 stress indicators screened, one entry (IET 7568) was found to be resistant (score I) and 11 entries were moderately resistant.

Evaluation of seed dressing fungicides on blast disease incidence

The objective of the experiment was to identify a good seed dressing fungicide against rice blast. Both under wet and dry sown conditions Fongoren 50 WP (4g/kg seed) treated plots showed least disease score.

New fungicidal evaluation trial for Blast disease control (Granular form)

The trial was to test the efficacy of new granular fungicidal formulations for the control of blast disease. All the granular fungicides tested viz. Kitazin 17G, Coratop 5G and Chlobenthiazole 6G were significantly effective in reducing the disease and increasing yield.

New fungicidal evaluation trial for blast disease control (EC/WP formulations)

The objective of the trial was to test the efficacy of new fungicidal formulations (EC/WP) for the control of blast disease. As the disease pressure was low, significant difference between treatments was not obtained. Fungi-one (1 ml/l) treated plots showed minimum leaf blast score and neck blast. Ediphenphos (1ml/l) treated plots gave maximum grain yield followed by Fongoren and Fungi-one treated plots.

Economic spray schedule for the chemical control of blast

The trial was to work out a suitable economic spray schedule for the chemical control of blast. Bavistin sprays in the nursery and main-field at tillering and heading was found most economical, though the

best schedule in reducing disease and increasing grain yield was spraying with Bavistin in the nursery followed by application of Kitazin 17G at tillering and Bavistin spraying at heading in the mainfield.

Chemical control of sheath blight

The experiment was conducted with the objective of testing the efficacy of different fungicidal formulations for the control of sheath blight disease of rice. Out of the seven chemicals tested, Validacin 3 L (2 ml/l) was found to be the best fungicide in reducing sheath blight and increasing grain yield.

Observational trial on use of mycoparasites in bio-control of sheath blight of rice

The objective of the trial was to find out a mycoparasite for exploiting the potential of biocontrol of rice sheath blight disease (*Chaetomium globosum*) soil application before planting and foliar spray at active tillering stage were found to reduce disease and increase yield.

ONGOING PROJECTS

Crop—Rice

Uniform variety trials

Two UVT-2 trials with 30 entries were conducted one each in kharif and rabi seasons. During kharif the highest grain yield of 3168 kg/ha was recorded by the local check Culture 23332-2 and the entry UPR-231-28-1-8 which were both statistically superior to both the national check IR-36 and Ratna. In the rabi trial the highest grain yield of 3748 kg/ha was recorded by the entries RP-2151-40-1 and RR-52-1.

Preliminary variety trials

Two PVT-2 trials with 81 entries were conducted. One each in kharif and rabi seasons. During the kharif season, the local check Culture 23332-2 with a grain yield of 3444 kg/ha was statistically superior to both the national checks ratna and IR-36. During rabi season the highest grain yield of 4012 kg/ha was recorded by the entry RP-2235-200-91-68.

International Rice Yield Nursery

During the year two trials viz., IRYN (E) and IRYN (M) were conducted during the rabi season. Out of the 25 entries in the IRYN (E) the highest grain yield of 4222 kg/ha was recorded by the entry IR-31805-20-1-3-3. The local check cul. 23332-2 was on par with international check IR-36.

Among the 23 entries in the IRYN (M) the highest grain yield of 4938 kg/ha was recorded by the entry BW-293-2. The local check Cul. 1727 was on par with the international check IR-42.

Breeding high yielding tall, photosensitive rice varieties with good straw yield specifically suited for the Mundakan season of Kerala

A total of 132 single plant progenies from 5 cross combinations in F5 generation were studied and a total of 60 promising single plants recording grain yield above 30 g/plant were selected for being further yield tested.

Two yield trials with cultures selected earlier were repeated during the year also. Results confirmed the earlier finding that the red riced culture 871 and the white riced culture 841 were promising. Both these cultures were nominated for minikit trials in farmers fields.

Breeding rice varieties for the ill drained and temporarily flooded areas in Kerala

The two flood tolerant cultures already identified and tested earlier viz. BR 51-315-4 and CR 52-96-3 were yield tested with PTB-1 as check. Both the cultures were found to be significantly superior to the check variety. These cultures have been supplied to the Department of Agriculture for minikit trials.

Evolution of an awnless and high yielding type of the rice variety "Parambu Vattan" for the virippu cultivation in Palliyal lands

Twenty nine selections in the M5 generations were studied and a total of 17 promising single plant selections were made, all of which were awnless and recording grain yields above the mean single plant yield of the original parental variety PTB-7.

Breeding lodging resistant, fertilizer responsive medium height rice varieties suited for dry sown virippu season in uplands of Kerala

The two cultures Cul. 1 and Cul. 2 from the cross Rasi x T-1421 were yield tested during the year also. The performance of both the cultures was very poor under the severe drought condition experienced during the year. Hence these cultures were finally rejected.

In the programme for the improvement of PTB-28 and Suvarna modan sixty cultures from four cross combinations were studied. The severe drought experienced during the year was exploited to select drought tolerant materials from these; and a total of 52 promising single plants from three cross combinations were selected.

Breeding cold tolerant varieties of rice for the high altitude region of Kerala

The two cultures 745 and 796 found promising based on the earlier trials were supplied for minikit trials in the Wynad and Idukki districts on large scale.

Evolution of semi tall or dwarf types of important tall Indica varieties

A total of 49 selected M4 populations of gamma ray irradiated PTB-1, PTB-23, and PTB-26 were grown and studied during the year.

Thirteen promising mutants of PTB-1 and six mutants of PTB-26 were selected. No promising mutant of PTB-23 could be isolated and hence PTB-23 is to be irradiated once again during 1987-88.

Breeding high yielding rice varieties resistant/tolerant to sheath blight

The F3 population of 22 selections from the cross Bhadra x 25331 were studied, and eight promising single plants selected for further intensive testing under disease pressure in 1987-88.

Improvement of rice varieties Br-51 and IR-36 for consumer acceptability

A total of 124 F3 families from 12 cross combinations involving either IR-36 or BR-51 as one parent were studied. A total of 10 red kernelled short duration single plants from crosses involving IR-36 and another 17 red kernelled medium duration single plants from crosses involving BR-51 were selected.

Breeding high yielding rice varieties with pigmentation at some plant parts

Seventy three single plant families in F3 generation from six different cross combinations each have the purple IR-1552 as one parent were studied. A total of 43 promising single plant showing good yield and also pigmentation at some plant parts were selected for further yield evaluation.

Performance evaluation of new rice mutants

An unreplicated yield trial of five new mutants along with Cul. 23332-2 as check was conducted. Two mutants M2 and M210 which recorded grain yields above 4 tons/ha were selected for further yield testing and evaluation.

Performance evaluation of the rice culture 'Red Triveni'

Two replicated yield trials were conducted in which the rice culture 'Red Triveni' was compared with three checks viz., Triveni, Annapoorna and Rohini. As in the previous year, the highest grain yield was recorded by the red kernelled culture 'Red Triveni' during both the seasons.

Performance evaluation of photo insensitive mutants of OORPANDY variety of rice

An unreplicated yield trial was conducted with seven OORPANDY mutants viz., 25331, 25333 and 25335 which recorded grain yields above 4.5 t/ha were selected for further yield testing and evaluation.

CROP MANAGEMENT

Permanent Manurial Experiment (Tall Indica Series)

The above experiment laid out during the year 1961 to study the effect of continuous application of g. leaves cattle manure and AmSO₄ alone and in combination with and without P & K on tall Indica (variety PTB-2 during Virippu and PTB-20 during Mundakan) was continued during the year.

During both the seasons the effect of the treatment on the grain yield were significant. The effect of '*organics alone*' in the form of either cattle manure or C. M. +g. leaves and that of '*organics + inorganics*' were found significantly on par on equal N basis during both the seasons. '*Inorganics alone*' recorded lower yield.

Pooled analysis of the grain yield data for the 25 years from 1961 to 1985 showed that application of organics combined with NPK gives significantly higher yield than NPK alone, with an increase of 7.6% and 6.4% in grain yield during Virippu and Mundakan respectively. The superiority of cattle manure over green leaves as an organic manure is also noticed since wherever cattle manure is an organic source yield increase has been noticed.

Permanent manurial experiment

This experiment laid out during 1973 with the objective on Dwarf Indica variety (Jaya) was also continued during the year under report '*Cattle manure application alone*' and application of '*Cattle manure + NPK*' were found on par and proved significantly superior to all others in grain yield during Virippu. During the Mundakan season the above treatments even though numerically superior were found statistically on par with others in grain yield.

The pooled analysis of the grain yield data from 1973 to 1985 showed significantly higher yield for '*Cattle manure alone*' during Virippu with an increase of 24% in grain yield over '*NPK alone*' with during Mundakan '*Cattle manure alone*' was on par with '*Cattle manure + NPK*'.

Chemical manipulation of growth and yield in tall and dwarf rices

In order to test the efficacy of plant growth regulators in tall, and dwarf rice cultivars and to modulate the partitioning efficiency of tall rice genotypes the trial was taken up in the second crop season of 1985.

The result showed that myxtacol and cycocel sprays at 1500 ppm have increased grain and straw yields of dwarf rice cultivars. But this effect was not noticed in the case of tall indica varieties.

Causes for the lack of response to phosphorus and potassium in soils of Central region

A pot culture experiment was conducted to find out the most appropriate doses of P & K for soils of different fertility status of these nutrients. The results obtained during the first crop of 1986 showed that there was no response to P & K in soils having low, medium and high levels of P & K.

Split and delayed application of phosphorus

The trial was initiated in 1985-86 with the objective to study the effect of basal and split application of P through DAP and SSP. The

results revealed that the different levels and different forms of phosphorus did not have any significant effect on the yield and ancillary characters of paddy.

N management for wet land rice in pest and disease endemic areas

The objective of the trial was to arrive at the best nitrogen management practice for control of sheath blight in wet land rice. The results showed that grain yield was the maximum in plots treated with prilled urea, followed by coaltar coated and neem cake coated urea. The degree of sheath blight infection was the minimum in plots treated with neem cake coated urea and was maximum in coaltar coated urea.

Monitoring soil fertility and crop productivity under continuous rice culture at moderate levels of fertilizer application

This is a permanent manurial trial conducted with the objective of monitoring the changes in crop productivity and soil fertility in a rice-rice rotation at moderate levels of fertilizer use. During both Kharif and rabi seasons, nitrogen gave significant response i.e. 60 kg N/ha was significantly superior to control. During the rabi season phosphorus also gave significant response; 30 kg P_2O_5 /ha was superior to control.

Rice variety for lateplanted situations

This trial aims at studying the yield potential of promising long duration rice varieties as affected by overaged seedlings under delayed planting conditions. The general yield of all the varieties were very low under all the dates of planting. However late planting was found to be better.

International net work on soil fertility and fertilizer efficiency research

The trial was done with the objective of testing the efficiency of modified urea materials and their efficient methods of application for increasing fertilizer N use efficiency for rice. Response to nitrogen was noticed upto 87 kg N/ha which was the maximum dosage tried.

PLANT PROTECTION

Chemical control of gall midge

This is a trial to find out an effective chemical control measure of gall midge. This trial includes nursery treatments and main field treatments. Nursery protection with phorate 10 G @ 1.0 kg ai/ha at 10 DAS followed by seedling root dip in 0.02% chlorpyrifos for 12 hrs and nursery protection with nuvacron 40 EC @ 0.5 kg ai/ha at 10 DAS followed by seedling root dip were the best treatments against gall midge. The trial has to be repeated for one more season.

Cataloguing rice varieties/cultures of Kerala against major pests of rice

Resistance of different Kerala rice varieties and cultures against major pests of rice is evaluated in this trial. PTB-21, PTB-33, Cul. 25316,

Cul. 167 and Cul. 168 were tolerant to gall midge, PTB-9 and PTB-26 were highly resistant to whorl maggot and MO-6 and Cul. 23 were showing comparatively lesser incidence of stem borer.

Cultural practices for summer rice fallows

The trial was laid out to formulate ideal cultural practices for summer rice fallows and to assess its influence on succeeding rice.

Analysis of the yield data showed that the treatment receiving ploughing, twice, just after the harvest of second crop or after the summer rain with the incorporation of cattle manure @ 2 t/ha recorded higher yields compared to control, though the differences due to treatments were non-significant.

Studies on the integrated use of organic and inorganic fertilizers in wet land irrigated rice

The experiment was conducted in the rabi season to study the effect of the integrated use of both organic and inorganic fertilizers on the growth and yield of rice under wet land irrigated conditions. The results revealed that there was no significant variation among the treatments in grain and straw yield.

Weed control trial for direct sown rice under upland conditions

This trial has the objective to identify suitable herbicides for effective and economic weed control in upland rice culture. The results revealed that where grassy weeds predominant benthicarb is good and when sedges predominate butachlor. For both 2 kg ai/ha is sufficient.

PULSES

Selection of long podded vegetable type cowpea for summer rice fallows

During summer 1987, out of the 8 varieties tested the variety IHR 6-1-B proved to be the highest yielder. The harvest was only as green pods. The variety IHR 6-1-B was the highest yielder during the previous years also. Hence we could recommend this variety for summer rice fallows.

Breeding horsegram varieties suited to the locality through single plant selection

Two selections, Cul.2 and Cul. 3 and the unselected Pattambi local were put under a comparative yield trial during Rabi season. Though the yield difference were not statistically significant, Cul.2 recorded the highest yield of 750 kg/ha. The project may be conducted at Eruthempathy where the conditions are more suitable for cultivation of horsegram.

Studies on input contribution in summer cowpea

The trial was conducted during the summer seasons of 1985, 1986 and 1987, with the objective of quantifying the contribution of various

production inputs in summer cowpea. Results highlighted that among different production inputs irrigation was the most important input followed by weeding and fertilizer application, withdrawal of which significantly reduced summer cowpea grain yield by 54.35%, 29.86% and 18.12% respectively over full package of practices (988 kg/ha).

SESAMUM

Evaluation of a high yielding sesamum variety for the uplands of Kerala by pureline selection in the Pattambi local variety

Seven cultures selected during the previous year were put in a comparative yield trial with 'Pattambi Local' as check. Though the yield differences were not statistically significant, the culture-7 which showed 12.5% higher oil content than the Pattambi local recorded numerically the highest mean yields of 947 kg/ha during rabi season and 366 kg/ha during the drought effected summer season.

COWPEA

Breeding high yielding short duration cowpea varieties with better grain quality

Culture 9 recorded the highest yield of 1640 kg/ha during Kharif whereas in Rabi Cul. 1 yielded the maximum (1172 kg/ha). During summer Culture-9 was the high yielder (1371 kg/ha).

Cowpea Co-ordinated Varietal Trial

Among the 18 varieties tested during Kharif 1986 the variety HG-171 recorded the maximum grain yield of 1731 kg/ha followed by GC 82-7 which recorded 1725 kg/ha.

Co-ordinated Varietal Trial on Mung

During Kharif 1986 the variety PDM 84-139 was the high yielder (633 kg/ha). Among the 15 entries tested during Rabi PDM 84-143 gave the maximum (487 kg/ha).

Blackgram Co-ordinated Varietal Trial

The variety PDU-1 gave the maximum grain yield of 2356 kg/ha during kharif. Out of 12 entries tested during rabi 1986-87 UH-80-9 was the highest yielder (1025 kg/ha).

Agronomic evaluation of promising genotypes of cowpea

Among the 12 genotypes of cowpea evaluated for their grain yield during kharif 1986, the genotypes RC-19 and V-38 produced higher grain yields of 1488 kg/ha and 1483 kg/ha, respectively which were statistically on par with C-152, RC-48, Guj-2 and V-240 and significantly superior to all other genotypes

Agronomic evaluation of promising genotypes of mungbean

In kharif, 1986, out of the 14 mungbean genotypes tested, the genotype ML-131 recorded the highest grain yield of 716 kg/ha which

was statistically on par with MH-309, PDM-84-139, PDM-84-146, Pusa-103 and PDM-54 and it was significantly superior to all other genotypes.

Agronomic evaluation of promising genotypes of pigeonpea

Seven pigeonpea genotypes were evaluated during kharif 1986. The grain yield of pigeonpea was abnormally low due to adverse climatic conditions, heavy pod borer infestation, severe bird attack and poor performance of the genotypes. The maximum grain yield recorded was only 44 kg/ha produced by H-82-26.

Evaluation of urdbean and mungbean genotypes during rabi planting (SZ)

Ten urdbean and fourteen mungbean genotypes were evaluated for planting during rabi season. The 10 genotypes of urdbean did not vary significantly in their grain yield. The genotype LBG-17 produced the maximum grain yield of 525 kg/ha. Among the 14 genotypes of mungbean tested, Pusa-103 produced the maximum grain yield of 310 kg/ha and it was statistically on par with PDM-54, ML-131, PDM-84-143, PDM-84-146, PDM-11, Co-2, Pusa-102 and ML-5.

Response of cowpea genotypes to dates of planting

In this trial, 20 treatment combinations were studied during kharif 1986. Among the 4 dates tested, July 15 planting recorded the maximum grain yield of 981 kg/ha which was on par with June 30 planting (843 kg/ha) and both these dates were significantly superior to the other two dates. Variations in grain yield due to genotypes were not statistically significant. Cowpea may be planted from June 30 to July 15 and if the planting is delayed beyond July 15 the grain yield will be reduced drastically.

Performance of grain legumes in rice fallows under different cropping systems

In this trial, the performance of four grain legumes (greengram, blackgram, cowpea and redgram) and two cropping systems (relay cropping and sequential cropping) was evaluated during the kharif and rabi seasons of 1986-87. Redgram did not come up. Among other grain legumes, blackgram with a grain yield of 377 kg/ha performed the best followed by cowpea (210 kg/ha). Between cropping systems relay cropping (276 kg/ha) was significantly superior to sequential cropping (118 kg/ha).

Collection and evaluation of tapioca varieties suitable for rice fallows

Five varieties selected during the previous year were yield tested in three trials, one each in kharif, rabi and summer. It was found that M4 and Co-2 were the two varieties giving highest yields during summer rice fallow season when the harvest is taken up five months after planting. The variety M4 was found to show excellent cooking quality even with the harvest at five months after planting and in all the seasons.

Collection and evaluation of Sweet Potato varieties

Five varieties H 4021, Op 57, IR-8, 76-OP-219 and Kanjangad local selected based on earlier unreplicated trials were yield tested in replicated trials during kharif and summer seasons. The mean tuber yields of the varieties ranged from 15.4 t to 25.9 t and from 17.3 t to 22.6 t per hectare during kharif and summer seasons respectively. Though the yield differences were not statistically significant, the variety IR-8 with white tubers appeared to be more promising during kharif and the variety Kanjangad local with red tubers were more promising during summer.

Screening brinjal varieties for rainfed garden lands and summer rice fallows

Four selections were yield tested in two yield trials one in kharif season and the other in summer season. The kharif season yields were very poor due to erratic rains. During summer the yields ranged between 19.3 and 29.4 t/ha among the four selections Culture-2 appeared to be more promising in yield though this is to be confirmed further.

Selection of a suitable variety of chillies for garden lands and summer rice fallows

Four varieties selected during 85-86 were evaluated in a replicated yield trial during summer season. The varieties 45968, 45969 and 45986 were found to be on par in green pod yields with yields per hectare ranging between 4600 kg to 5400 kg.

Studies on the loss of applied N with the use of different sources and methods of application—ICAR Co-ordinated Project

In an experiment to study the loss of applied N with different sources of N fertilizers under low land rice cultivation, the cumulative loss of N through volatilization 15 days after application was worked out to 0.86% and 5.34% of the applied N in the case of 'Urea split application' and 'Neen coated urea' respectively during the Virippu season while it ranged from 5.96% for 'Urea split' and 9.5% for rock phosphate urea during the mundakan season. Green leaves + urea (50-50) gave a loss of 5.7% of the total N applied. The volatilisation loss found maximum during the 6 days period after application. Rock phosphate and gypsum coated urea tested were on par and less efficient than others in reducing the loss by volatilisation.

Micronutrient studies in the soils of Ankamali and Chittoor areas

A field experiment was conducted during the second crop of 1985 with different levels of P_2O_5 , K_2O and zinc in Chittoor area. Maximum yield was recorded by the treatment receiving maximum nitrogen (240 kg/ha farmers practice). In order to test the response of nitrogen and their trial was planned and conducted during the second crop of 1986 in 3 locations. In one location, the experiment was completely damaged

due to lack of drainage facilities. In the other two locations, the treatments receiving the highest dose of nitrogen gave the highest yield. The beneficial effect of zinc was also observed.

Studies on the organic matter status of the laterite soil profiles of Kerala

Experiments were laid out during the summer of 1986 to find out the rate of decomposition of added organic matter in laterite soils. Different levels of straw and Glyricedia were added and soil samples were collected 15 days intervals. The results obtained did not show any significant variation in N and carbon contents between treatments and intervals of observation.

National project of Development and use of Biofertilizers

Pattambi is one of the sub centres for the production and distribution of algal crust under the national project on development and use of biofertilizers. 500 kgs of algal crust have been produced during 1986-87.

N-losses from the rice soils of Kerala with special reference to Ammonia volatilization

The objective was to identify the factors which accelerate the rate of volatilization of ammonia from the rice soils under submerged condition representing the major rice growing tracts of the state and to formulate suitable methods to reduce this loss.

During the year under report incubation studies were conducted under laboratory condition with various soils collected from the rice growing tracts of the state. The sandy soils from Onattukara and the Kole soils recorded the highest and lowest volatilization losses respectively.

Increasing the rate of N, application of lime and influence of algal growth resulted an increase in the loss, while sterilisation of soil had no effect. The above study was followed with a pot culture experiment with 9 N sources and 2 soil types (laterite and sandy) with Jaya as the test variety. Based on the information from the above experiment with respect to the volatilization loss of ammonia and crop yield, treatments were subjected to further test in another set of pot culture experiment. Urea mudball application and urea super granules recorded minimum volatilization loss and higher yields. The above information obtained from the pot culture studies are being tested further under field conditions.

Visitors

Students from various educational institutions visited the station for studies in September, October and January 1987.

Justice K Sukumaran visited the station during the period.

HIGHLIGHTS

Crop Management

Permanent manurial experiment conducted to study the effect of continuous application of cattle manure and green leaf as organic and

Am SO₄ as inorganic, alone and in combination with and without P&K showed that application of organics combined with inorganic NPK is significantly better in rice cultivation from the yield as well as soil fertility point of view than applying inorganic alone.

In places where rice-rice-green manure cropping system is practised the Kharif and Rabi rice need to be given 75 per cent of the fertilizer dose of 90:45:45 kg N: P₂O₅: K₂O respectively for each season instead of giving 100 per cent of the dose for both the seasons.

When rice-rice-fallow cropping system is followed, application of either of the recommendation in 50 per cent of the dose for Kharif and 100 per cent of the dose for Rabi or 85 per cent for both the seasons is sufficient instead of giving full dose for both the seasons.

In soils which are medium nutrient status, a N, P₂O₅ and K₂O dose of 50:25:25 kg/ha is sufficient for getting reasonable yield.

In summer season, where water scarcity is observed, 5 cm irrigation two days after the disappearance of ponded water is sufficient instead of giving 5 cm submergence throughout the crop period. The saving in water can be used for irrigating an additional area of 0.2 ha.

Co-18 is found to be a multiple resistant variety.

Monocrotophos is found to be the best insecticide against leaf folder than Quinalphos and it can be sprayed at either low, medium or high spray volumes.

Deltamethrin at lower doses i.e., 0.5 to 1.0 ppm is found to induce population multiplication of the lesser grain beetle, *Rhizopertha dominica*.

Against gall midge, the seedling root dip in 0.02% chlorpyrifos for 12 hours is found to be an effective chemical control measure.

Seed dresser Fongoren 50 W P (Pyroquilon) @ 4g per kg of seed gave ample protection from seedling blast upto 45 days after transplanting.

Granular fungicidal formulations like Coratop 5 g, Kitazin 17g, and Chlorbenthiazole 6 g showed promise in controlling rice blast.

Spraying Validacin 3L, 2 ml per litre of water twice at 40 and 50 DAP was found very effective against sheath blight disease of rice.

In an experiment to study the volatilization loss of nitrogen with different sources of N fertilizers under low land conditions the % loss on applied N went upto 5.34% during Virippu and 9.5% during Mundakan season. Split application of urea offered good scope for reducing the loss through volatilization and the volatilization loss under the Pattambi soil conditions was found maximum during the six days period after application.

NARP SUB CENTRE, ERUPHEMPATHY, PALGHAT DISTRICT

The NARP Sub Centre, Eruthempathy started functioning from 1-6-1985 at the Integrated Seed Development Farm of the Department of Agriculture, Kerala. An area of 1.75 ha of land in the ISD Farm was utilised for conducting the experimental works.

The objective of starting the centre was to recommend better varieties of crops and to suggest suitable crop management techniques for each of the major crops grown in the locality.

The administrative and technical control of this station are vested with the Associate Director, Regional Agricultural Research Station, Pattambi.

Sri M. Oommen was in charge of the centre.

Research

Evaluation of rice varieties for the region

Under this project two experiments viz. evaluation of upland rice varieties for the drought tolerance and screening trial for rice upland varieties were laid out in the first crop season. But due to the drought conditions prevailed during the season, both the experiments failed.

Evaluation of fodder sorghum varieties under dry farming conditions

Among the six varieties tried K. Tall, MSH-51 and IS 3541 were found to be significantly superior to local, TNS-27 and Co-25 varieties. Among the three varieties found to be superior K Tall produced a biomass of 14977 kg/ha followed by MSH-51 and IS-3541, yielding 12218 kg/ha and 11144 kg/ha respectively.

Evaluation of pulse varieties

Comparative performance of blackgram varieties under dry farming conditions was laid out during the kharif season 1986. In this experiment six varieties viz. Co-2, Co-3, Co-4, Co-5, T-9 and local were tried to evaluate their comparative performance and it was found that excepting T-9 all other varieties were on par. However the variety T-9 was highly inferior, the grain yield being 220 kg/ha.

Evaluation of oilseed crop

During the kharif and rabi seasons 1986 two experiments on groundnut viz. evaluation of groundnut varieties under dry farming conditions and nutritional requirement of groundnut under rainfed conditions in dry farming regions were taken up.

Twelve groundnut varieties were tried for evaluating their yield performance. Though the yield of these varieties ranged from 1214 kg/ha to 2793 kg/ha. On statistical analysis no significant difference in yield was seen between varieties. Co-1 variety of groundnut however recorded the highest yield of 2793 kg/ha.

During the second crop season the drought affected the crop severely and the yield obtained was very poor.

Nutritional requirement of groundnut under rainfed conditions in dry farming regions

From the analysed data on significant influence of N, P and K nutrients on groundnut pod yield was noted.

During the second crop season, the crop was affected by drought and hence the yield data was not analysed statistically.

OPERATIONAL RESEARCH PROJECT, OZHALAPATHY

The Operational Research Project for resource development on watershed basis started functioning on 7-11-84 in the rainshadow region of the Palghat District, as a fully financed project of the ICAR, for an initial period of 3 years. The main objectives of the project are to optimise the productivity of all available resource in the watersheds; verification of available alternate farming system for efficient utilization of available natural resources; Identification and analysis of gaps and constraints in adoption of resource development programme on watershed basis; and creation of additional employment potential for small and marginal farmers and agricultural labourers.

The operational area of this project is spread over 7 sub watersheds in the Vadakkapathy Panchayath and comprises a total area of 730 hectares with total of 337 holdings and an average holding size of 2.2 hectares. This project was super-imposed in the area where the State Department of Agriculture was implementing a pilot project for propagation of water conservation/harvesting technology in the dryland area of the district.

Sri PH Latif was in charge of the station.

Farm Assistant Sri D. Sivaprasad was posted to the Station vice Sri P. K. Kumaran transferred.

Research Report

Adaptive trials on fodder sorghum

Most high yielding and suitable varieties of Fodder Sorghum are IS-3541 and Koilpetty Tall. These varieties can be used for dual purpose i.e., grain yield and fodder yield.

Adaptive trials on transplanted ragi

Most high yielding and suitable variety is Co-12.

Demonstrations with fodder sorghum and transplanted ragi were laid out in 7 locations. Mean yield of sorghum was 23 tons/ha and that of ragi was 3054 kg/ha.

HIGHLIGHTS

The adaptive trials conducted have identified the varieties of fodder sorghum and ragi most suited to this rain shadow region.

The demonstrations conducted have helped to convince farmers of the watersheds about the high yield potentials and economy in growing these varieties.

The demonstrations on high yielding varieties of ragi (Co-12) conducted in the farmers fields of the sub watersheds have helped to build up a seed stock of 3200 kg for rapid population among the farmers.

1.10 LIVESTOCK RESEARCH STATION, THIRUVAZHAMKUNNU

The farm was started in the post war development scheme of Animal Husbandry, Department of Madras Govt. in the year 1950. This was transferred to the KAU in 1972 and was converted to Livestock Research Station with effect from 14-8-78. AICRP on Agroforestry started in the Station w.e.f 8-12-1983.

The farm is located in the Mannarghat Taluk of Palghat District 17 Kms. north-west of Mannarghat town. This station is spread over an area of 163.3 ha of which 84.37 ha is under fodder crops. The details of area under different crops and utilization are as follows.

Fodder and cash crops	: 82.17
Area under local grass and trees of different varieties	: 32.93
Area under roads and buildings	: 10.00
Forest area	: 32.00
Area under field experiments of Agroforestry	: 5.20
<hr/> Total	<hr/> 163.30

Dr PP Balakrishnan was in charge of the Station till 12-5-86 and thereafter Sri NK Sasidharan was in charge of the station.

Dr C Sreedharan Unni, Assistant Professor (Vety), has been deputed for undergoing Ph.D. programme in Anatomy.

Research

AICRP on Agroforestry is the only research project in this station.

HIGHLIGHTS

Three thousand plants of 10 different tree species of fuel, fodder and timber uses were planted in the field experiment and the experiment is under progress.

Studies on management practices on Agroforestry Systems

Compatibility of different components in agro horticultural system is being studied. The seven tree components viz., Jack, Mango, Clove, Nutmeg, Tamarindus and Mulberry were planted and its aftercare were

done during the year. The growth of Jack, Mango, Tamarindus, Nutmeg and Mulberry are quite satisfactory while the survival rate of clove is only 50%.

Spatial arrangement and harvesting schedules in Silvopastoral systems

Observations on yield of Guinea grass as well as Leuceana was taken. None of spatial arrangement has observed to be have any effect on the yield of guinea grass. However growth of Leuceana was not satisfactory. Hence the total bio-mass production as well as the competitive and complimentary effect can be studied only after proper establishment of the Leuceana seedlings.

1.11. AGRICULTURAL RESEARCH STATION, MANNUTHY & INSTRUCTIONAL FARM, VELLANIKKARA

This station was originally established during 1957 as the Rice Research Station, Mannuthy in the then Central Farm as a separate research unit to study the various problems confronting rice cultivation in the middle lateritic region of Trichur and Ernakulam districts under the administrative control of the Rice specialist. During 1963, the headquarters of the Rice Specialist was shifted to Pattambi and this station continued as one of the Regional Rice Research Station. With the formation of the Kerala Agricultural University, the station was taken over from the Department of Agriculture. In the year 1976 this station was converted to the Research Station & Instructional Farm of the College of Horticulture.

For efficient management and administrative convenience, the Research Station and Instructional Farm, Mannuthy was re-named as Agricultural Research Station, Mannuthy and the Vellanikkara unit was retained as the Instructional Farm, Vellanikkara in the year 1983-84. However the separation so ordered has not been effected so far. The Agricultural Research Station, Mannuthy forms a sub centre of the Central Region of the NARP and Special zone for problem area covering the kole lands of Trichur. Apart from the projects undertaken under NARP, experiments under All India Co-ordinated Rice Improvement Projects, are also being implemented at this station. Prof. T. F. Kuriakose, Project Co-ordinator (Rice) continue to be the head of the station.

AGRICULTURAL RESEARCH STATION, MANNUTHY

Total area of station is 38.34 ha and the total cropped area is 34.75 ha.

INSTRUCTIONAL FARM, VELLANIKKARA

Total area of the farm is 95.35 ha. The total cropped area is 48.09 ha, and the area under rubber plantations, buildings, roads and other forest tree is 47.26 ha.

During the year under report 9.9 Tons of paddy seeds, 46.3 kg. vegetable seeds, 4337 coconut seedlings, 6281 fruit plants, and 5976 ornamental plants were sold.

Total expenditure for 1986-87 was Rs. 1540711.44 and total receipts for 1986-87 was Rs. 292792.75.

Training programmes conducted by the station

a. Field training for DASC students of Kelappaji College of Agricultural Engineering & Technology, Tavanur.

b. Field training for the B. Sc. (Ag.) students of College of Horticulture.

c. Work experience programme for B. Sc. (Ag.) Final year students—Paddy cultivation.

d. The staff of this station have offered classes to Tribal Youth as part of "Training on Agriculture to tribal youth" conducted by Central Training Institute, Mannuthy.

e. Project Co-ordinator (Rice) handled classes for the training programme conducted for Joint Directors and Deputy Directors of Agriculture Department.

RESEARCH

No. of research projects as on 31.3.1986 was 29.

RESEARCH REPORT

Uniform variety trial-I

With an objective to evaluate comparative performance of very early maturing selections 18 entries including the local check variety Annapoorna were tried. IET No. 7983 recorded the highest grain yield of 4333 kg/ha were as the check variety Annapoorna recorded 3043 kg/ha.

Uniform variety trial-II

A total of 30 entries including the local check variety Annapoorna were tested. The highest grain yield of 4306 kg/ha. was recorded by IET No. 7958. The check variety Annapoorna recorded 3566 kg/ha.

Uniform variety trial-III

The objective of the trial is to evaluate the comparative performance of medium duration varieties. Out of the 23 entries IET. 8717 recorded the highest grain yield (4843 kg/ha). The local check variety Kārthika recorded a grain yield of 3693 kg/ha.

Preliminary variety trial-I

The objective of this trial is to evaluate comparative performance of very early maturing selections. 11 test entries including the local check variety Annapoorna were tested during kharif season. The highest grain yield of 5768 kg/ha was recorded by IET No. 10391, where as the local check variety Annapoorna gave 3843 kg/ha.

Preliminary variety trial-II

With an objective to evaluate early maturing selection, 81 test entries including local check Annapoorna were tested during kharif 86.

Maximum grain yield of 5642 kg/ha was recorded by IET No. 9947 where as the local check Annapoorna gave 4019 kg/ha.

Preliminary variety trial-III

With an objective to evaluate comparative performance of early maturing selections, 80 test entries and the local check Karthika were tested during the kharif season of 1986. IET-9837 recorded the highest grain yield (5033 kg/ha).

Gall midge resistant variety trial

To study the comparative yield performance and relative resistance to gall midge of certain gall midge resistant selections, 80 entries were tested during the kharif season of 1986. IET No. 10264 ranked first with 5416 kg/ha of grain yield and zero infestation to gall midge. The second highest yielder was IET. 9679 with 5260 kg/ha grain yield.

Screening of rice varieties/cultures for drought resistance

The objective of this experiment to screen rice varieties and cultures having drought tolerance during the early stages of Virippu crop and late Mundakan crop. Among the short duration cultures/varieties cul-10-1-1 recorded the highest yield (5800 kg/ha) and in medium duration group Karthika recorded the highest yield and was on par with Cul-8 registering a grain yield of 5069 and 4888 kg/ha respectively.

Purification of rice culture 10-1-1

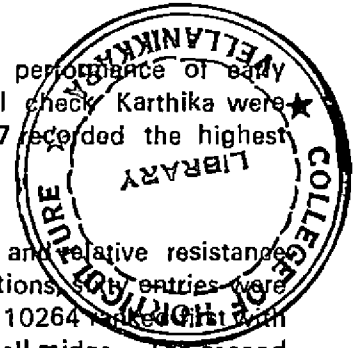
With an objective to purify cul. 10-1-1, 200 earheads of the culture were collected from the kole lands of Trichur; from the 200 lines, 25 lines were initially selected, and again by a further evaluation 11 lines were selected. Based on the vigour and susceptibility to disease of these cultures, 6 cultures were selected finally for further evaluation and testing.

Evaluation of rice varieties/cultures for kole lands

The objective of the trial is to select suitable rice varieties for kole lands. Newly released rice varieties and promising rice cultures from the various research centres were tested along with the local check varieties, during punja season in cultivator's field in kole lands. In the short duration trial (86-87) Triveni recorded the highest grain yield (5156 kg/ha) followed by cul. 10-1-1 (4900 kg/ha) and they were on par.

Adaptive trial with extra short duration rice cul. 24-20 in kole lands

Adaptive trials were continued with cul. 24-20 during the summer season in kole lands at two locations viz. Kanjani and Eravu. Annapoorna was used as check variety. At Kanjani cult. 24-20 recorded a per hectare yield of 4050 kg where as Annapoorna recorded 3875 kg. At Eravu the yields recorded were 2300 kg/ha and 1925 kg/ha. for cul. 24-20 and Annapoorna respectively.



Multi locational trial with short duration cultures of Rice

Multilocal trial with three, short duration Moncompu cultures (cult. 153-1, 200 and 204) along with Jyothi and Bharathi as checks, was laid out in the Kharif 1986. Culture-204 recorded highest grain yield (3670 kg/ha) followed by cul. 153-1 (3462 kg/ha)

Fertilizer management for Kole land paddy

The objective of the trial is to find out the optimum dose of N, K for short and medium duration rice in kole land. Higher levels of N & K than the present recommendations were tried both for short and medium duration paddy. Among the treatments for short duration variety Annapurna (NPK @ 110:35:55 kg/ha) recorded the highest grain yield of 3641 kg/ha and for the medium duration variety Jaya NPK @ 150:45:75 kg/ha recorded the highest grain yield of 4530 kg/ha. The control plot gave the lowest grain yield.

Cropping system for double crop Kole lands

With an objective to find out suitable crop combination for double crop kole lands, 16 combinations consisting of Rice varieties Annapurna, Triveni, Jyothi and Cul. 24-20 were tried in the farmers field for the Additional and Punja crop in kole lands. Among the different combinations Jyothi-Annapurna sequence recorded the highest average grain yield. Average straw yield was highest in Jyothi-Culture 24-20 sequence.

Evaluation of neem cake-urea-carbofuran blends for increasing N. U. E. and efficiency of carbofuran

The objective of the trial is to evaluate the efficiency of Neem cake-urea-carbofuran blends for increasing rice yield and for better control of pests. Of the seven treatment combinations tried in the summer 1986 in the farmers field in kole lands highest grain yield was recorded by treatment with 2/3 urea + carbofuran 0.75 kg ai/ha as basal and 1/3 urea alone as Top dressing

PULSES & OILSEEDS

GROUNDNUT

Screening groundnut varieties ideal for coconut gardens

Twenty promising varieties cultures of groundnut were evaluated, during the kharif season 86-87 at Instructional Farm, Vellanikkara in the coconut garden. TMV 2 recorded the highest dry pod yield of 1283 kg/ha followed by the variety Spanish Improved (1182 kg/ha).

Cataloguing of groundnut germplasm

The objective is to describe the important characters of the 400 accessions maintained in the germplasm collection and catalogue them into different groups based on their characters. A groundnut description

consisting of 40 characters were prepared and observations were taken. Among the accessions there were 10 early maturing lines maturing between 90-100 days.

Evaluation of pulses and oil seed varieties for koler land

The objective of the trial is to select suitable pulse and oil seed varieties for koler lands in areas where there is no scope for a rice crop. Five independent experiment for cowpea, green gram, black gram, sesamum and groundnut were laid out in the farmers field in the upper reaches of Pullazhi koler. The results were as follows:-

Cowpea:- Treatments did not differ significantly. The highest yield was recorded by Kanakamony (1881.51 kg/ha)

Greengram:- The varieties were not significantly different in their yield. The highest yield was recorded by 58 (987.66 kg/ha)

Blackgram:- The varieties were not significantly different from each other in their yield. The highest yield was recorded by CO2 (1461.74 kg/ha)

Groundnut:- The varieties were not significantly different from each other. The highest pod yield (fresh weight) was recorded by TG.14 (3022.26 kg/ha.)

The experiment on sesamum was discarded due to lack of enough plant population.

Studies on weed control in groundnut

The objective is to find out the most suitable weedicide and its dose for controlling weeds in groundnut crop. It was found that oxy-fluorofen is effective in controlling the weeds. However the highest pod yield was recorded in Tr.7 (Benthiocarb @ 1 kg ai/ha).

Optimum plant population for the recommended erect bunch cultivars of groundnut

Three groundnut varieties viz. TMV.2, TG 14 and Spanish Improved were planted at five spacing. There was no significant effect of the treatment on pod yield in both the seasons viz. kharif and summer.

Studies on the effect of coating cowpea seeds with Mussorie phosphate

The objective of the trial is to find out the effect of coating the cowpea seeds with mussoriephos at varying levels and also to find out the period of storability of the mussorie phos coated seeds as compared to other methods. A laboratory study and a field experiment was conducted. The results revealed that mussorie phosphate coating has significant effect on yield.

FRUITS & FLORICULTURE

Maintenance of germplasm collection of jack

A germplasm collection of jack consisting of 63 types are maintained at this station.

VEGETABLES

SNAKEGOURD

Studies on the effect of different levels of N, P and K on the yield of snake gourd

The objective is to study the effect of different levels of NP & K on the yield and yield contributing characters of snakegourd. Three levels of NP & K were tried. The effect of different levels of N on the yield was significant while different levels of P and K had no significant effect on yield.

CHILLIES

Effect of graded doses of NPK on the yield and other agronomic characters of chillies

The trial results showed that the effects of N and K was significant while that of 'P' was not significant. NP and NPK inter actions were also significant and others were not significant. The maximum yield (7888 kg/ha) was recorded by the treatment receiving NPK @ 80:40:40 kg/ha.

BRINJAL

Effect of different levels of NPK on the yield of brinjal

The objective of the trial is to find out the effect of different levels of N, P and K on the yield of brinjal. The result revealed that the effect of N was significant while P and K had no significant effect on the yield. The highest yield was recorded by the treatment receiving NPK @ 100:40:50 kg/ha.

Other matters

The work of NARP field laboratory has been completed and temporary electric connection obtained.

Visitors to station

Dr. H. S. Patil, Groundnut Breeder from Baba Atomic Research Centre visited the station on 23.8.86.

A large number of visitors including farmers and students were entertained here during this period.

HIGHLIGHTS

Culture 24-20 is a very short duration rice culture which matures in 75 days and gives comparable yield with the prevailing short duration variety Annapoorna which matures in 90 days. As very short duration varieties are the felt need of the farmers in kole land, this culture is being tested in large areas in kole lands.

Cul. 10-1-1 (ptb 10 x T (N)1 a short duration red kernelled culture developed in this station is gaining popularity in kole lands and is on par with Triveni and Annapoorna in yield.

The present fertilizer recommendation of 70:35:35 and 90:45:45kg NPK/ha for short and medium duration varieties needs enhancement for kole land paddy. A fertilizer doze of NPK @ 110:35:55 kg/ha for short duration varieties and 150:45:75 kg/ha for medium duration varieties gives optimum yield in kole lands.

Application of carbofuran @ 0.75 kg/ha in conjunction to basal application of urea was found to be effective in increasing yield of paddy.

For double crop kole lands for enhanced production the appropriate varietal sequence would be Jyothi followed by Annapoorna or Triveni.

PULSES AND OILSEEDS

Cowpea, greengram, blackgram, sesamum and groundnut can be successfully cultivated in the upper reaches of kole land where there is no scope for a rice crop due to water scarcity.

1.12. ALL INDIA CO-ORDINATED CASHEWNUT IMPROVEMENT PROJECT, MADAKKATHARA.

Initially the project was started at the Cashew Research Station, Anakkayam, Malappuram District on 18-1-1972. Due to want of sufficient area to lay out all the experiments, it was subsequently shifted to the University main campus at Madakkathara on 1-5-1973. The total area of this station is 15 ha.

The major objectives of the project are to identify high yielding cashew types by screening existing germplasm collections, to evolve new types through hybridization, to standardize the techniques of vegetative propagation suited to the local conditions, to work out manurial schedules for cashew by conducting fertilizer experiments, to evolve effective control measures against the pests and diseases affecting the crop, to standardize the seedling selection, to conduct comparative yield trials with types collected from different cashew areas in order to identify types suited to the locality.

Sri P.G. Veeraraghavan, Professor continued to be in charge of the station, during the period.

Sri D. Sitarama Rao, Assistant Professor and Smt. V.A. Celine, Junior Assistant Professor attended Horticulturists group discussion held at CPCRI, Vittal on 22nd and 23rd August 1986.

Sri D Sitarama Rao, Assistant Professor attended the farmers seminar held at St. Thomas College, Trichur during November 1986.

He also attended State level Seminar of Cashew growers organized by Department of Agriculture MSCP at Koodali High School, Cannanore during November 1986.

RESEARCH

No. of Research Projects as on 31-3-1987 was 7.

ONGOING PROJECTS:

Crop Improvement:

Germplasm collection in cashew and description of varieties:

At Madakkathara, 93 accessions consisting of 164 trees are maintained. These are collections mainly within Kerala. Observations were recorded on growth measurements, flowering duration, yield and nut characters. The progenies were also screened for their susceptibility to pests and diseases.

An evaluation of the data revealed that only 8 trees of 8 accessions possess desirable attributes like yield, shelling percentage and nut characters, while the rest exhibited poor attributes. The accession numbers M-1-2, A-6-1 and A-26-2 have recorded the highest yield in the 7th year of orchard life as compared to others with yields of 17kg, 16.90 kg and 17.50 kg respectively. The nuts are medium sized (6.35 to 7.75 gm) and shelling percentage between 25.83 and 27.50. But they are late flowering types (Jan-Feb).

Breeding improved types through hybridization:

The object is to evolve new high yielding types with desirable attributes like medium to bold nut size. High shelling percentage, higher percentage of bisexual flowers etc. Based on their performance and other desirable attributes 14 hybrids have been identified as promising. Of these the hybrids H-1598, H-1600, H-1608 and H-1610 have been included in the multilocational trial in the different centres to study their comparative performance with other varieties under different agroclimatic conditions. A scion bank of the promising hybrids identified at this centre is also maintained.

Comparative yield trial of Anakkayam selections and hybrid progenies (air layers):

In the comparative yield trial using air layers of 16 high yielding types of Cashew Research Station, Anakkayam, laid out in 1975, the pooled analysis of yield data for 10 years revealed that the types differed significantly in respect of yield of nuts. The highest cumulative yield of nuts was recorded by the type BLA-39-4 (30.204 kg per tree) for 10 years followed by K-22-1 (28.342 kg) and NDR-2-1 (28.179 kg).

Standardization of seedling selection technique in cashew:

The object of the experiment was to correlate the size, weight to seedling vigour, earliness and other economic characters of the tree and arrive at a selection criterion for quality seedlings in cashew. From the

data it was revealed that the nut characters viz., weight, volume and L/B ratio were positively and significantly related with seedling height, girth and number of leaves.

The yield parameters studied viz. height, girth, spread, number of leaders and laterals, the spread in general and spread in north-south direction in particular appears to have more pronounced effect of yield.

Propagational trials on cashew:

Under vegetative propagation, studies were taken up to find out the best season for "soft-wood grafting." The data revealed that the months of May, June and October are best to obtain maximum success (41.5 to 46.5 percent). Among the varieties studied, the variety K-22-1 recorded the maximum success of 62% in May followed by BLA-39-4 (49.5%), NRR-2-1 (43%), H-3-17 (38%) and BLA-139-1 (32.6%).

Crop Management

Trial on foliar application of urea along with insecticides

In the replicated trial on "foliar application of urea with endosulfan" laid out with 5 treatments during 1986-87 the yield data on nuts revealed no significant difference between the treatments.

Trial on root activity pattern of cashew using P-32

The experiment with 15 treatments was carried out at this station by the Radio Tracer laboratory of the College of Horticulture, Vellanikkara.

The results of 2 years study indicated that cashew is a surface feeder on laterite soil with most of active roots in the 0-15 cm surface layer and that the tree forages [mainly from the 2 m radius area around it beyond which the root activity decreases.

Insecticidal trial on Tea Mosquito in cashew

In the insecticidal trial against 'Tea mosquito' conducted for 4 years from 1983-84 to 1986-87 using seven insecticides, results of pooled analysis of the data revealed that Quinalphos, Endosulfan, Monocrotophos and Dimethoate consistently performed better than the other insecticides. Phosalone was the least effective.

Field control trials on stem borer on cashew

In the stem borer control studies, root feeding with Monocrotophos suspensions was not so successful. Stem padding with monocrotophos was found effective during the early stages of borer attack.

HIGHLIGHTS

Cashew hybrids with bolder nut size ranging from 5 to 10.85 gm. and with export grade with w. 180 and w. 210 have been evolved.

Root activity studies using radio active P-32 have categorically proved that cashew is a surface feeder with most of the active roots confirmed to the 0-15 cm surface layer and the tree forages mainly from the 2 m radius around it.

The months of May, June, and October are found best to obtain maximum success in "soft-wood" grafting in cashew.

Visitors to the Station

Nguyen Van Nu, from Vietnam, Ian Duncen, Cashew Scientist from Australia, and Dr Mr Thakur, Vice Chancellor, Himachal Pradesh were visited the station during the year to acquaint with the research work carried out at this station.

1.13. BANANA RESEARCH STATION, KANNARA

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PINEAPPLE RESEARCH CENTRE, VELLANIKKARA

Banana Research Station at Marakkal was established during the year 1963 in an area of 17.3 ha to carry out research on banana and pineapple. In 1970, the Station was brought under the All India Co-ordinated Fruit Improvement Project for Banana and Pineapple of ICAR. In 1974, the venue of Pineapple Research was shifted to Vellanikkara, in an area of 7.00ha suited for pineapple cultivation and research. During the period under report ICAR has withdrawn 4 scientific posts and a Laboratory Assistant post w.e.f. 1-4-1986.

The main objective of the Station is to collect and establish good genetic stocks of banana and pineapple to evaluate their genetic performance and resistance to major pests and diseases under Kerala conditions to develop better varieties of banana and pineapple by hybridization and induced mutagenesis; to find out the best cultural and manurial recommendations for higher yield.

Dr K Pushkaran, Associate Professor continued to be in charge of the Station.

Dr EV Nybe, Assistant Professor (Hort) joined duty on 10-6-86 FN consequent to the transfer to Smt. S. Prasannakumari Amma to the College of Horticulture, Vellanikkara. Smt. A.K. Babylatha, Junior Assistant Professor on promotion to Asst. Professor (Hort) was transferred and posted in the College of Horticulture. Smt. T. Radha, Asst. Professor (Hort) joined duty consequent to the transfer to Sri. B. R. Reghunath to the College of Horticulture, Vellanikkara.

The post of Junior Plant Breeder (Asst. Professor), 3 posts of Jr. Asst. Professor and one post of Laboratory Assistant were abolished w. e. f. 1-4-1986 by ICAR.

The Scientists of the Station attended the T & V and NARP Workshops. Sri Job Sathyakumar Charles (Asst. Professor) attended Summer Institute on "Control of plant parasitic nematodes" organised in the Department of Nematology, IARI, New Delhi in May 1986 with financial assistance from Indian Council of Agricultural Research, New Delhi.

Field trainings were given to the Students of College of Horticulture and Rural Institute, Tavanur. The Scientists took classes to visitors such as K. G. T. Agricultural Students, Tribal Youth, Progressive Farmers etc.

Research

No. of research projects as on 31-3-86 was 43.

RESEARCH PROJECT REPORT

BANANA

Varietal studies in banana

At present 124 varieties were maintained in the germplasm collection out of which eighteen varieties found suitable under Kerala condition were recommended for large scale cultivation.

The diploid acuminata (AA) produce comparatively smaller bunches in comparison to genome ABB whereas other triploid banana (AAB and AAA) produce medium to heavy bunches

Clonal variation studies in banana var. Nendran

The five superior clones identified were put to multilocational trials in six centres viz., Kannara, Mannuthy, Chalakudy, Kumarakom, Pillicode and Ambalavayal to test local adaptability.

Intraclonal variation in rainfed banana cv. Palayankodan

Twentyfive accessions of Palayankodan were collected and maintained.

Five clones ie. Morayur, Udumbannur, Anchal, Kalavoor and Vellayani were found to be promising.

Hybridization studies in banana

Four hybrids with Mannan, Agniswar, Harichal and Vannan as female parents and Pisang lilin as male parent are under critical evaluation.

In the F1 seedling generation the Agniswar x Pisang lilin hybrid is found to be early and better in quality, but only a medium yielder. Vannan x Pisang lilin is a high yielder but the quality is poor. The two other hybrids in general are poor.

Induction of mutation

Rhizome buds of Nendran were irradiated with gamma rays from 0.5 KR to 3 KR at 0.5 KR interval. Hybrid seeds obtained from the cross between Karpooravally x Pisang lilin were also irradiated at seven different doses from 20 KR and 80 KR.

The germination was favoured by gamma radiation. 16 irradiated seedlings are showing good vegetative growth.

Combination breeding in banana

The F1 seedlings from the cross between Karpooravally x Pisang Lilin are maintained properly.

The hybrid plants are coming up well with very high vegetative vigour.

Flower bud initiation studies in banana

Flower primordia of five popular varieties of banana viz., Nendran, Palayankodan, Poovan, Robusta and Red banana were collected and processed for microtome sectioning.

Nutritional requirement of rainfed banana var. Palayankodan

Nitrogen at 0, 150, 300 g/plant; Phosphorus at 0, 50, 100 g/plant and K at 0, 200 and 400 g/plant in all combinations were tried on three plant crops, three first ratoon and one second ratoon. Harvest of one second ratoon was done.

None of the characters studied were significantly influenced by the different levels of N, P, K except height and girth at flowering.

Population density trial in banana var. Palayankodan and Poovan

The experiment was conducted separately for each variety with population densities of 4444, 3268, 2500, 1976 and 1600 plants/ha in square and rectangular methods of planting.

In the case of Palayankodan, a spacing to accommodate 2500 plants/ha in the rectangular method recorded highest yield. Reducing the population density below 1976 plants/ha has also reduced the yield considerably. The same population density recorded the highest yield in the case of Poovan also.

Effect of number of suckers retained on the performance of the ratoon crop of banana var. Palayankodan

Retention of one to three suckers with three levels of fertilizer/clump were tried.

Retention of 2 suckers along with the application of NPK @ 200:400:800 g/clump was found to be superior in terms of yield.

Effect of 'Vipul' on plant growth and yield of banana

Vipul—plant growth promoter was applied 3 times @ 4 kg/acre.

Vipul was not found to be effective in increasing yield of banana.

Standardization of cropping system for banana var. Nendran

A total of 11 intercrops viz., bitter gourd, ash gourd, watermelon, pumpkin, cucumber, amorphophallus, sweet potato, amaranthus, tapioca, groundnut and sesamum were tried.

Maximum bunch weight was observed for banana + groundnut. The intercrops have not affected the yield of banana significantly.

Control of banana rhizome weevil with insecticides applied around the rhizome

Soil application of insecticides such as Phorate, Carbofuran and Carbaryl at the rate of 20 g at planting and 25 g 3 months after planting while Heptachlor, Chlordane, HCH and Aldrin @ 100 g at planting and again 100 g 3 months after planting were compared with the control for rhizome protection from weevil attack.

Studies on the resistance of important banana varieties to attack by banana rhizome weevil

A total of seventy two varieties of banana maintained under the germplasm were screened for the resistance to banana rhizome weevil.

None of the varieties were found immune to weevil attack. The varieties such as Poovan, Njalipoovan, Kadali, Kunnan, Chakkarakadali, Ambalakatadi, Chetti, Poomkalli, Gros Michel, Monthan, Malakali, Pisang Mas and Pisang Seribu were least attacked by weevil whereas varieties such as Robusta, Peyan, Palayankodan, Kullan, Karpooravally, Adukkal, Sambrani monthan, Ash monthan, Bainsa, Giant Governor and Beula were highly susceptible to banana rhizome weevil.

Studies on the population dynamics of banana aphid

Weekly observation for the aphid population on unsprayed banana plants were recorded.

The population of banana aphid was very low during summer months and periods of heavy rain.

Survey and identification of banana nematodes

A total of 65 soil and root samples collected randomly from the banana growing areas of Kannara, Mannuthy and Vellanikkara were processed and studied for the association of plant parasitic nematodes.

The nematode population associated with banana include *Radopholus similis*, *Rotylenchulus reniformis*, *Hoplodaimus*, *Meloidogyne* sp., *Heterodera* sp., *Pratylenchus* sp., *Helicotylenchus* sp. and *Tylenchorynchus* sp.

Control of burrowing nematodes of banana using intercrops

The different antagonistic plants such as marigold, crotalaria, clerodentron, sesamum, *Alpinia galanga* and asparagus were sown as intercrops soon after planting of banana.

Banana + crotalaria recorded the maximum bunch weight and is on par with sesamum. The minimum number of nematode population was recorded in sesamum plots and is on par with crotalaria.

Screening banana germplasm against nematode pest

Random sampling of soil prior to planting the germplasm showed the presence of reniformis nematode, *Rotylenchulus reniformis*. The nematode population ranged from 70 to 120 per 250 ml soil. Hence field screening of 58 varieties of banana against reniformis nematode was carried out.

Varieties such as Mannan, Sikuzani, Namrai, Kunnan, Matti, Chetti Jurmani kundali, Karpooravally, Beula, Bodles Altafort, Kanchikela, Monthan, Adukkam, Pisang Raja, Kostha bontha and Sanna chenkadali, were shown resistance to the nematode during this year.

Bio-ecology of cyst nematode infecting banana Var. Nendran

The pathogenicity, influence of different soil types on multiplication of the nematode, host range for the nematode and life cycle on banana have been worked out in detail.

The *Heterodera oryzae* causes significant reduction in growth parameters and yield characters. The infected plants showed sparse root system and necrosis of feeder roots. The nematode multiplication was more in sandy loam followed by coastal sandy and the least in red soil. Out of the sixtyone plant species only two plants namely *Oryza sativa* and *Kyllinga monocephala* were found to be the hosts of the nematode. The life cycle of the nematode is completed in about 20 days.

Fungal diseases of banana and their controls

Two sprays with Bordeaux mixture 1%, Power oil 1%, Bavistin 0.12%, Power oil 1% + Dithane M-45 (0.2%), Difoltan 0.3%, Dithane M-45 (0.2%) were given at an interval of one month starting from the first monsoon showers (May-June)

The percentage of infected leaves was not significantly affected by various treatments. Dithane M-45 treated plants produced higher yield.

Survey of fungal and viral disease of banana

Survey was conducted in Trichur and Trivandrum districts.

It was observed that bunchy top disease is more prevalent in Trivandrum Dist. whereas leaf spot and Kokken were causing great destruction for banana plantation in Trichur district than bunchy top.

Assessment of losses caused by important fungal disease of banana

An estimated loss of 40-75 per cent was seen to occur due to Kokken disease. Though the incidence of leaf spot disease was about 50-75 per cent, there was not much reduction in yield.

PINEAPPLE

Varietal studies in pineapple

Twentyfive varieties are being maintained and evaluated. Fruit characters of 10 varieties were evaluated. The variety Kew recorded the maximum fruit weight followed by Pulimath local and Valera Moranda and the smallest fruits were obtained from Queen and Ripley Queen. Colour of the pulp was either yellow or golden yellow in all the varieties except in Valera Moranda which gave whitish pulp. Regarding the T. S. S. percentage the maximum was in Valera Balanca closely followed by Queen and then by Mauritius and Ripley Queen. The fruits from Pulimath local, Kallara local and Thaliparamba local types were not sweet having low T. S. S. content.

Clonal variation studies in pineapple var. Kew

A total nineteen clones collected from seven districts were maintained and evaluated.

The Clone 2/82 from Ernakulam District recorded the maximum fruit weight followed by 2/81 which was collected from Trichur district.

Breeding new varieties of pineapple

Seeds obtained from various crosses were treated with different concentrations of H_2SO_4 for various times. The seeds were sown under *in vitro* condition in petridishes using Kinetin and Auxin in the medium. Kinetin 1 ppm gave more than 80% germination in most of the cases.

All the transplanted seedlings wilted in a course of six weeks, due to high temperature and dry weather.

Nutritional requirement of pineapple var. Kew

Three levels each of N, P and K and their factorial combinations were compared.

The lower dose of 6 g N, 3 g P_2O_5 and 8 g K_2O per plant per year was found to be optimum for the Kew variety.

Ratooning under high density planting of pineapple

The population per hectare tried were 53,333; 44,444; 40,404; 37,037; 36,036; 31,746; 18,518 at different spacing.

The yield/ha was found superior in population densities of 53,333 plants/ha and 44,444 plants/ha.

Staggering of fruit production in pineapple by adjusting planting time and growth regulator application

Hormone application completed by Aug-Sept. 1986.

Planting taken up between June to September with growth regulator application at 23 months after planting can assure fruits throughout the year.

Use of pineapple crown as planting material

Crowns weighing 250 g, 251–500 g, 501 to 750 g and 751 to 1000 g were tried.

Crowns weighing above 500 g can be used as planting material instead of suckers without affecting fruit weight.

Studies on the effect of certain chemicals and growth regulators on pineapple crown, fruit size and quality

Two separate experiments were conducted with the following treatments.

Removal of meristem of crown mechanically, removal of whole crown by hand, application of MH 100 ppm, Alar 100 ppm, CCC 100 ppm, TBA 100 ppm and Conc. HCl 1 drop per plant on the meristem.

The second experiment consists of application of the following chemicals @ 5 ml/plant after complete flowering. MH 50 ppm, Alar 50 ppm, CCC 50 ppm, TIBA 50 ppm and Kerosine.

Application of Kerosine (5 drops) was found to be significantly superior to all other treatments in reducing crown length, weight and crown yield/ha. All the treatments except CCC resulted in increased acidity of the fruit at fully ripe stage when compared to control.

Investigations on the marbled fruit of pineapple

The four aspects for the study include investigations on the aetiology of the disease investigations on control measures using Streptocyclin, Terramycin, Plantomycin, Bordeaux mixture and Bavistin influence of NPK on the occurrence of the disease influence of planting density on the occurrence of the disease.

No conclusive results were obtained.

Survey and control of pineapple nematodes

45 soil and root samples collected from Pineapple Research Centre, Vellanikkara was processed for the association of parasitic nematodes.

Two nematodes viz., *Rotylenchulus reniformis* and *Meloidogyne* sp. were found associated with the roots at the rate of 11.5 and 19.1 respectively in 10 g roots. The other parasitic forms recovered from the soil include *Hoplotaimus*, *Helicotylenchus* and *Tylenchorhynchus*.

Other matters

On 27-9-86 a Kissan Mela was conducted at the Poovanchira Tribal Colony under the auspices of Lab-to-Land Programme. During the occasion planting materials like groundnut seed, gingelly seed, banana suckers, rooted cuttings of pepper, coconut seedlings, implements such as mamatty, felling knife, plant protection chemicals and sprayers were distributed among the 25 tribal families selected under the programme.

A demonstration in the extraction of fibre from banana both manually and by machine (Respador) was conducted in the Station in collaboration with Khadi and Village Industries Commission.

Visitors to the Station

Dr C.P.A. Iyer, Project Co-ordinator, (Fruits), I. I. H. R., Bangalore, Sri Ouseph Attokaran, Member Secretary, Kerala State Export Promotion Council, The Director, Kerala Khadi and Village Industries Commission, and a team of farmers from Lakshadweep visited the farm during the year.

HIGHLIGHTS

BANANA

An exhaustive germplasm of banana with 124 types is being maintained at the Station.

Among the hybrids obtained, the F_1 generation of Agniswar x Pisang lilin was found to be early and better in quality.

The germination of banana seeds was found to be enhanced by gamma irradiation.

Clonal variation studies in banana var. Palayankodan has revealed the superiority of five clones such as Morayur, Udumbannur, Anchal, Kalaveer and Vellayani were found to be promising.

The growth hormone Vipul (Triacntanol) was found to have no effect on growth and yield of banana var. Nendran.

While ratooning Palayankodan, retention of two suckers with manuring for both the plants individually seems to be superior in terms of yield.

Paired row planting of Nendran banana retaining the normal population density seems to be more remunerative since this method helps to fetch more income from intercrops without affecting the yield of banana

None of the banana varieties were found resistant to rhizome weevil attack though the degree of incidence vary with variety.

The population of banana aphid was found to be very low during summer months and periods of heavy rain.

The nematode population in banana can be reduced to a great extent by growing sesamum and crotalaria as intercrops.

Most of the culinary varieties of banana are found to be resistant to nematode infestation.

Survey of banana nematodes in Kannara and suburbs revealed the presence of *Radopholus similis*, *Rotylenchulus reniformis*, *Hoplolaimus*, *Meloidogyne* sp., *Heterodera* sp., *Pratylenchus* sp., *Helicotylenchus* sp., and *Tylenchorhynchus* sp.

An estimated loss of 40-75% was seen to occur due to Kokkan disease. Though the incidence of leaf spot was about 50-75%, there was no conspicuous reduction in yield.

PINEAPPLE

A total of 25 varieties of pineapple, both indigenous and exotic, are assembled for critical evaluation and incorporation in future breeding programmes. In addition to the germplasm, 19 clones of var. Kew and eight hybrids from the cross Ripley Queen x Kew were also maintained.

As a result of massive hybridization programme a large number of hybrid seeds could be obtained which got germinated under *in vitro* but failed to survive beyond six weeks.

The optimum fertilizer requirement of the var. Kew was found to be 6:3:8 g/plant/year of N:P:K.

Planting of pineapple during June to September along with the flower induction at 16th or 23rd month assure the availability of fruits throughout the year.

Pineapple crowns weighing above 500 g can well be used instead of suckers without affecting the fruit weight or total yield.

Physical or hand removal of crown was found to be effective in reducing the crown length, weight and crown yield/ha. Chemicals when used to reduce the crown size resulted in increased acidity of the fruit.

1.14 AGRONOMIC RESEARCH STATION, CHALAKUDY

The Agronomic Research Station, Chalakudy was originally established by the Kerala State Department of Agriculture in 1962 at Pariyaram near Chalakudy to carry out studies on water requirement and cropping patterns to be adopted for the irrigated areas, in 2 ha of leased land. That scheme was wound up in 1970. Later on the research station was re-established at the present site in 1972 in an area of 8.95 ha acquired by the Department of Agriculture. The station along with the staff was taken over by the Kerala Agricultural University in 1973 for implementing the Co-ordinated Project for Research on Water Management sponsored by ICAR. The said scheme was started functioning at this centre from July 1974 onwards. The NARP sub project for water management studies in the Central region of Kerala has started functioning at this centre from 1983-84 onwards.

The research station is situated in the northern side of the Chalakudy-Sholayar road about 400 metres away from the Chalakudy town. The station is located at 10°20' North latitude and 76°20' East longitude at an altitude of 3.25 m above MSL.

The total area of the farm is 8.95 ha comprising of 7.05 ha of wet land and 1.90 ha of upland.

The objectives of the station are:-

To develop cropping patterns suitable for varying water management and fertility situation

To test new crops and varieties for their adaptability and performance under different moisture conditions.

To estimate the water requirement of rice, pulses, oil seeds, vegetables, banana, tapioca and other important crops of Kerala.

To evolve suitable measures to increase water use efficiency of crops.

To work out economics and optimum schedule of irrigation for important crops cultivated in the region.

To study the ground water fluctuation, quality of ground water and recycling of drainage water for irrigation.

To conduct operational research programme on water management in the command area.

Under the ICAR sponsored Co-ordinated Project for Research on Water Management, the Operational Research Project (O. R. P) in water management was operated at Thuravoor village of Ernakulam District with a view to test the field applicability of the research findings on the different aspects of irrigation water management in rice and rice based cropping systems under varying supplies of irrigation water. The study was conducted in a compact area of 25.3 ha of rice fields owned by 100 farmers.

An area development programme was simultaneously implemented in the O. R. P area at Thuravoor with limited 'critical' input assistance aiming at the integrated development of the locality under the lab to land programme.

Dr G. R. Pillai continued to be in charge of the station.

Sri Jose Mathew, Assistant Professor was awarded the ICAR Senior Fellowship for undergoing Ph. D. programme for 3 years.

Dr G. R. Pillai attended the 11th Annual Workshop of the ICAR Co-ordinated Project for Research on Water Management held at the Sukhadia University, Udaipur, Rajasthan from 9th to 13th February, 1987.

Research

No. of research projects as on 31.3.87 was 13.

Concluded Project

RICE

Effect of different water regimes under varying levels of nitrogen on the growth and yield of medium duration rice. (Farmer's field at Alathur)

The experiment was conducted for three consecutive years with a view to find out an optimum water management practice for rice under different levels of nitrogen during the second crop season at Alathur. The test variety was IR-20.

Results revealed that there is significant difference in the yield of grain and straw due to the effect of nitrogen, where as the effect of water regimes was found to be non-significant. The data on grain yield showed that the treatment with 135 kg/ha) was significantly superior to all other treatments.

The effect of irrigation schedules on yield parameters was found to be non-significant, where as the effect of nitrogen levels was significant. Hence the study showed that the rice variety IR-20 responded to higher levels of nitrogen than the present recommended dose of 90 kg N/ha and irrigation to second crop can be extended even upto five days after the disappearance of ponded water at Alathur conditions.

Multilocational trial on paddy varieties

The experiment was laid out to assess the comparative performance of three promising Moncompu cultures viz. Cul. 153-1, Cul-200 and Cul. 204 along with Jyothy, Bharathi and Jaya as treatments.

Analysis of grain yield revealed that effect of treatment was significant. Jyothi recorded the highest yield (2560 kg/ha) and on par with Bharathy (2430 kg/ha), and Jaya (2257 kg/ha). Cul-200 recorded the lowest yield of 1823 kg/ha.

Under Chalakudy condition, where the soil is sandy loam the Cul-153-1 was suitable among the three Moncompu cultures tried which was on par with Jyothy.

COCONUT AND ARECANUT

Ongoing project

ICAR—Studies on the effect of irrigation schedules on the growth and yield of coconut

The experiment was started in a farmer's field at Kodassery with a view to formulate a suitable irrigation schedule for coconut during summer season and to work out the economics of irrigation in coconut. Since the experiment was conducted in adult bearing palms (yield stabilized) pre-treatment data on nut yield was collected during 81-82 and treatments were applied during the summer season of 1982-83 to 86-87. Due to the wide time gap between flower initiation and nut maturity, the effect of irrigation usually influence the nut yield only from the third year onwards. The data on the aggregate yield of nuts for the first year did not show any indication of the influence of various irrigation schedules. During the second year, (1984) the data on nut yield showed

a drastic reduction in all the treatments than the previous year. This is due to the severe drought experienced by the crop during the year 1983. The treatment effect was not observable during 2nd year also. The data on nut yield during the third year revealed that highest yield was recorded by the treatment receiving irrigation once in three days and 50 mm CPE. There was an yield increase of 34 and 29 nuts per palm per year when irrigation was given at 25 mm CPE and once in three days respectively, which was worked out to 36 and 30 percent increase over control.

The data on total nut yield during the 4th year (1986) showed similar result confirming the result obtained during the 3rd year of irrigation.

As observed in the 3rd year, in the 4th year also (1986) the treatment effect of irrigation once in 3 days, 25 and 50 mm CPE were on par and superior to the unirrigated control.

Comparative study on drip and basin irrigation in coconut

An experiment was started to evaluate the comparative merits of drip and basin methods of irrigation on water use and yield response in coconut variety West Coast Tall which was planted on 20-8-85 at Agronomic Research Station, Chaikudy.

The experiment has to be continued upto the age of stabilization of yield.

PULSES AND OILSEEDS

Concluded Project

Response hybrids of groundnut to different irrigation schedules and phosphorus levels (Alathur)

The experiment was conducted in a farmer's field at Alathur in Palghat district during the summer seasons of 84-85, 85-86 and 86-87.

From the study it is seen that irrigation at 0.75 IW/CPE ratio (at an interval of 8 days) with 50 mm water and application of phosphorus @ 60 kg P_2O_5 /ha are required for higher pod yield in groundnut (var.TMV-2) during summer season under Alathur condition.

b. ERUTHIAMPATHY

The study was conducted in a farmer's field at Eruthiampathy in Palghat District during the summer season of 86-87. The experiment consisted of 4 levels of irrigation and levels of phosphorus and the variety was TMV-2.

The data indicated that pod and haulm yield of groundnut was significantly influenced by irrigation treatment. The highest pod yield (6034 kg/ha) and haulm yield (6255 kg/ha) were recorded by the irrigation treatment of IW/CPE ratio 0.2 (at an interval of 8 days).

From the study of the 1st year data, it can be seen that irrigation at 0.9 IW/CPE ratio (irrigation at an interval of 8 days) and application of phosphorus @ 60 kg P_2O_5 /ha are required for higher yield of pod and haulm in groundnut (TMV-2) in summer season at Eruthiampathy conditions.

VEGETABLES AND TUBER CROPS

Bittergourd

Water management practices for bittergourd

The experiment was conducted using the 'Priya' (VK-1) variety of bittergourd to find out the effect of (i) timing and frequency of irrigation (ii) graded doses of nitrogen under different water regimes (iii) to work-out the optimum combination of irrigation and fertilizer dose on the growth and yield of bittergourd.

Results of the 1st year study indicated that irrigating bittergourd at 15 mm, 30 mm, CPE of the farmer's practice of once in two days irrigation do not vary significantly among each other with regard to fruit yield. Hence scheduling irrigation to bittergourd at 30 mm CPE (approximate interval of 10 days) is most economical.

Soils and Agronomy

Evaluation of long term effect of canal irrigation on changes in physical properties of soil

The study has been initiated during 95-86 in collaboration with the staff of the Soil Survey Department of Kerala. in the command area of Periyar Valley Irrigation Project to evaluate the long term effect of canal irrigation on changes in the physical and chemical properties of soil. The major garden soil series viz. Thodupuzha (Tpa) and the wet land soil series viz. Kothamangalam (Klm) were selected for this study. Soil sampling to monitor the changes in profile property was done during summer season.

Morphological studies of soil profiles, *in situ* determination of infiltration rate, hydraulic conductivity laboratory determination, physico-chemical properties were completed in the samples collected during 85-86 (1st year of study) and the analysis is in progress for the samples collected during 86-87. The experiment will be continued for 10 years.

Studies on soil moisture retention and release characteristics of laterite soils of varying percentage of gravel

This study was undertaken to assess the water storage capacity of laterite soil containing high amount of gravel (25-60%) which is useful for scheduling irrigation in laterite soil which is the major soil group of the state.

The soil series "Thodupuzha" (Tpa), which is the major soil series of the laterite soil was selected for this study. From this series of soil, 6

profiles were dug out at different locations to a depth of 150 cm or upto hard layer and soil samples were collected from the profiles at an interval of 15 cm for the top soil and 30 cm below that upto a depth of 150 cm. Morphological characters, hydraulic conductivity, percentage of gravel both by weight and volume of the undisturbed core samples were completed and the remaining analytical work is in progress.

Cropping patterns and farming systems

Studies on rice based cropping pattern under constraints at irrigation water

The experiment was repeated for the fourth consecutive year with five cropping pattern (two crops of rice followed by a third crop of rice, cowpea, groundnut, sesamum and bhindi) and two water management practices for rice during second crop season (7 cm irrigation one and three days after the disappearance of ponded water) and three water management practices for different crops during the third crop season (7 cm irrigation 1, 3 and 5 days after the disappearance of ponded water for rice and IW/CPE ratio of 0.3, 0.6, 0.9 and 1.2 for other crops) to identify an appropriate cropping pattern under constraints of irrigation water.

The results obtained during this year agreed with the results of the previous years. As in the previous year, the crops raised during the 3rd crop season did not show any significant influence on the growth and yield of the rice raised during the succeeding 1st crop season. So also it was found that rice needs irrigation only at 3 days after the disappearance of ponded water during 2nd crop season and one day after the disappearance of ponded water during the 3rd crop season. Other crops in the sequence viz. cowpea groundnut, sesamum and bhindi responded well to frequent irrigation.

Input requirement for rice based cropping pattern

A study with four rice based cropping pattern and seven fertilizer levels was carried out for the 9th year at the Agronomic Research Station, Chalakudy, to identify the most economic rice based cropping pattern for the locality and to estimate the input reduction in terms of chemical fertilizers and could be achieved by following different cropping patterns.

The residual effect of the third crop raised in the summer rice fallows significantly influenced the grain yield of rice during the first crop season but not during the second crop season. The first crop of rice succeeding daincha recorded the maximum grain yield and it was comparable with the crop succeeding cowpea. Considering the additional income obtained from the third crop of cowpea by way of grain yield of the succeeding rice crop which may enable the farmers to reduce the fertiliser dose by 25 per cent. It is inferred that among the crops tried cowpea is ideal after two crops of rice than daincha or sesamum or keeping the field fallow.

Regarding the fertiliser levels, the highest yield of rice was obtained when the recommended dose of fertiliser was applied in both the seasons, which was on par with 75 per cent of the recommended dose. This indicates the possibility of reducing the existing recommendation of fertiliser dose (90:45:45 kg NPK/ha) for rice to its 75 per cent when appropriate crop patterns are followed.

Farm Economics and Extension

Studies on 'On farm irrigation water management in the command area of the Chalakudy command

The Operational Research Project on water management was implemented in the Chalakudy command area to test the field applicability of improved water management technology developed at the research centres on large scale with a view to irrigation water use efficiency. During the year 86-87 new location at Thuravoor near Angamaly was selected with a compact area of 25.3 ha belonging to 100 farmers.

During Kharif and Rabi, the variety Jyothi and during summer season variety Thriveni were planted in the study area.

An yield of 2710, 2250 and 3300 kg/ha was obtained from the study area as against 1750, 1450 and 1250 kg/ha in the control area during kharif, rabi and summer season respectively.

The higher yields obtained during the three season cannot be attributed water mangement alone since all the package of practices recommendation of the University was adopted in the study area. However, during rabi and summer season water management practices like shallow submergence, continuous flow irrigation, occasional drainage were effective in elevating the iron toxicity, which is a serious menace in the locality and increase in the yield.

A saving of 184 mm of water could be achieved in the study area due to the controlled irrigation and shallow submergence practices.

Other matters

Participated in the Pooram exhibition organised by Directorate of Extension, Kerala Agricultural University.

One day Kissan mela/Seminar and on field training were organised at the area of Operational Research Project at Thurvaoor, Angamaly during September 86 and February '87.

HIGHLIGHTS

Rice

The rice variety IR-20 responded to higher levels of nitrogen than the present recommended dose of 90 kg N/ha under Alathur conditions. Irrigation to second crop can be extended even upto five days after the disappearance of ponded water under conditions of shallow water table and low evaporative demand.

The Moncompu culture 153-1 recorded yield comparable with Jyothi under Chalakudy condition.

Groundnut

Irrigation at 0.75 IW/CPE ratio (at an interval of 8 days) with 50mm water and application of phosphorus @ 60 kg P₂O₅/ha are required for higher pod yield in groundnut during summer season under Alathur conditions.

The existing recommendation of fertilizer dose for medium duration rice (90:45:45 kg NPK/ha) can be reduced to its 75 per cent when appropriate crop patterns are followed. Raising daincha or cowpea during the third crop season is effective in increasing the grain yield of rice during the succeeding first crop season. Cowpea will be preferable due to the additional income obtained by way of grain yield.

It was found that rice needs irrigation only at 3 days after the disappearance of ponded water during the second crop season and one day after the disappearance of ponded water during the third crop season.

Coconut

Coconut responds well to irrigation and irrigating coconut during December to May at cumulative pan evaporation of 50 mm (approximate interval of 12 days) is optimum.

1.15. RICE RESEARCH STATION, VYTTILA

Rice Research Station, Vyttila was started in the year 1958 in leased land in Kunnara area in Ernakulam District and the station started functioning in the present site in 1963 by acquiring 11.375 acres of land. Subsequently in 1973 an additional area of 10.150 acres and during 1981 an area of 0.770 acres were also acquired thus making the total area of 22.30 acres or 8.91 hectares.

Area used for rice cultivation is 4.2500 hectares and area used for fish ponds is 3.0552 hectares. Dry land area used for cultivation of coconut and buildings, roads etc. is 1.6082 hectares.

The objective of the station is to evolve high yielding saline resistant rice varieties suited for the low lying coastal areas and to find out suitable agronomic practices for the cultivation in such types of lands in the state and to evolve culture practices for various types of fishes and prawns and to identify fish varieties suitable to culture in the paddy fields with and without rice and in the ponds and other water areas.

One unit of the scheme for Investigation of Coconut Root (Wilt) Disease is being functioning in this station from 1981. This station is included under National Agricultural Research Project for special region. On the termination of All India Co-ordinated Research Project on Bra-

ckishwater Fish Farming functioning in this station a fish unit is established to carry out the projects under Fisheries Faculty. A project under Asian Farming System Net Work is being implemented in this station from the year 85-86.

Sri T.U. George, Professor (Agricultural Botany), continued to be in charge of the station.

The monthly workshop under T&V programme in Ernakulam District has been conducted in this station during the year under report.

One training class for 25 farmers has been conducted in this station on 30th August '86.

Sri T. U. George, Professor, attended the NARP Zonal workshop conducted at Regional Agricultural Research Station, Pattambi on 4.9.'86, the District Agricultural Seminar at Mudapuzha on 18.10.1986, the Mini Package workshop on 3rd March '87 and the workshop on Status Paper conducted at Mannuthy on 5th and 6th July '86. Sri T. U. George, Professor has visited the State of Karnataka as an internal consultant under the T & V programme from 24th October to 7th November '86.

Research

Number of research projects as on 31.3.'86 was 13.

RESEARCH REPORT

RICE

Hybridization programme—Improvement of Pokkali

The object of the project is to evolve high yielding varieties suitable for Pokkali area by taking up crosses between present pokkali varieties and high yielding varieties like T (N) 1 and Jaya. Under this project two sets of hybridization were taken up.

1. Pokkali x T(N) 1
2. Pokkali x Jaya

One culture (Culture 4-4) evolved from the cross between Pokkali x T (N) 1 has been released as a new variety-Vyttiila 3 - in 1985. Two cultures (Cul] 11 and Cul] 53) evolved from the cross Pokkali x Jaya were in a comparative yield trial during the cropping season in 1986 with Vyttiila 1 and Vyttiila 3 as control. As in the previous three seasons Cul 53 gave higher yield than the other varieties.

The statistical analysis of the yield data of the comparative yield trial for the year 86-87 and the combined data for four years was done. Though culture 53 gave higher yield in all the four seasons and in farm trials in four locations the yield difference were not found statistically significant.

Breeding for earliness in the Variety Mashoori by induced mutations

The object of the project is to reduce the duration of the variety Mashuri by using physical mutagens. Among several varieties trial in

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Breeding for earliness in the Variety Mashoori by induced mutations

The object of the project is to reduce the duration of the variety Mashuri by using physical mutagens. Among several varieties trial in

Pokkali area Mashuri came up well but the variety cannot be used due to its long duration. If the duration is reduced to 120-125 days the variety can be widely used in Pokkali area. Hence a mutation breeding programme was initiated and six early cultures were selected after conducting preliminary yield trials. These cultures are having a duration of 118 to 128 days and plant height from 125 to 135 cm. A comparative yield trial of these six cultures was laid out during the cropping season in 86-87 with Vyttila 1 as control. The growth of the plants was good in the initial stages; but due to long dry spell during the month of August '86 the salinity has increased and the crop was damaged very seriously. Only very few plants were survived and the seeds from these plants were collected and kept for further trials.

Breeding high yielding rice varieties suitable for Pokkali area by hybridization

The objective is to evolve high yielding rice varieties suitable for Pokkali area by hybridization between Pokkali varieties and IR 5. Along with high yield the other requirements are the tall plant type, short duration, ability to withstand salinity, acidity and water logging. With these objectives hybridization programme has been initiated in the year 1980, and the following three Pokkali varieties namely Vyttila 1, Vyttila 2 and Ponkuruka were crossed with IR 5. Thirty three cultures were selected from the F6 generation during the cropping season in 1985. Though the season was quiet unfavourable due to lack of sufficient rain during the months of August-September '86 most of the cultures gave higher yield than the control.

The promising cultures can be carried over to conduct further yield trials during the next cropping seasons.

Breeding for earliness variety H4 by induced mutations

The objective of the project is to reduce the duration of variety H₄ by using physical and chemical mutagens. Mutation breeding programme was initiated in the year 1980 by treating the seeds of H₄ with both physical (Gamma ray) and chemical (Ethyl Methyl Sulpharate) mutagens. Five early cultures were selected from M6 generation during the cropping season in 1985. The five cultures were in a replicated preliminary yield trial during the year '86-87.

In spite of the adverse conditions due to lack of rains during the cropping period all the cultures gave higher yield than the control. Moreover the cultures showed better saline tolerance during this season.

Collection maintenance and utilization of saline resistant rice varieties

The object is to have a collection of saline resistant rice varieties suitable for Pokkali area and also to use these varieties to evolve new saline resistant rice varieties suitable for the saline areas in the state. Forty three saline resistant rice varieties were collected and maintained under this project. The main plant characters are being studied.

Evaluation of fertilizers response and production potential of promising saline tolerance cultures of rice

The objective of this trial is to study the fertilizer response and production potential of four saline tolerant cultures selected from the screening trials conducted. The two levels of fertilizer did not have any significant difference in yield. In the previous years also levels of fertilizers as well as the interaction effect were found to be non-significant.

This trial is to be continued including new varieties as they are evolved and including one more higher dose of fertilizer level.

Permanent manurial trial of Rice in acid saline soils under flooded conditions (Pokkali tract)

This trial is intended to evolve technology and manurial schedule for rice in ill drained and flooded conditions in Kerala with special reference to Pokkali soils.

Though this trial was conducted from 1977-78 as permanent manurial trial no significant results between treatments were noticed in those years without crop failures. This may be due to flooded condition that prevails in pokkali areas which may be nullifying the treatment effect. This condition may be controlled by building permanent masonry bunds in the experimental plots so as the flow of water between plots can be controlled.

Evaluation of various lining materials for country baskets used for sprouting pokkali seeds

The object of the project is to evaluate the best lining material to be used in the country baskets used for sprouting pokkali seeds.

From the observations it can be seen that at 2 weeks and 4 weeks period with koova leaves as lining material gave significantly highest percentage of germination.

With regard to decayed sprouts, Koova leaves as lining material gave significantly lowest percentage both at two and four weeks periods and was superior to all others.

The experiment will be repeated in the next season with woven plastic material.

Tidal effect on the properties of Pokkali soils

Water samples were collected from the field on full moon, new moon and Ashtami days and analysed for pH and EC. Tidal amplitude was also noted.

The work under the project has just started during the year under report.

Integrated Production Trial—Cropping System Research Project

The object of the project is to evolve a new cropping system in which rice-fish-prawn crops are raised under Pokkali condition thereby increase the productivity of the Pokkali lands.

The technical programme consists of three different cropping systems (i) Rice followed by traditional prawn filtration (ii) Rice with fresh water fishes followed by selective stocking of prawn (iii) Rice followed by selective stocking of prawn.

This trial was conducted with the above treatments during the years 85-86 and 86-87. The yield of rice was poor during the year under report due to increase of salinity in the month of August '86. The rice yield was only 861 kg/ha against the rice yield of 1850 kg/ha obtained during the year 85-86. The fish production was only 110 kg/ha in a period of 108 days because of the high rate of fish mortality due to increase of salinity.

The selective stocking of prawn in the pokkali fields gave better return than the traditional prawn filtration. More detail trials are required to draw definite conclusions.

Effect of application of granular pesticides for control rice pests on fish in Pokkali fields

Initially, the trial was conducted with three granular insecticides namely, Thimet, Carbofuran and Sevidol.

No difference in yield was noticed between treatments thereby indicating that granular pesticides applied as mounds with paddy seedlings before transplantation has no residual effect in controlling the pests like stem borer and leaf roller affecting the crop later in their growth period after transplantation.

But mortality of prawn and fish has been found to be the highest in plots with Thimet. Furadan and Sevidol were safer. Least mortality was noticed in control plot.

Later during 1986-87 the experiment was conducted with Carbofuran and Basudin. In this case, highest mortality in fish and prawn was noticed in Basudin followed by Carbofuran. The least was in control.

There was no yield difference in paddy.

Hence, instead of resorting to insecticides for control of pests in paddy in Pokkali conditions, it is advisable to resort to biological methods if any, for control of pests of rice in Pokkali condition. Investigations on these lines may be taken up.

COCONUT

Response of diseased and apparently healthy palms to fertilizer levels and organic manuring (in reclaimed soil types)

Fertilizers and organic manures were applied as per treatments during May-June, June-July and September-October. Observations on yield and scoring on disease intensity were taken at six month interval.

There was no significant difference between treatments in yield, disease intensity and total number of leaves in the case of apparently healthy palms.

In the case of diseased palms also, no significant difference was noted between the treatments in yield, disease intensity and total number of leaves.

The experiment will be continued as such for another two years.

Studies on the growth, performance and disease resistance of coconut cultivars and hybrids under disease stress conditions at Rice Research Station, Vyttila

The palms were manured as per the package of practices recommendation. Observations were taken, the details of which are given below.

The highest number of nuts was produced by Andaman Giant (56.3 nuts) followed by D x T (55.3). Highest intensity of Root (Wilt) disease was observed in Laccadive Ordinary followed by T x NCD and Andaman Ordinary. Cochin China was completely free from the disease followed by D x T.

Highest number of leaves was affected by leaf rot in Andaman Ordinary followed by T x NCD, Laccadive Ordinary and Andaman Giant. D x T, T x YD and Cochin China are completely free from leaf rot.

Visitors

Dr W.G. Walaker, Associate Director of Research, Gujarat Agricultural University, visited the station on 30th September '86.

Dr A. Tripathy, Professor and Head of Extension, Orissa University of Agriculture and Technology, Bhubaneswar, visited the station on 6th March '87.

HIGHLIGHTS

A new culture (Cul 53) evolved from the cross Pokkali x Jaya was in comparative yield trial and in Farm Trial in cultivators field and in all these trial this culture gave higher grain yield than the control.

Five early mutants of the rice variety H₄ have been selected after conducting preliminary yield trial during the year. More yield trials can be conducted with these cultures as they were found to be promising in yield as well as in salinity tolerance.

In the cropping system trial the selective stocking of prawn after the rice crop gave better returns than the traditional prawn filtration.

1.16 AROMATIC & MEDICINAL PLANTS RESEARCH STATION, ODAKKALI

This station is functioning under KAU since 1972.

The objective of the station is to conduct investigation on the crop improvement, crop management, plant protection, post harvest technology and biochemical aspects of the aromatic and medicinal plants so as to develop the cultivation of these group of plants in the state.

Total area of the station is 12.4 ha, with lemon grass 5.90 ha, Paimarosa 2.45 ha, coconut 1.25 ha, cashew 0.40 ha., lemongrass germplasm 0.40 ha, *catharanthus roseus* 0.1 ha, and banana 0.2 ha and 0.6 ha under other crops such as dioscorea, colocasia, pineapple, pepper solanum and other medicinal plants. Area under buildings is 1.10 ha.

Professor E.V.G. Nair continued to be in charge of station till 23.7.86 when he was transferred to Vellanikkara and thereafter Dr J. Thomas, Assistant Professor was holding the charge of the station.

Farmers were given classes on flower gardening and cultivation aspects of paimarosa crop by the implementing officer.

Extension lectures were organised at periodical intervals to the farmers of Asamannur Village and various aspects of crop management were dealt with.

Research

No. of research projects as on 31.3.1987 was 14.

Projects operated during the year

Stabilisation study on lemongrass type OD.440. Germplasm evaluation of lemongrass and utilization in crop improvement programme.

Study of the reproductive mechanism of paimarosa.

Morphological classification of the type collections of lemongrass and paimarosa available in the germplasm bank.

Study of the reproductive mechanism of Jammu lemongrass

Induction of flowering in American lemongrass

Induced mutations in lemongrass variety OD-19.

Hybridization in lemongrass.

Germplasm collection, multiplication and evaluation of paimarosa,

Induced mutations on palmarosa variety ODP-2

Polycross breeding in paimarosa,

Germplasm collection, multiplication and evaluation of Java citronella.

Effect of graded doses of nitrogen on growth and yield of different *Cymbopogon* species.

Effect of micronutrients on the growth and yield of paimarosa.

A germplasm collection of medicinal plants were undertaken and about 100 new plants are collected and established.

1.17. CARDAMOM RESEARCH STATION, PAMPADUMPARA

The Cardamom Research Station, Pampadumpara was started in the year 1956 with a view to undertake research programme in various agronomical, entomological and phytopathological problem of cardamom cultivation. The station is situated in the high range region of Kerala lying at an altitude of 1100 m from the sea level in the Pampadumpara village, Udumbanchola Taluk of the Idukki District, 35 Kilometers away from Kumaly, in the Kumaly-Munnar road. The All India Co-ordinated Spices and Cashew Improvement Project of ICAR was started functioning at the Station during 1972.

Total area of the farm is 46.44 ha. Cardamom area is 37ha. of which 17 ha. are under yielding and 20 ha are of young seedlings.

30% of the cardamom plants were dried up due to the severe drought during 1986-87. Replanting is in progress.

Area under pepper is 2 ha, coffee 5 ha and 2.44 ha is under buildings and roads.

Dr P Karunakaran, Professor continued as head upto 24.6.1986 and thereafter Dr C K. Peethambaran, Associate Professor (Plant Pathology) continued as head of station.

Sri K.P. Kuriakose, J. A. P had undergone a training on the "Katte Transmission" held at Appangala from 31.7.1986 to 2.8.1986.

The scientists participated in the monthly workshops under T & V programme of Idukki District was Chairman & Resource personnels.

RESEARCH

Ongoing Projects

NPK fertilizer experiment for cardamom

Objective is to find out a suitable manurial schedule for cardamom.

The trial was laid out during 9/84 as per the technical programme approved by the AICS & CIP workshop.

The growth of the plants are satisfactory and the plants started bearing after one year of planting. There is profuse bearing even during the off season, which is due to the uniform and optimum shade, which shows that shade is the most important factor of cardamom.

Effect of soil stirring and leaf mulching in cardamom

Objective is to find out the suitable mulching method and time for cardamom.

The trial was started during the year 1984 and all the operations as per the schedule were carried out. Observations on the biometric characters are being recorded as per schedule. The experiment will be continued for two more years for getting conclusive results.

Etiological studies of clump rot/Azhukal disease of Cardamom

Objective is to study the disease by artificial inoculation to prove their etiology.

The organism causing Azhukal disease of cardamom has been authentically identified as *Phytophthora meadi* and got it confirmed from CMI, England.

Visible symptoms of Azhukal disease was observed on younger spindle leaves and on capsules when inoculated with *Phytophthora* individually and in combination with *Pythium*. No symptoms of clump rot could be reproduced when inoculated with *Pythium*, individually and in combination with *Phytophthora*.

It was also observed that Azhukal disease symptoms could be reproduced artificially only during the rainy months of the year, when the relative humidity is around 80%.

Testing lines of cardamom for disease resistance

Objective is to find out varieties/types of cardamom resistant of 'Katte' disease.

Inoculation studies were conducted with viruliferous aphids on seedlings starting from the 3rd leaf stage. The seedlings were raised in trays and 1st, 2nd and 3rd inoculations conducted with aphids @ 5-10 aphid/seedling at an interval of 35 to 45 days. Katte disease symptoms were observed on susceptible seedlings of all the three popular varieties, viz, Malabar, Mysore and Vazhukka from 28-45 days of inoculation when the seedling were at the 3rd leaf stage and decreased in subsequent inoculations.

Testing the efficacy of MII-505 (Ethion 50% EC) against cardamom thrips and borer

The trials conducted during 1985-86 has shown that MIT 505 is effective in controlling thrips. However it was on par with quinalphos.

The trial is being repeated this year also.

1.18. REGIONAL AGRICULTURAL RESEARCH STATION, KUMARAKOM

The Coconut Research Station, Kumarakom established in the year 1947 by the Indian Central Coconut Committee, was taken over by the State Department of Agriculture in 1958. Since 1972 the station is functioning as a constituent centre for research under the Kerala Agricultural University. In 1978, a new programme 'Integrated Research project on mixed farming of coconut, livestock and fish underlying the principle of organic recycling to maximise agricultural production in the area was initiated and is being continued. During 1980-81, a scheme for the investigation of the serious malady of coconut root (wilt) disease

was implemented at this station. The station was upgraded and recognised as a Regional Agricultural Research Station for the regions of the problem areas of Kerala with Rice Research Station, Moncompu, Rice Research Station, Kayamkulam, Rice Research Station, Vyttila and the Kole region Research unit of Agricultural Research Station, Mannuthy as sub stations under the National Agricultural Research Project (NARP) in the year 1182.

The area of this farm was originally 23.23 ha. An additional area of 21.49 ha of wet lands was taken over by the University from the Department of Agriculture in 1980 making the total area of the station to 44.72 ha out of which about 18 ha are channels & waterways. The main crops grown on the uplands are under paddy. The water channels are used for fish farming. The main objective of the centre was originally to conduct research on coconut and coconut based farming systems with special reference to coconut root (wilt) disease. Now with the implementation of NARP the broad objective of the station is to conduct problem regions of Kerala.

Prof. U. Mohammed Kunju continued to be charge of the station during the period.

Sri K. Sankara Panicker and Sri A. A. Pankajakshan retired from service on superannuation.

The post of Professor of Plant Pathology (Rootwilt) at the College of Horticulture, Vellanikkara was shifted to RARS, Kumarakom during December, 1986.

Sri Abraham Varghese, Assistant Professor (W. S.) was granted deputation for undergoing Ph. D. Programme in Agrometeorology.

Details of training programmes conducted by the Station/Scheme

Social forestry training programme for the Village Extension Officers of the Development department was conducted here for four batches of forty one members each.

T & V workshop of Kottayam District was conducted at this station every month during the period under report.

The VIII NARP—KAEP—Zonal workshop for the problem zone was organised during September, 1986,

A one day regional Agricultural Seminar was held at this station under the auspices of the Directorate of Extension, Kerala Agricultural University.

Dr K. M. Rajan, Professor of Plant Pathology attended the workshop on 'Biological control of Plant disease' held at TNAU, Coimbatore during March 1987 and presented papers.

He also attended the International Symposium on "Ganoderma wilt disease of palms and other perennial crops" held at Thanjavoor during January 1987 and presented papers.

Dr K. G. Padmakumar, Assistant Professor (Ag) attended seminar on "Environmental pollution and protection of natural resources" organised by the Institute for natural resources development and State Committee on Science and Technology, at Mar Thoma College, Thiruvalla and presented a paper.

Research

No. of Research Projects as on 31-3-1987 was 46.

RESEARCH REPORT

Concluded Project

Effect of intercropping fodder legumes and grasses in coconut gardens on the incidence and intensity of root (wilt) disease

The results of the study was that intercropping fodder, legumes and grasses will not improve the yield or reduce the disease intensity of coconut palms.

Ongoing Projects

COCONUT

Effect of mixed cropping cocoa in coconut gardens

Observations on the yield of coconuts and cocoa were recorded. The trend indicated that pure crop of coconut gave better yields than mixed crops of coconut and cocoa.

Effect of growing and incorporation of different green manure crops and its influence on diseases and apparently healthy palms

The results indicated that there was reduction in disease index and Daincha recorded the highest yield of green manure.

Effect of boron on the leaf-rot disease of coconut

The results indicated that the treatments has no influence on the disease.

RNA + DNA content in coconut palms as influenced by root (wilt) disease

An increase in total Nucleic acid content was seen in the roots of root (wilt) affected palms.

Nutrient status of coconut water at different stages of development in palms of varying intensities of root (wilt) disease

The data showed little differences in quantity but there were differences in quality between the stages of development.

The quality of nut in relation to the root (wilt) disease of coconut

The analysis of the fresh endosperm from palms of varying intensities of root (wilt) showed that the qualitative characters like the oil

content, copra recovery—protein—content and moisture are not significantly affected. But when calculated as per palm basis it was found to be directly correlated with the root (wilt) disease.

Weed control in coconut gardens in reclaimed alluvial soils of Kuttanad

The weed species and their seasonal abundance as influenced by the treatments were recorded. It was observed that gramaxone @ 2.5 l/ha thrice, together with one digging in December-January, was effective in controlling the weeds in coconut gardens of reclaimed alluvial soils of Kuttanad.

Tidal effect on the physio chemical properties of the soils of chira (bund) and its influence on yield and disease incidence of coconut palms

The preliminary results indicated that free tidal flow maintain higher nutrient status (organic carbon P_2O_5 , K_2O). The electrical conductivity and apparent density are lower in bunds subjected to tidal flow, imparting beneficial effects. The study is in progress.

Root studies in palms of varying intensities of root (wilt) disease in relation to foliar syndrome

The study has shown that the roots decay as a result of the root (wilt) disease and is pronounced during the advanced stage of the disease.

Studies on VAM association in tuber crops

Tapioca varieties Ambakkadam and Ramanthala were noticed to be the most responding ones to VAM inoculations. The study is being continued.

Studies on the Arthropod fauna in the rhizosphere of coconut palms

The results so far obtained did not show any positive correlation between root (wilt) disease and soil micro and macro arthropods. The trial will be continued.

*Nature and intensity of damage caused by the mealy bug *Pseudococcus spp* and their control*

The results of the studies indicated that the mealy bugs are only minor pests of coconut except on very susceptible plants.

Control of rodents infesting coconut garden

Observations on the rats trapped were recorded. The Moncompu trap was found to be effective in trapping rats infesting seedlings planted on mounds.

*Evaluation of attractants for the red palm weevil *Rhyncophorus ferrugineus**

It was found that coconut stem discs with cocoa pulp or that with stem clumps soaked in toddy serve as good attractants for the red palm weevils.

Control of red palm weevil R. ferrugineus using stem injection technique

Application of monocrotophos (as Nuvacron) @ 75 ml per palm through root with an equal volume of water could control effectively the infestation of the red palm weevil in pre-bearing palms upto three metres height.

RICE

Concluded projects

Yield trial of medium duration cultures under adverse soil conditions

Culture 204 and culture 153-1 were found to perform well under adverse soil condition.

Ongoing trial

Optimisation of dose and timing of 2,4-D application to reduce phytotoxic effects in rice

The most ideal stage for applying 2-4D sodium salt as spray was 25 days after sowing for wet sown rice crop. The optimum dose of the commercial material of 2-4D (Fernoxone) was 0.75 kg/ha for controlling broad based weeds and sedges.

COWPEA

Effect of different levels of fertilizers on the growth and yield of vegetable cowpea grown as intercrop in the coconut gardens of Kuttanad

An NPK level of 30:20:70 was found to give maximum yield of vegetable cowpea during the summer season, and a dose of NPK 20:20:20 for the rainy season.

FISHERIES

All India Co-ordinated Agronomic research project—Rice based fish culture

The study highlights the possibility of raising carps along with the H. Y. V of paddy. The yield of fish realised in the study is highly encouraging.

Fish cum duck farming in ponds and channels of coconut gardens of Kuttanad

The results of the studies point out that this is an economic proposition. The net profit worked out under the system was Rs. 4057/ha and the cost benefit ratio was 1.68. However more studies are required to standardise the practices.

Paddy cum fish culture

The results of the present studies are highly encouraging under the Agro-ecological situation of Kuttanad. The studies are being continued.

Culture of gaint fresh water prawn *M. rosenbergii*

The studies clearly show that prawn culture in coconut garden channels is a viable technology suitable to Kuttanad.

VEGETABLE AND TUBER CROPS

Bhindi—Concluded projects

Effect of different levels of fertilizers on the growth and yield of Bhindi as intercrop in coconut garden.

Both for the rainy and summer seasons an NPK level of 75:10:15 was found to give maximum yield.

Sweet potato—Concluded projects

Nutritional studies on Sweet Potato in the uplands of Kuttanad

None of the treatments of fertilizer levels were statistically significant. However N:P:K @ 75:75:75 kg/ha recorded the highest tuber yield.

Tapioca

Studies on VAM association on tuber crops

The varieties Ramanthala and Ambakkadan were found to be the most responding ones to VAM inoculations with respect to yield.

SOCIAL SCIENCES

Concluded Projects

Extent of adoption and constraints in the adoption of improved Agrl. technologies

The study on the extent of adoption of package of practices recommendation of the KAU with respect to the major crops cultivated in Alleppey district revealed that the major constraints were lack of awareness of farmers, apprehension about the new practices, capital deficiency—non availability of superior inputs etc. and in some cases, non practicability of the recommendations.

HIGHLIGHTS

Rice

Two Rice cultures 204 and 153-1, screened at RRS, Moncompu were found to perform well under adverse soil condition of RARS, Kumarakom.

Sweet potato

Results of the studies conducted on the nutritional requirement of Sweet potato grown in the uplands of Kuttanad indicated that an optimum N:P:K dose of 75:75:75 kg/ha for higher yield. The maximum yield recorded from the above treatment was 13.76 t/ha.

Tapioca

Tapioca varieties, Ambakkadan and Ramanthala were found to be the most responding ones to the inoculation of Vesicular Arbuscular Mycorrhiza.

Fisheries

Studies conducted at this station on fish-duck farming has indicated a maximum fish production of 5370 kg/ha in 302 days. The fish yield registered is much higher than the maximum reported for similar studies elsewhere. The cost benefit ratio works out to be 1.68.

Studies on rotational cropping of paddy and fish showed a fish production of 1005.56 kg/ha/184 days. The fish production obtained is very impressive as it is higher than the maximum (700 kg/ha/10 months) reported from studies elsewhere in the country.

VISITORS:

Dr K. J. Rama Reddy, Head of extension education Institute visited the station during May 1986.

Dr M. S. Mathew, Scientist and Head, CMFRI, Narakal visited the station during May 1986.

Dr H. K. Jain, IDA Mission visited the station during August 1986 for appraisal on the proposal of phase II NARP.

NARP appraisal Team headed by Dr Chockey Singh visited the station in February 1987.

1.19. RICE RESEARCH STATION, MONCOMPU

Rice Research Station, Moncompu was established in the year 1940. In 1963 it became a full-fledged Regional Station to handle Plant Breeding and problems connected with Agronomy, Soil Science, Agricultural Entomology and Plant Pathology.

Rice Research Station, Moncompu is located in Champakulam Village of Kuttanad Taluk in Alleppey District. The station is mid-way between Alleppey and Changanacherry and is located on the northern side of the Alleppey-Changanacherry road. The total area of the farm is 8.7 ha. of which 2 ha comprises of garden lands and the remaining area constitute double crop paddy lands.

RESEARCH

No. of Research Projects as on 31-3-1986 was 37.

RESEARCH REPORTS

Ongoing Projects

Crop Improvement

Breeding for rice varieties resistant to Brown Plant hopper.

Minikit trials with two short duration (93 and 170) and two medium duration (126 and 168) Cultures were continued during the year. Quality analysis of the cultures was conducted at C. R. R. I., Cuttack.

Culture 93, 170 and 126 were found to be consistently good yielders with an average grain yield of 5000-6000 kg/ha. In the quality analysis, Culture-93 was found to be a very promising one with an elongation ratio of 2.23.

Evolution of blast resistant varieties of rice

Initial evaluation trial with 52 cultures was conducted during additional crop 1986 and 32 cultures selected on the basis of yield reaction to pests and diseases, etc. Preliminary yield trial with the selected cultures along with check varieties was conducted during Punched 1986-87.

Breeding for high yielding varieties of rice with multiple resistance to major pests and diseases of Kuttanad

Single plant selections were made from the F4 and F5 generations of 8 crosses based on duration, plant and panicle characters and reaction to pests and diseases.

Breeding for high yielding varieties of rice suitable for the Kari lands of Kuttanad

Single plant selections were made from the F2 and F3 generations of 7 crosses based on plant and panicle characters and reaction to pests and diseases.

Developing male sterile lines adapted to local conditions

Male sterile lines derived from the high yielding varieties of the Station viz., MO. 4, MO. 5, MO. 6, MO. 7, Jyothy etc. were crosses with varieties from the germplasm collection to identify, maintainer and restorer lines.

IR-50, IR-24 and one culture viz., 7-44-5 were found to restore the fertility of male sterile lines whereas most of the other varieties used in the crossing programme were found to maintain the sterility of the lines.

Evolution of gall midge resistant varieties of rice suitable for Kuttanad

Single plant selections were made from the F3 and F4 populations of 8 crosses based on resistance to gall midge and other pests and diseases, duration, plant and panicle characters etc. during 1986-87.

Breeding for high yielding varieties of rice specifically suited to the additional crop season of Kuttanad

25 single plant selections made during additional crop 1986 were put under IET along with 3 check varieties during Punched 1986-87. Observations were recorded on plant height, productive tillers/hill, duration, grain yield, straw yield and reaction to pests and diseases. Promising lines will be selected and further trials conducted.

Improving the yield quality and plant type of rice varieties by induced mutation

31 single plant selections made from the M6 generation of 3 varieties during Additional Crop, 1986 were put under IET during puncha 1986-87 along with three check varieties. Data were taken on flowering duration, Plant height, tillers/hill, yield of grain and straw and resistance to pests and diseases. Promising lines will be selected for further evaluation.

Development Technologies suited for "Koottumundakan Cultivation" I Varietal Trials

20 varietal trials using 4 first crop varieties (MO. 7, PTB. 9, H4 and Vyttila-II) and 5 second crop varieties (Rasmy, Kottarakkara-I, Local Mundakan, PTB-20 and Lakshmy) were conducted during 1986-87 in the Koottumundakan area.

Among the first crop varieties, PTB. 9 and among second crop varieties, PTB. 20 and Rasmy are found to give good yields.

Evolving a short duration semi tall variety of rice

For additional crop season 1986, there was significant difference in yield between treatments. Bharathi gave maximum yield of 3910 kg/ha. But it was on par with the yield of Culture 153-1 with a per hectare yield of 3575 kg. During punja 1986-87, there was no significant difference in yield. Based on yield and pest and disease tolerance, Culture 153-1 is proposed for Minikit trial for 1987-88.

Comparative yield trial with selected AICRIP Cultures

During first crop season culture 310 has given highest yield of 4833 kg/ha. and during Punja season, Culture-304 has recorded highest yield ie. 5700 kg/ha. Based on yield and other characters of past 6 seasons, 3 cultures viz., Culture 304, 310 and 311 were proposed for District trial during 1987-88.

Uniform Variety Trial-2

There was no significant difference in yield during first crop season. The local check variety MO.7 gave highest yield of 3000 kg/ha. During punja season there was significant difference in yield. Entry No. 217 (Pusa 587-2-1) gave highest yield of 3450 kg/ha. and MO.7 ranked second in yield with a per hectare yield of 3400 kg.

Uniform Variety Trial-3 (Special)

IET-8098 and IET No. 8891 gave highest yield of 3928 kg/ha. During punja 1986-87 there was significant difference in yield. IET 7296 has given maximum yield ie. 4650 kg/ha.

Brown plant hopper resistant variety trial

Since 11 entries have not flowered during first crop season, statistical analysis was not done for yield data. During Punja 1986-87,

there was significant difference in yield. KAU 153-1 has given highest yield of 4587 kg/ha. Out of 42 entries, 9 have shown resistance to brown plant hopper.

Sheath blight resistant variety trial

Since all the entries of the trial have flowered very late, yield was very poor and hence statistical analysis was not done during first crop season of 1986. During punja 1986-87 there was significant difference in yield. IET No. 9852 and IET No. 10152 have recorded highest yield of 4500 kg/ha. 24 entries have shown resistance to sheath blight.

Gall midge resistant variety trial

This trial was conducted during additional crop season of 1986. There was significant difference in yield. Entry No.1327 recorded highest yield ie. 4400 kg/ha. Thirty entries out of 60 have shown gall midge attack less than 10%.

Crop Management

Studies on the nutritional requirement of pre-release culture

The experiment was conducted during additional crop season and punja seasons. During additional crop season, culture 153-1 was superior to culture-200 and culture-200 was superior to culture 204. Culture 153-1 and culture-200 were significantly better to culture-204 during the punja season. All the three higher doses were statistically on par with each other and were significantly superior to the lowest level of 50:25:25 kg N, P₂O₅ and K₂O/ha.

Weed control trial in direct sown rice under puddled condition

The experiment was conducted to study the effectiveness of different herbicides under two levels each. Among the chemicals tested Arrosolo @ 2 kg.ai/ha. has produced minimum weed growth and maximum grain. During punja season machete 15 kg ai/ha. produced maximum grain yield and minimum weed growth.

Weed control trial in transplanted rice

The experiment was conducted during additional crop season and punja season.

During additional crop season Arrosolo 1.5 kg ai/ha produced maximum grain yield but minimum weed growth was recorded in treatment where Machete was applied. During punja season Arrosolo 2 kg. ai/ha produced maximum grain yield.

Bio-efficiency experiment with calcium peroxide

The experiment was conducted during additional crop season and punja to study the efficiency of CaO₂ coated seeds in controlling wild rice and general weeds in direct sown paddy. During additional crop season the two treatments did not show any significant variation in yield of grains. However the population of weed in CaO₂ treated plots was significantly lower than that of control.

The experiment was repeated in Punja season. The analysis of results revealed that there was considerable reduction in weed population in CaO_2 treated plots than in control.

Fertilizer management for Koottumundakan crop

Multi-locational trials in Koottumundakan crop was laid out to study the effect of chemical fertilizers in the yield of the crop.

The results of virippu and mundakan revealed that fertilizer application has significantly increased the yield of grains and straw. 60:30:30 kg. N, P_2O_5 and K_2O / ha. was found superior in Virippu season whereas in mundakan both 60:30:30 and 40:20:20 were on par.

Nitrogen management for lowland rice in pest and disease endemic areas

The objective is to study the effect of treating urea with various nitrification inhibitors like neem cake, coal tar etc. in releasing nitrogen slowly to the rice crop. Its effect on the pest, and disease incidence is also studied.

Prilled urea in splits is better when compared to other urea coated materials. Under conditions where split application of urea is not feasible the coated urea materials can be applied as basal. With respect to BPH attack all the nitrogen application treatments do not differ statistically.

Evaluation of Mussoorie Phos coated Urea 'N' efficiency in lowland rice

The objective is to study the effect of Mussoorie Phos—coated Urea (MRPU) in relation to Neem Coated Urea (NCU) and Gypsum Coated Urea (GCU) in different dose viz. 30 kg. N/ha., 50 kg. N/ha., 90 kg. N/ha in two splits were tried.

It is seen that Gypsum Coated Urea is a better nitrogen fertilizer material in relation to MRPU and NCU. 60 kg. N/ha. is found to be the sufficient dose of N/ha. for the grain and straw production.

Tolerance (screening) studies on high yielding varieties of rice for acidity, salinity iron, aluminium and manganese under Kuttanad conditions

Screening of 124 varieties/cultures of rice were done. The varieties/cultures tolerant to 0.5% salt concentration and 400 ppm. iron concentration were selected and a replicated field trial was laid out at Karumady (a representative tract of Kari Soil) in a farmer's field during Punja 1986-87.

With regard to grain yield the variety Rohini and IR-8 were on par with the check variety MO.5. Rohini recorded the highest grain yield of 5090 kg/ha. Straw yield was highest for the variety Rohini (10,125 kg/ha) which was superior to all the other varieties.

Plant Protection

Insecticide evaluation trial

During additional crop season Coroban 10 G, at 1.0 kg.ai/ha, and Coroban 40 EC @ 0.5 kg.ai/ha. exert 67% and 50% control of gall midge over untreated control. Brown plant hopper control was 62% in Coroban 40 EC and 59.57 in Basudin 10G, treated plot. During puncha season stem borer at reproductive phase was effectively controlled by application of Padan 4 G. and MOCap, 10 G. @ 1.5 kg.ai/ha. reduction being 40% and 35% respectively. Application of Padan, Coroban 40 EC and Basudin 10 G. recorded yield of 5167, 5017 kg/ha. during puncha season while in control it was only 3866 kg/ha. thus producing 33.65, 31.07 and 29.77% more yield over untreated control.

Trial on synthetic pyrethroids

This trial was laid out to find out the efficiency of synthetic pyrethroids in comparison with commonly used insecticide monocrotophos.

Against stem borer and gall midge the synthetic pyrethroids were not as effective as Nuvacron. Against brown plant hopper Ripcord 10 EC at 100 and 150g ai/ha were effective as the check Nuvacron effecting 52.11 and 54.77% mortality respectively while in Nuvacron it was 51.60, 53.38, 56.43%. As regards grain yield Ripcord @ 150 g. ai/ha. was on par with Nuvacron 500 g.ai/ha. which was on par with Nuvacron 750 g.ai/ha producing 3950, 4167 and 4417 kg grain/ ha which was 24.09, 30.91 and 38.77% more than untreated control. In untreated control the yield was 3183 kg/ha.

Gall midge screening trial

118 entries including breeding lines and donor parents were screened under field conditions to study the reaction of these entries against gall midge. Silver shoot incidence ranged from nil in 40 entries to 19.10 in susceptible check T (N) 1 lines derived from crosses involving Phalguna and Vikram showed resistance to gall midge. Among the cultures developed at Rice Research Station, Moncompu Cultures, 170, 168 and 93 showed good resistance to gall midge. Among donors Nagrasal, Phalguna, "—1263, Balam and Bengali exhibited resistance to gall midge.

Brown plant hopper screening trial

The lines were tested under screen house conditions using standard evaluation system. 4 entries namely ARC-6650, Ptb. 33, RP-1579-96-85 and RP-2362-110-54-27 alone show resistance with a score upto 3 on 0-9 scale.

Operational Research Project on Integrated control of Rice Pests in Kuttanad

The location of this project was shifted to Ramankary Village (Treatment) and Veliyanadu Village (Control) during the year.

The programmes implemented was

- 1 Adaptive trials on farmers fields
- 2 Rodent control campaign
- 3 Area wide demonstrations
- 4 Agroclinics
- 5 Training programme to farmers and labourers
- 6 Pest surveillance programmes
- 7 Surveys

PLANT PATHOLOGY

Epidemiological studies on important rice diseases in Kuttanad

This experiment was conducted with a view to study the influence of weather factors on the incidence and severity of different rice diseases. Fortnightly planting of four rice varieties viz., Jaya, Jyothi, T (N) 1, and Bhadra were done during each season and weather data during the crop period was simultaneously recorded.

Results gathered during additional crop season and puncha season showed that incidence of sheath blight disease was low. Variety Jyothi was highly susceptible to the disease. Sheath rot incidence was more during the fourth series of planting in both seasons. During the additional crop season the low incidence of sheath blight disease may be attributed to the heavy rainfall received during the most susceptible stage of the crop viz. the P. I. stage.

Screening rice varieties against important diseases

The objective of this experiment was to study the relative tolerance of different rice varieties available at Rice Research Station, Moncompu.

During the additional crop season significant difference between treatments was obtained in the case of stackburn, leaf infection, grain infection and grain yield. During punja the disease incidence was comparatively lower and significant difference between treatments was obtained only in the case of brown spot grain infection. Highest grain yield was recorded by Culture-126.

Screening rice varieties against falsesmut and stackburn diseases

Twentyfive varieties were screened in against falsesmut and stackburn diseases during additional crop and punja.

During both crop seasons significant difference was obtained among varieties on stackburn leaf infection and grain infection Culture-312 recorded minimum score for grain infection in both season.

Chemical control of sheath blight

The experiment was laid out using the variety Jyothy. The seeds were broadcasted in plots of 10 sq. m.

The fungicide validacin @ 2 ml/litre was found to be the most effective and significantly superior to all the fungicides tried in checking sheath blight disease of rice.

Evaluation of common fungicides for the control of sheath blight disease of rice

In order to find out the most effective chemical for the control of sheath blight disease and also the most suitable time of application of these chemicals a trial was laid out using the variety Jyothi.

During additional crop season and punja season significant difference between treatments was observed in the case of sheath blight leaf infection. During additional crop season lowest leaf infection was recorded by Bavistin sprayed plots at 40 DAS followed by Fytolan and Bordeaux mixture sprayed plots at 60 DAS whereas in punja season lowest leaf infection was recorded in Difolatan spray after 80 DAS followed by Dithane M. 45 at 60 DAS and Difolatan at 60 DAS.

Observational trial on use of mycoparasites in bio-control of sheath blight of rice

The object of this trial was to evaluate the efficacy of using mycoparasites above and in combination with fungicides for the control of sheath blight disease of rice. Three fungi viz. *Trichoderma hatzianum*, *T. viride* and *Chaetomium globosum* were utilized for this trial with the fungicide Bavistin. Treatments were given both as foliar spray and soil application.

There was no significant difference among the treatments in the case of disease intensity, disease spread and grain yield during additional crop season. During punja no treatments were given and observation were recorded to evaluate the residual effect of the previous season's treatments. There was no significant difference among the treatments in any of the observations noted.

Observational trial on control of brown spot of rice

This trial was laid out to find out the effect of micronutrients like Mn, Zn and Cu on the incidence of brown spot of rice.

During additional and punja season seed treatment with Zinc sulphate (1%) + Cu SO₄ (0.25%) recorded lowest grain infection of brown spot disease. In seedling root dip treatment lowest grain infection was recorded in Manganous sulphate sprayed plots. In sprayed plots lowest grain infection was recorded in Manganous sulphate sprayed plots during additional crop season and Zinc sulphate 2% and Manganous sulphate 2% sprayed plots during punja season.

Study of coefficient of variation in field experiments with rice

The project is to study the distribution pattern of coefficient of variation in field experiments with rice and to examine the range values of coefficient of variation for different categories of experiments.

Using the data on field experiment in rice, coefficient variation values were worked out. Classifying the experiments under different categories the range of coefficient of variation for each category was estimated based on standard statistical technique. The coefficient of variation values for varietal trials were the lowest.

Study of interdependence of climatological factors and yield of paddy with reference to the additional and puncha crop in Kuttanad

A previous study conducted in this line revealed that linear combination of weather factors such as rainfall, rainy days, maximum, minimum temperature, monthly rainfall during the season, influence the grain yield variations positively as well as negatively during puncha season.

But in additional crop the weather factors influence the yield variation independently. Using the grain yield recorded at Rice Research Station, Moncompu the study is continued. A stray correlation between rainfall and yield is seen in both seasons. Further study is in progress.

FISHERIES

Cage culture of fishes in public waterways of Kuttanad

Bamboo framed polyethylene netting cages were constructed and stocked fingerlings of Common Carp and Mrigal in the cages installed in the nearby canal. The objective is to assess the techno-economic feasibility of culturing fishes in cages and then for the profitable use of public water ways by the landless poor.

Trends:

Common carp shows rapid growth rate and the result may be promising.

Mono-culture of common Carp in homestead ponds with single stocking and multiple harvesting

Objective of the project is to standardise a technology for the profitable use of homestead ponds by the poor. Fingerlings of Common Carp, Mrigal etc. were stocked at a density of 5000 Nos/ha.

Common Carps growth rate seems to be promising.

Extension Activities of the Rice Research Station, Moncompu

Lab-to-Land Programme

The programme for Phase IV was sanctioned for 6 months 1-4-1986 (upto 30-9-1986). Twentyfive families were selected as a cluster and critical inputs and assistance were given for following enterprises.

<i>Agriculture</i>	<i>Inputs given</i>	<i>Quantity</i>
	a. Coconut Seedlings	25 Nos.
	b. Vegetable Seeds	6 Packets
	c. Fertilizers	179 Kg.
	d. Improved implements	50 Nos.

Poultry farming:

a) Austrowhite/Austrolope birds	125 Nos.
b) Chickmash	250 Kg.

Technologies Transferred:

Cultivation of improved varieties of vegetables including peas and beans

Cultivation improved variety of coconut seedlings

Poultry farming with improved breeds of high yielding birds

Improving farm labour efficiency with improved farm implements.

Trainings:

Training in production technology for coconut and rice

State Level Training in rice production technology. (Sponsored by Directorate of Rice Development, Ratna)

Training in Farm Management and Research methodology

Training for Agricultural labourers on the use of pesticides as part of integrated pest control

Farmers training in Rice Production Technology under ORP.

Seminars and Workshop:

Consortium of Operational Research Project.

Training and Visit programme monthly workshop (Alleppey District)

Village Adoption Programme:

The Village Adoption Programme was implemented during the year by giving guidance to the farmers of adopted village of Champakulam on rice and coconut cultivation and fish farming.

Farm Clinic:

The Farm Clinic being functioning in the station gave suggestions and solutions to the farmers who approached with specific problems on agriculture and aqua-culture.

Visitors:

The NARP Phase II appraisal Team consisting of Dr. Chokhey Singh Dr. Thyagi, Dr. Shanmuga Velu, Dr. Jayasankar visited the Station on 15-2-1987 and had discussions on the NARP Phase II proposals for this station.

Sri S.K. Paul, Joint Director of Agriculture. West Bengal and Internal consultant, Government of India visited the station on 24-2-1987 and had discussions with the scientists and resource personnel for T & V system.

HIGHLIGHTS

Crop improvement:

Two short and two medium-duration cultures with tolerance to brown plant hopper and other pests and diseases have been evolved and proposed for release based on the performance in various Research Stations under Kerala Agricultural University, AICRIP and in cultivators field.

Culture-93 (Jaya x Ptb. 33)	duration	100-110 days	height	85 cm
Culture-170 (ARC 6650 x Jaya)	..	-do-	..	75 ..
Culture-126 (Jaya x Ptb. 33)	..	110-120	..	100 ..
Culture-153-1 (IR-1561 x Jaya)	..	120-125	..	105 ..

Breeding for blast resistance, multiple resistance, tolerance to adverse soil conditions; gall midge resistance, seed dormancy, etc. are in progress and the progenies under various stage of selection.

Under the Ail India Rice Co-ordinated Improvement Programme trials on varietal improvement have been taken up.

Promising cultures evolved at this Station are also included in these trials. Culture-93 and 153-1 have uniformly given higher yields and shown tolerance to Brown Plant Hopper in several locations.

The results of the uniform trials conducted in the Koottumundakan area of Alleppey District have shown that Ptb. 9 during the first crop and Ptb. 20 and Rasmii in the II Crop season have given satisfactory performance.

Nutritional requirement studies of pre-release cultures have revealed that NPK dose of 70:35:35 is optimum for Culture-93, 170 and 126 and 90:45:45 for Culture-153-1.

Nitrogen management under direct sown medium duration rice in Kuttanad recorded that rate of application of $\frac{1}{2}$, $\frac{1}{4}$ and $\frac{1}{4}$ and $1/3$, $1/3$ and $1/3$ are equally good.

Weed control trial in direct sown rice under puddled condition has shown that Arrosolo @ 2 kg. ai/ha. and Machete @ 1.5 kg. ai/ha. gave maximum grain yield and minimum weed growth. The same results have been observed in transplanted rice also.

Sowing of calcium peroxide coated seeds in standing water was found to lower the weed growth significantly during both the seasons.

Fertilizer Management studies in Koottumundakan areas have revealed that the application of fertilizer has significantly increased both grain and straw yield. Application of NPK @ 60:30:30 was found superior during Virippu season while there was no difference between 60:30:30 and 40:20:20 during Mundakan season.

Trial with tagged Ammophos has revealed that application of Ammophos is better than Urea + Super phosphate or Ammonium sulphate + Super phosphate for getting higher yields. Split application of Ammophos 20 and 40 DAP was found to give maximum yields.

Application of Rock phosphate 60 kg. P_2O_5 /ha. + Pyrite (1:1W/W) as basal dressing gave significantly higher yields.

The split application of potash synchronising with the application of nitrogen is found to be better than two splits of potash.

Coroban, Padam and Basudin were found to control rice pests and give better yields.

In the varietal screening trials the following varieties are found to be resistant for the various pests.

For the chemical control of sheath blight Validacin @ 2 ml/lit. was found to be effective and significantly superior to other fungicides.

For the control of stack burn, Bavistin, Phytojan, and Bordeaux Mixture were found to be effective.

1.20. ALL INDIA CO-ORDINATED RESEARCH PROJECT ON AGRICULTURAL DRAINAGE ON WATERSHED BASIS UNDER ACTUAL FARMING CONDITIONS, KARUMADY

The project comes under Ambalapuzha Village and Taluk of Alleppey District. It lies 4 Kms East of Ambalapuzha junction on National Highway 47 in the Ambalapuzha--Thakazhy road. The project area is a typical representative of Kari lands. The project commenced on 1-12-'81.

Area of the Project including control is 4 ha. Kaval Thekkumpuram Padasekharam and other Kari soils of Kuttanad comprising 7000 ha will be benefited by this project.

Sri E. K. Mathew, Assistant Professor (Agrl. Engg) is in charge of this project.

Sri E. K. Mathew, Assistant Professor (Agrl. Engg) has attended the workshop of the All India Co-ordinated Projects of Agricultural Drainage and Wells and Pumps at I. A. R. I, New Delhi.

RESEARCH

No. of Research projects as on 31.3.87 is five (5).

Research Reports of each projects

Survey and characterisation of quality of water in the project area. (Kaval Thekkumpuram Padasekharam)

Water samples are drawn at weekly intervals from the waterways surrounding the project area and from the field itself. They were then analysed for the pH and EC values and graphs were prepared of pH and EC drawn against time and learned that the pH values fluctuated between 5.5 to 7.5. The EC values varied from 0.5 to 2.5mm hos/cm.

From the above pH, it is learned that the pH is not at all a problem during the cropping season in Kari lands. However the EC values are found to be not conducive for paddy crop even during the cropping season.

Preparation of water table Contour map and hydraulic map of the project area (Kavil Thekkumpuram Padasekharam)

This study was taken up to understand the ground water table fluctuations. The padasekharam is surrounded by Ambalapuzha—Thakazhy road at North, Kalathil thodu at East, Karithodu at South and Karumady thodu at West. For the experiment 24 observation wells had been installed in the project area "Kavil Thekkumpuram Padasekharam" in three bands to monitor ground water table fluctuation. Weekly observations have been recorded on water levels in these observation wells and height of water levels are also been taken from the surrounding water bodies at predetermined points.

The water level readings of the observation wells and surrounding water level were plotted against time and learned that the water level in the project area was always lower by 0.5 to 1.00 M than that of the waterbodies outside the project area during the cropping season.

From this experiment hydraulic conductivity was found to be 0.19 m/day. This observation will help in fixing the optimum spacing for the laying of tile drains.

*Development of a suitable technology for the subsurface drainage system in the Kari lands of Kuttanad:
(Kavil Thekkumpuram Padasekharam)*

This experiment was laid out to find out the different parameters of hydraulic conductivity of the tile drainage system in the project area. Accordingly 9 lines of lateral tile drains were laid. The first six lines are at 15 M apart and remaining at 30m apart. The first five lines are 75 m long and remaining are of 100 m length. To find out the hydraulic parameters, observations like rate of discharge from each lines and subsidence of ground water at different locations were taken during day and night continuously for the last cropping season. The above data was analysed for finding out the hydraulic conductivity using steady state equation, since the water movement and drain discharge performance showed a relative constant behavior towards the later part of the continuous drainage.

The average value of hydraulic conductivity was computed as 1.468 m/day. Another important factor noticed in the project was that the water table before the continuous pumping is not level and showed a slope towards the farther side from the outside of the waterbody.

Development of a suitable technology for the sub-surface drainage system in the Kari lands of Kuttanad (Kavil Thekkumpuram Padasekharam)

The experiment was conducted to find out the effectiveness of tile drainage system in the performance of paddy crop the Kari land. Day and night pumping throughout the cropping season was started along with the broadcasting and were continued upto 10 days before the harvest.

The paddy crop was raised in the field laid out with the lateral drains, giving uniform package of practices in the whole experimental area. The standing crop was divided into different strips of 5 m width along the drain line.

It has been found that there was no significant difference for any parameters in between the drain line for 15 m spacing and all other parameters except No. of hills/Sq. M. were significantly superior to control plot in the case of 30 M spacing. The grain weight upto 15 M and straw weight upto 30 M from drain was found superior to the control plot while all other parameters were found not significant. It is concluded that a 15M spacing can give an additional yield of 1.93 t/ha of grain and 10.3 t/ha of straw.

Water samples from each tile drain were collected at fortnightly intervals and they were analysed for its EC and pH. Graphs were drawn of EC versus time and is learned that the soils which are closer to the outside natural bodies of water drained less salt than the one which is farther. This is because of the higher waterlevel outside the farming area creating a natural internal drainage and to some extent washes the soil.

A comparison of the weekly average values of EC of drained water and the irrigation water showed that a substantial amount of salt can be leached through the sub-surface drainage system.

Development of a suitable technology for the sub-surface drainage system in the kari lands of Kuttanad. (Kavil Thekkumpuram Padasekharam)

This experiment was conducted to evaluate the performance of different filter materials to find its economic suitability including its design criteria for the sub-surface drainage system. During the period under report the drains were laid out. The observations will be recorded during the ensuing cropping season punja 1987.

1.21 SUGARCANE RESEARCH STATION, THIRUVALLA

Sugarcane Research under the Kerala Agricultural University was started in 1977 in the Farm at Thiruvalla. Research work initially commenced with total assistance from ICAR under the All India Co-ordinated Research Project on Sugarcane. This Sugarcane Research

Station is located at 9.6" North latitude, 76.5" longitude at an elevation of 25.14 M above MSL.

Scheme for intensification of sugarcane research, survey appraisal and control of major disease of sugarcane under financial assistance from ICAR and fabricating moist hot air treatment unit are the three Schemes functioning. The entire research activities at the station are confined to these three schemes.

The farm is located at Kallunkal on the banks of the River Manimala about 7 Km south west from the Railway Station. Office of the research station is situated in the town for want of building facilities in the farm.

Typical river bank alluvium with an acid reaction in the range of pH 5 constitute the soil type in the farm.

Sri S. Sukumaran Nair continued to be in charge of the station till 31-5-86 and Dr N. N. Potti took over the charge from 1-6-86 when Sri Nair was transferred to Pilicode.

State level workshop on Nursery programme on sugarcane was conducted at this station.

B. Sc. (Ag) students were given training for a period of two weeks on planning and execution of Research programmes.

Dr N. Neelakantan Potty, Professor of Agronomy attended the 14th All India workshop for Sugarcane Research Workers at Hissar during November 1986 and presented a paper on red rot disease in Kerala.

Sri K. C. Chandy attended the National hybridization programme on Sugarcane Breeding Institute, Coimbatore during December 1986.

The district level T&V Workshop of the Pathanamthitta district was conducted every month and attended by Sri S. Sukumaran Nair, till May 1986 and Dr N. N. Potty and K. C. Chandy the rest of the period.

Dr N. N. Potty, chaired one session and presented a paper on "Sugarcane an Agro-industrial resource" in the seminar on "Environmental pollution and National Resource Development" conducted by the Institute of Natural Resource Development, Trivandrum.

Research

Number of research projects as on 31-3-1986 was 20.

Research Report

SUGARCANE

Concluded Projects

Zonal varietal Trial—Series-II.

The pooled data of 2 plant crop and one ratoon crop showed that though Co-740 had produced the maximum millable shoots, the highest yield was recorded by Co-62175 and Co-7405 in that order.

Co-7405 manifested a marginal superiority over Co-62175 in quality characteristics. The stability in yield expression and significantly higher yield of Co-7405 over Co-997 which require a substitute due to high red rot susceptibility would suggest that Co-7405 can be released as a variety in the state.

Multilocational trial conducted under the auspices of the University also had shown the superiority of Co-7405.

Experiment to find out the optimum level of P and K for sugarcane

Results obtained over three years from one plant crop and two successive ratoon crops showed that there is pronounced significant and linear response for potash. Enhancement of potash application to 100 kg/ha brought about a mean increase of 18.8 MT/ha. Observations on response to phosphorus showed that the response was limited to the level of 100 kg. of P/ha. Even this response was limited to 69 MT/ha. Application of P beyond 50 kg/ha failed to bring about significant increase in yield.

Ongoing projects

Fluff Exchange programme, Evolution of varieties

Hybridization programme

Hybridization work involving 16 cross combinations were done at the National hybridization Garden of Sugarcane Breeding Institute, Coimbatore during November-December 1986. Fluff obtained were sown in the nursery and a total number of 4217 seedlings were obtained during the year. Fluff of one cross combination Co-7201 x CoC-671 failed to germinate.

During 1985 nine cross combination were made including seven zonal crosses and two University crosses and a total of 945 seedlings were transplanted to the main field. The biotype characteristics of the seedlings were studied and 186 clones were promoted to the 1st clonal trial (progeny row trial).

148 selected clones from the 1984 hybridization programme include 101 clones from the KAU crosses and 47 from AICRP. The trial was laid out in single row. The biotype characters were studied and 36 clones were selected for initial evaluation trial.

Initial Evaluation Trial 1983-84 series

The yield and yield attributes and red rot reaction were studied and 26 clones were selected for comparative yield trial. This include 8 clones from the zonal crosses and 18 from the KAU crosses.

Comparative yield trial 1983-84 series

26 clones selected from the Initial Evaluation Trial was planted in the field.

Comparative yield trial 1982-1983 series

After detailed studies on the biometric characters yield and yield attributes as well as pests and disease incidence a rigorous selection was made and 18 clones were isolated as promising types and promoted for further yield trials.

The clones have been advanced to the final station trial with the objective of getting varieties for the diverse agro-climatic environments such as, flood prone area, semi arid tracts, normal gardenland conditions and subtropical semi arid and superhumid conditions. Under the trial conditions in the station yield of varieties range from 56 to 140 MT/ha.

A comparison of the clones with the local checks show that 4 clones viz. 617, 747, 750 and 250 significantly out yielded Co-997.

Evolution of varieties:

Germinability of general collection seeds of sugarcane hybrids and studies on seedling performance.

The seedlings showed wide variability in growth and vigour. A total of 1120 vigorous seedlings were selected and planted in the field. The number of seedlings produced from general collection of each variety and planted in the field.

Evolution of certain off types of sugarcane with fodder characteristics for fodder purpose

An observational trial with 10 off types of sugarcane was laid out during March, 1987. The crop has germinated and the condition of the experimental crop is satisfactory.

Studies on the suitability of setts obtained from flowered cane tops as seed materials

The pooled data of 2 plant crop and one ratoon crop showed that though Co-740 had produced the maximum millable canes, the highest yield was recorded by Co-62175 and Co-7405. Co-7405 manifested a marginal superiority over Co-62175 in quality characteristics due to stability in yield as well as higher yield over Co-997. Co-7405 can be released as a substitute variety in the state for Co-997 which is highly susceptible to red rot disease.

Multilocational trial of promising varieties

An experiment was laid out with 8 select cultures and 2 check varieties to study the adaptability in different locations for yield and quality. The data on yield show that Co-7405 had produced the maximum yield of 91.82 MT/ha. closely followed by Co-7704 with 91.14 MT/ha.

Effect of varieties nitrogen levels and moisture conservation practices on the yield of rainfed sugarcane

Data on the main effects of varieties, nitrogen levels and moisture conservation practices showed that varieties did not significantly differ among themselves in any of the yield and quality parameters studied, though Co-62175 tended to out yielded Co-997.

Data on the second order interactions showed that the lower level of nitrogen with soil treatment of Atrazine and foliage application of CaCO₃ gave the highest yield of 95.48 MT/ha followed by the highest dose of nitrogen + soil treatment of atrazine and foliage spray of CaCO₃. This indicated that only the lower level of nitrogen is enough under rain-fed conditions of sugarcane production.

Programme for studying the efficiency of biofertilizers for sugarcane

The results showed that the varietal variation was significant in respect of yield and juice content. Co-997 have significantly higher yield which was 15.66 MT more than that of Co-62175 on per hectare basis. On the other hand juice percentage was 5.84 per cent more in Co-62175 than in Co-997.

A comparison of soaking setts with Azospirillum culture and application of Azetobactor culture alone show that under conditions of no nitrogen application millable cane count and yield per hectare were better influenced by Azospirillum.

Application of 50 per cent of the recommended dose of nitrogen and soaking setts in Azospirillum culture and 75 per cent of the recommended level of nitrogen with application of 2.00kg Azetobactor applied on 30 and 60 days increased the yield and bio-fertilizer treatment are capable of bringing about a more efficient utilization of nitrogen.

Experiment to find out the optimum level of P and K for sugarcane

The results showed that phosphorus levels did not have any significant effect on yield or quality of cane in the second ratoon crop. Application of graded levels of potassium registered a linear increase in yield of cane in the experiment. Application of 100 kg K brought about an increased yield of 21.02 MT/ha over control.

Comparative efficiency of setts planting by tractor drawn, semi-automatic sugarcane planter and conventional planting

Data on mean millable cane count and yield under conventional planting and planting by semi-automatic sugarcane planter showed that manual planting was better than mechanical planting in respect of millable cane count and yield in plant crop. This was due to the low germination and shoot count which was due to a deeper planting.

Visitors

The NARP Team headed by Dr Chokkey Singh visited the station in February, 1986.

HIGHLIGHTS

Efforts to evolve high yielding high sugared disease resistant varieties adaptable to the diverse agro-climatic conditions of the state have yielded a number of clones which are now in the final yield trial in the station.

Possibility of locating desirable varieties from seedlings from the varietal museum was initiated.

Practicability of carrying out hybridisation work at this station itself was established. This offers scope for developing this centre as a national hybridisation garden alternate to the only other centre of its kind at Coimbatore.

Experiments conducted at this station has conclusively proved that level of potassium application shall be enhanced to 100 kg/ha for sugarcane.

Preliminary investigation have indicated the possibility of reducing the level of application of chemical fertilizers to sugarcane through use of bio-fertilizers like azospirillum and azotobactor.

Farmers field testing of elite clones identified from station trials have established that Co-7405 is a viable substitute to red rot prone Co-997.

The first ever combined seminar of the officials of the Department of Agriculture, sugar factories and research workers of the University was convened and an action programme to increase sugarcane production and productivity in the state was chalked out.

Nursery programme in sugarcane was introduced in the state for the first time in collaboration with the Department of Agriculture and the sugar factories.

1.22. RICE RESEARCH STATION, KAYAMKULAM

The Rice Research Station, Kayamkulam was established in the year 1937 under the University of Travancore. In 1957 it was transferred to the Kerala Agricultural Department. With the formation of Kerala Agricultural University this institution was transferred to the University on 1-2-1972 and now it functions as a constituent unit of the Kerala Agricultural University.

In 1981 this station has been declared as sub centre for conducting Research on root (wilt) disease of coconut. From 1982 it has become a part of the special zone of problem areas under NARP to tackle the problems of Onattukara region.

ICAR has also sanctioned an adhoc scheme in 1985 for the rapid improvement of sesamum and groundnut in the Onattukara region and has consented to finance the scheme for 3 years.

Three medium duration cultures 153-1, 200, 204 evolved at Rice Research Station, Moncompu were tested during the first crop season in this station to find their adaptability in Onattukara sandy tract. Out of the three cultures tried, 153-1 gave good performance compared to Jyothi and Bharathy the existing varieties in this area.

Organic manure is a must for the sandy soils of Onattukara. Application of P_2O_5 and K_2O is found essential for higher yields in this sandy tract. In this area continuous application of nitrogen in the form of fertilizers without P_2O_5 and K_2O is having deleterious effect.

The response of the varieties Bhagya and Onam which were released from this station recently, to different fertilizer doses were tried at the most optimum level of N P K and it was observed that maximum yield of grain and straw for both varieties was recorded by the treatment combination 70, 35, 35 kg NPK/ha.

SESAMUM AND GROUNDNUT

F_1 generation of 50 different inter-varietal cross combination of sesamum developed in the previous year were raised for advancing to F_2 generation.

90 other cross combinations were developed by crossing in diallel pattern the sesamum varieties ACV-1, CST-785, BS-5-18-6 (G), Vinayak, Improved selection 5, Thilothama, RAUSS 17-4, ACV-2, B-14 and Kayamkulam-1.

Sesamum varieties ACV-1 and Kayamkulam-1 were subjected to gamma rays at different doses and the M1 generation was raised. Seeds from each plant were collected.

GROUNDNUT

The F_1 generation derived from the cross TMV-2 x 21176, TMV-2 x Chicko and MK-374 x Chicko was raised. 31 single plants were selected for advancing to F_5 generation.

To identify an early maturing variety for Onattukara sandy tract, a comparative yield trial was conducted. Out of 16 varieties tried Dh (E)-32 gave significantly higher yield (1067.90 kg/ha) than the check variety TG-3 (756.17 kg pod/ha).

30 varieties received from AICORPO were put in the Initial Evaluation Trial to find their yielding ability. Of the varieties tried Thilothama gave significantly higher yield (303.39 kg/ha) followed by Kayamkulam-I (257 kg/ha) and RT-54 (257 kg/ha).

In the comparative yield trial where 10 varieties were tested HT 16 and RT 55 gave maximum yield of 334 kg/ha where as the local check Kayamkulam-I yielded only 273.63 kg/ha.

The yield of 12 varieties were compared in another comparative trial and it was found that TNAU-10 gave a significantly higher yield (419 kg/ha).

Among the cultivators there is a notion that by dusting soil in situ on the leaves of young sesamum plants during early morning the growth and yield can be increased.

In an experiment to study whether the belief is true or not, three frequency of soil dusting were tried and it was found that there is no significant difference between treatments as far growth and yield are concerned.

To control the seed rot and collar rot of groundnut spraying with five fungicides were tried. Two methods of application of chemical (viz) treating seed with fungicides and, spraying fungicides in the seed furrows immediately after sowing were tested.

With regard to seedling mortality and yield of pods, Bavistin was found to be significantly effective in controlling the disease.

PULSES

To screen out a medium tall short duration grain type cowpea with high yield potential suitable for summer rice fallows and under partial shade condition in coconut garden of Onattukara region, 12 varieties having desirable characters were selected for further studies.

20 cowpea varieties were tried in a comparative yield trial to screen out a best yielder having short duration and medium height suitable for rice fallows it was observed that Co-3 yield 1879 kg pod/ha followed by COVU-8456 (1814 kg).

BLACKGRAM

In a comparative yield trial with 11 blackgram varieties was conducted to identify a black gram genotype suitable for cultivators in the summer rice fallows and coconut garden and the variety COBG 307 gave the highest yield (1324 kg/ha) followed by CO₁ (1241 kg).

RESEARCH REPORTS

Rice

Evolution of high yielding photosensitive varieties of rice suited to different agroclimatic zones

Objective is to evolve high yielding semi-tall photosensitive varieties suited to second crop season in Onattukara region.

Maximum grain yield was recorded by culture-1358-2 (3480 kg/ha) in the Research Station and 1900 kg/ha in the Quilon District. In the Quilon district (Ochira) severe drought was experienced and hence the yield was poor. During the last year (1985-86) also culture No. 1358-2 out yielded all the other cultures.

Farm trials with the photosensitive cultures

Cul-1336-3, 1358-2 and 1423-5 will be continued during this year also, for confirmatory results.

Screening local varieties tolerant to salinity flood in the Orumundakan tract (observational trial)

An observational trial using nine varieties and Orumundakan Local was laid out in the cultivator's field of Orumundakan area during August, 1986 to assess their adaptability and tolerance to salinity and flood.

The survival percentage of seedlings recorded 4 weeks after transplanting indicates that seedlings of all varieties except Oorumundakan Local have least tolerance to salinity.

Those plants that survived, performed well, during the remaining growth period. But the salt water intrusion in the field immediately after the panicle emergence during December has caused complete damage to all the varieties, revealing that none of the above varieties are tolerant to salinity.

Genetic refinement of Oorumundakan

Objective is to identify a superior variety by selection and Bulk progeny testing in the local variety Oorumundakan and to develop high yielding tall indica variety suited to the ill-drained saline-Oorumundakan area of Karunagappally and Karthikappally Taluk during second crop season.

A survey on the Oorumundakan area has been conducted and studied the morphological characters of the variety. The variety exhibit considerable variation in respect of panicle and grain size. Soil and water samples have been analysed.

District trial with short duration Moncompu cultures

There was no significant difference on grain yield between the varieties.

All the varieties were susceptible to sheath blight and pests like stemborer and leaf roller.

Crop Management

Permanent Manurial Trial

To find out the effect of continuous application of Nitrogen both as organic and inorganic as well as P_2O_5 and K_2O in soil fertility and yield of rice.

During 1st crop season, there was significant difference in grain and straw yield due to the effect of treatments.

This experiment is being conducted from 1964 onwards. Results during the last 10 years reveal that organic manure is a must for the sandy soils of Onattukara. Application of P_2O_5 and K_2O in sandy soil is

found essential for higher rice yields in sandy tracts. Continuous application of Nitrogen in form of fertilizers without P_2O_5 and K_2O is having deleterious effect for rice growth in sandy area.

Response of newly released varieties Bhagya and Onam to different fertilizer doses.

Objective is to derive at the most optimum level of N P K doses for the two varieties.

Agro techniques for Virippu rice in Onattukara.

Method of sowing and weed control (Observational Trial)

Data on weed wet weight and dry matter production 25 days after seeding show that spraying butachlor @ 1 lit ai/ha immediately after seeding reduced dry matter production of weeds from 38.5 gm/m² to 2 gm/m². *Cleome* species disappeared by decaying in standing water by 18th to 20th D. A. S.

One handweeding was given 25 DAS. Second handweeding was given on 40th DAS. The regrowth of 15 days in hand weeded plots accumulated 29 gm dry matter/m² whereas in butachlor sprayed plots it was only 1 gm/m².

Spraying butachlor @ 1 lit ai/ha immediately after seeding dry seeds during virippu rice is a very effective practice for controlling weeds in Onattukara tract. Weedicide spray has not effected rice germination and growth followed by working harrow and planting.

Broadcasting seeds followed by harrowing and planking is found to be efficient in establishment and will be cheaper to dibbling seeds behind country plough by about Rs. 500/- to Rs. 600/- per hectare. Dibbling require 20 men and 15 women per hectare, costing Rs. 900/- Broadcasting will increase the plant population/m² also, which is low in dibbled farmer's fields. The economics and cost benefit ratio can be worked out only after harvest of the crop.

OILSEEDS

Pedigree breeding programme in Sesamum

Objective is to develop high yielding varieties of sesamum suited to summer rice fallow cultivation in Onattukara region.

Fifty different intervarietal cross combinations of sesamum were developed during Rabi season 1986-87. The F1 generation was raised during summer season and the seeds collected for advancing to the F2 generation. In addition to the 50 cross combinations developed during Rabi season 1986-87, 90 other cross combinations were developed during summer season 1986-87. The programme is continuing.

Mutation breeding programme in Sesamum

Sesamum varieties ACV-1 and Kayamkulam-1 were subjected to gamma rays at different doses, and the M1 generation was raised during summer season 1986-87. The seeds were collected plant wise and stored for advancing to M2 generation.

Breeding of early maturing Groundnut varieties

The F₁ generation derived from the crosses TMV-2 x 91176, TMV-2 x Chico and MK-374 x Chico was raised during summer season 1986-87. From the 40 F₁ generation lines, 31 single plants were selected for advancing to the F₂ generation.

Comparative yield trial of 24 Groundnut varieties

Variety J-11 was significantly superior to the check variety TMV-2 in dry pod yield.

Comparative yield trial of early cultures of Groundnut

The highest dry pod yield was recorded by Dh (E) 32 and was significantly superior to the check variety TG-3 Dh (E) 32 matured in 99 days, while days to maturity for TG-3 was 105 days.

Maintenance of Germplasm of Groundnut and Sesamum

Germplasm of groundnut and sesamum was collected from various sources in the country. The collection consists of 800 groundnut varieties/types and 210 sesamum varieties/types. The germplasm is being maintained in the station.

Co-ordinated Varietal Trials (AICORPO) in Sesamum:-

The performance of the sesamum varieties supplied by AICORPO under Onattukara condition and identify superior varieties for trials and breeding programme are carried out in this trial.

There is significant difference between treatments. Maximum yield was recorded by Thilothama 303 kg/ha followed by RT-54 (257 kg/ha) and Kayamkulam-1 (257 kg/ha).

AICORPO Trials in Groundnut:

Initial Evaluation Trial (New)

Significant differences existed among the varieties for pod yield. The variety J-11 gave the highest dry pod yield followed by the varieties, Dh-20, TG-3, VF-77, Co-2, KGS-35-1, and MH-6, showing no significant differences among them.

Initial Evaluation Trial (Early)

Significant differences were observed for pod yield among the varieties. The variety Dh (E)-32 recorded the highest dry pod yield and this was on par with the varieties TG-3, VG (E)-55 & TCGS-1.

Effect of soil dusting on the growth and yield of sesamum

There is no significant difference in grain yield due to the effect of treatments. Maximum grain yield was recorded by 2% urea spray.

Evaluation of fungicides for the control of Leaf spot and pod blight disease of Sesamum

Though there was no significant difference between treatments, spraying with Bordeaux mixture 1% was found comparatively better in controlling the disease and increasing the yield. Similar results were obtained during previous season also.

Chemical control of Seed rot and Collar Rot of Groundnut

Seed treatment with Bavistin 0.2% or drenching the soil with 0.2% Bavistin immediately after sowing is found very effective in controlling seed rot and collar rot of Groundnut.

PULSES

Screening of cowpea variety suitable for summer rice fallows and coconut gardens

An Initial Evaluation Trial (IET) was laid out in coconut garden during Kharif using 54 varieties. The performance of the varieties was quite satisfactory. Observations were recorded for eight characters, viz., days to flowering and maturity, plant height, pods/plant, pod length, seeds/pod, grain yield/plant and 100 seed weight. 12 varieties have been selected for conducting CYT in coconut gardens during next kharif.

Comparative yield trial in rice fallows

Twenty varieties (16 varieties/cultures+4 local checks) were grown in summer rice fallows during January, 1987. The performance of the crop was quite good inspite of severe drought.

Significant differences were observed for seed yield among the varieties. The variety CO.3 recorded the highest seed yield followed by COVU-8456, and DPI-1243.

BLACKGRAM

To identify blackgram genotypes suitable for (i) summer rice fallows and (ii) coconut gardens

Onattukara region

53 varieties of blackgram were grown in the coconut garden during September, 1986. The performance of the crop was very poor. This must be due to insufficient moisture in the garden land during the season. Hence the IET will be repeated during next kharif season itself (May-July).

CYT (first) in Rice fallows

Twelve varieties (10 varieties/cultures+2 checks) were grown during January.

The stand of the crop was quite satisfactory inspite of severe drought during the season.

The yield data was statistically analysed and there was significant difference in seed yield between varieties. The highest yield was recorded by the culture COBG-307 followed by CO-4.

1.23. CROPPING SYSTEMS RESEARCH CENTRE, KARAMANA

The centre is situated at Nedumcaud, Karamana 3 KM south east of Trivandrum central Railway station. It is established in 1955. The area of the centre is 7.65 ha comprising of 7.25 ha of lands and 0.40 ha garden land.

It is the major centre of All India Co-ordinated Agronomic Research Project and also functions as the main centre of this project. In addition to the Agronomic Projects of the AICARP scheme, Kerala Agricultural University experiments are also being conducted here. It also meets the requirement of farmers for seeds of high yielding varieties.

From October 1983 onwards this station has been upgraded as the Headquarters of AICARP scheme in Kerala. Karamana is also the Head quarters of the scheme "experiments on the cultivator's field" at Quilon.

Dr E. Thajuddin continued to be in charge of the centre during the year.

Sri P. Yageen Thomas, Assistant Professor of Statistics has been granted study leave for undergoing M. Phil. course in Statistics.

Given field training to the vocational higher secondary Agricultural students and B.Sc. (Ag) out going students, in this station.

Dr Tajuddin, Dr. Saifudeen, Mr S. M. Shahul Hameed, and Mr P. Yageen Thomas have attended the group meeting of the scientists working in AICARP scheme at Bangalore during the month under report.

Research

No. of Research projects as on 31-3-86 is 14.

PROJECTS CONCLUDED DURING THE YEAR

Crop technology for optimum production under resource constrains

Objectives are to find out suitable package of practices for rationalisation of inputs usage for higher return in crop sequence.

During both kharif & rabi normal date of planting, with recommended dozes of fertilizer and with need based plant protection recorded maximum grain and yield. In general, plots which were planted on normal date of planting gave better yields.

AICARP Experiments

Economics of crop sequence and their effect on soil fertility and crop productivity over the years.

The experiment was started during Kharif 85-86. All operations for rice crop for all the treatments were done during the kharif and rabi season. The summer crop was taken up as per treatments.

Permanent plot experiment on integrated nutrient supply in a cereal based crop sequence

Objective is to develop suitable integrated nutrient supply system for a cereal based crop sequence involving more efficient use of fertilizers in conjunction with a judicious combination of organic manure by effective recycling techniques without detriments to long term soil fertility and by improving crop productivity.

Long range effect of continuous cropping and manuring on soil fertility and yield stability

Objective is to study the long range effect of selected crop sequences with high yielding varieties and graded fertilizer levels on the yield stability and soil fertility.

The experiment was started during 1977-78 kharif and is proposed for 10 years. It is being continued in the same lay out plan with the same set of treatments. Since the first two crop was a failure the experiment was proposed to be extended for two more years.

Fate and efficiency of urea based fertilizer nitrogen for rice

Objective is to find out the fate and efficiency of urea based fertilizer nitrogen for rice.

The experiment was started during kharif 1985-86 and kharif crop was taken up as per the technical programme. After that a residual study was conducted during rabi giving 50% of the recommended dose of nitrogen. The yield obtained from kharif crop was statistically analysed.

Evaluation of synthetic pyrethroides for the control of rice ear head bugs

It is reported that the synthetic pyrethroides are having high insecticidal activity with low toxicity. This study is intended to evaluate the efficiency of four synthetic pyrethroides at two doses in comparison with Methyl Parathion as check for the control of rice bug.

The experiment has been conducted in two seasons in the year under report.

Other matters

The lab to land programme and village adoption scheme of the KAU has been implemented through this station during the year under report. This programme has helped to motivate the farmers for adopting vegetable cultivation and goats rearing at peringamala of Nemom Village.

1.24. NATIONAL AGRICULTURAL RESEARCH PROJECT (SOUTHERN REGION), VELLAYANI

The National Agricultural Research Project (Southern Region) with its lead station located at the College of Agriculture, Vellayani is one of the six sub-projects sanctioned under the ICAR, with the objective of strengthening the research capabilities of the Kerala Agricultural University.

The establishment of a special station at Kottarakkara to tackle the specific field problems of homestead farming was also envisaged. The land for establishing the special station was handed over to the University on 26-4-86. Subsequently, the station started functioning from 14-5-86 at Sadanandapuram, 5 km south of Kottarakkara.

The assistance was provided by the International Development Agency (IDA) for a period of five years. The southern region covers the districts of Trivandrum, Quilon, Pathanamthitta, Alleppey and Kottayam, except the high ranges and the problem areas (such as the coastal saline tracts, Onattukkara sandy soils and the problem soils of Kuttanad) for which separate NARP sub projects have been sanctioned. Although this project was sanctioned with effect from 1-9-81, its actual implementation dated from 8-2-1982 only. The first phase of the project ended on 29-11-1986.

Major objectives are multi-disciplinary research on various situations for the integrated development of the region, aimed at maximum farm productivity and net income of the farmers, particularly the small and marginal farmers.

The specific objectives include the following:-

- i) to formulate and undertake research on tapioca and other tubers and on homestead farming systems as the lead functions at the Regional Station, Vellayani and the special station at Kottarakkara, respectively.
- ii) to conduct regional workshops for each planting season (kharif and rabi) and to establish an effective institutional net work for ensuring feed back between the scientists and the extension personnel.
- iii) to undertake limited field extension activities through participation in field work, training, Kisan Mela etc., thus making research more purposeful and transfer of technology more rapid.
- iv) to maintain a catalogue of problems referred to by the extension personnel and the farmers and those observed by the scientists during their field visits, and
- v) to take part in the training of the extension personnel working in the T & V system of Agricultural Extension.

The Eighth Zonal Workshop of the Southern Region was held at Vellayani on the 9th and 10th September, 1986. The progress of the project made till then was reviewed and research programmes for the next seasons were finalised during the workshop.

The various research projects which were being implemented on priority basis, were categorised under the following four main farming systems currently practiced by the farmers of the region:

- Homestead farming system
- * Tapioca based farming system
- * Coconut based farming system
- Rice based farming system

The technical programme for the year under report included 60 research projects under the four main farming systems mentioned above.

The following schemes functioned under the administrative control of the Associate Director.

- * ICAR *ad hoc* scheme on 'Cyst Nematode' *Heterodera oryzoicola* infesting rice in Kerala.
- * Two schemes funded by the Department of Science and Technology namely 'Mushroom flora of Kerala' and 'Mycorrhiza! association and forest ecosystem of Kerala'.
- AICRP on pesticide residues.

The two KAU stations in the region, namely, the Cropping Systems Research Centre at Karamana and the Coconut Research Station at Balaramapuram also functioned under the administrative control of the Associate Director.

Civil work

The plots of land selected for the special station, Kottarakkara were handed over of the University on 26-4-86. A portion of the pond was deepened to serve as a source of irrigation. Work on contour survey of the two plots progressed.

The reclamation of kayal land and the development of additional garden land, except the installation of the pumpsets, were completed during the year.

Dr N Mohanakumaran, Associate Director continued to be in charge of this project.

Seminar/Workshops conducted/attended

A one-day Regional Agrl. seminar was organised at the College of Agriculture, Vellayani on 9-10-86 to impart knowledge to the farmers on the agro-techniques in crop production and also to document the field problems, farmers innovative practices etc.

The VIII Zonal Workshop of the Southern Region was held on 9th and 10th September at the College of Agriculture, Vellayani.

The T & V pre-coordination meetings and the monthly workshops for Trivandrum district were conducted regularly. These were chaired by Dr N. Mohanakumaran, Associate Director. Dr P. Manikantan Nair, Professor of plant breeding continued to serve as a resource person for the workshops.

The scientists under the NARP (SR) participated in the VIII zonal workshops held at the College of Agriculture, Vellayani on 9th and 10th of September, 1986 and presented the progress reports of the projects handled by them.

Dr N. Mohanakumaran, Associate Director participated in the seminar on "Problems of coconut production and productivity" held at Kanakakunnu palace, Trivandrum on 27.9.86. He participated in the District Agricultural seminar organised by the Kerala Agricultural University and the Trivandrum District Co-operative Bank on 29.9.86.

The scientists under the NARP (SR) attended the workshop on "Rice Production Technology in Kerala—a critical appraisal" on 9-9-86 and 10-9-86 at the College of Agriculture, Vellayani. The Associate Director chaired the technical session.

NARP (SR) scientists attended the guest lecture on "Fungal Antagonism and Plant Disease Control" by Dr H. P. Reddy at the College of Agriculture, Vellayani on 6-12-86.

Prof. M. K. Mammen, Head of the special station and Smt S. Sobhana, Jr. Asst. Professor attended the Agrl. Seminar held by the National Demonstration scheme at Karunagappally on 2-1-'87.

Dr N. Mohanakumaran, Associate Director and Dr (Mrs) P. Saraswathy, Associate Professor attended the 'National seminar on Agro-meteorology of Plantation Crops' held at the Regional Agrl. Research Station, Pilicode on 12th and 13th March, 1987.

Sri Arthur Jacob, Assistant Professor of Nematology, ICAR *ad hoc* project on Rice Cyst Nematodes, participated in the "Summer Institute on Nematode disease. problems and their management" from 5-5-86 to 24-5-86.

Smt G. R. Sulekha, Asst. Professor of Horticulture attended a training in Social Forestry at Mannuthy on the 1st and 2nd July, 1986.

Dr K. K. Rao, King's College, London gave a special lecture on Photosynthesis and its Application in the production of Fuels and Chemicals on 1-1-87

Research

Number of Research Projects as on 31-3-86 was 60.

RESEARCH HIGHLIGHTS

RICE

In the project on screening rice varieties and cultures for tolerance/resistance to BPH, sheath blight and yield potential, the performance of the varieties over three years showed that Jyothi recorded the highest grain yield (3438 kg/ha) followed by Cul. 1954 (2478 kg/ha). With respect to sheath blight and sheath rot incidence, the Culture 1954 exhibited superiority over the others.

Application of granular insecticides (Furadan 3 G) has been found to be effective in controlling the stem borer and gall midge in the vegetative phase. In the later stage, sprays were found to be better than granular application. Among the sprays, Ekalux 0.05% was the most effective, especially against leaf roller. Considering the overall effects on pest control, prophylactic application of Furadan 3 G @ 1.5 kg. ai/ha + need based spray of Ekalux 0.05% was found to be more effective. This treatment also recorded the highest yield.

VEGETABLES AND TUBERS

Seventeen sweet potato types were screened for their suitability to summer rice fallows. Muttavella gave the highest yield (10kg/12.96m²), followed by H4021 (8 kg/12.96m²). For upland conditions, the type SPC-13 gave the highest yield (6250 kg/ha) followed by SPC-18 (5278 kg/ha)

An adaptive trial with hybrid clones of sweet potato was conducted in three locations (Muttacaud, Punnakulam, Panakode). The local varieties out-yielded the hybrids H 2723, H 4021, H 4126 and Kanhangad Local.

Nine farm trials were conducted with V-26 cowpea as companion crop for tapioca, during the kharif season of 1986. In all locations, V-26 (800 kg/ha) out-yielded C-152 (649.5 kg/ha). Thus, V-26 has been found to be an ideal companion crop for tapioca.

Farm trials with the pre-release cultures of chilli were conducted in 10 locations. In six locations culture-57 gave the highest yield, followed by the culture-47. Cui-57 yielded 69.5 kg/cent whereas Cui-47 yielded 70.6 kg/cent and Vellanotchi yielded 52.5 kg/cent. The VIII Zonal workshop recommended Cui-57 and 47 for Trivandrum district and further trials for Quilon and Pathanamthitta districts are in progress.

PULSES AND OILSEEDS

In the adaptive trial on dry land agriculture with cowpea varieties, KM-1 recorded highest yield (905.22 kg/ha) followed by T-9 (882.38 kg/ha) and TMV-1 (791.54 kg/ha) in two locations. In one location, T-9 ranked first followed by TMV-1 and KM-1.

In the varietal evaluation trial with groundnut grown under partially shaded conditions in coconut plantations, TG-3 recorded the highest yield of dry pods (415 kg/ha) followed by Pollachi-1 (371 kg/ha).

Two *Rhizobium* cultures each for blackgram (KAU-BG-2, KAU-BG-12) and groundnut (USA-123, GNI-K) were ready for release to the Department of Agriculture for mass production and distribution in the state.

FODDER CROPS

In the varietal evaluation for guinea grass under partially shaded conditions in coconut plantation, the variety FR-6000 gave the highest yield followed by FW. 429 and Hamil.

In the observational trial on the control of rhinoceros beetle in homesteads, both doses of BHC (0.1 and 0.2 kg ai/m²) and Aldrin (0.025 and 0.05 kg ai/m²) were found to be effective in controlling the grubs in cowdung pits.

Research Report

RICE

Screening of rice varieties and cultures for tolerance/resistance to BPH, sheath blight and yield potential

The project aims at identification of rice varieties and pre-release cultures for tolerance/resistance to BPH and sheath blight, coupled with high yield potential.

The trial conducted during kharif 1986 with medium duration varieties/cultures did not show any significant difference in respect of sheath blight and sheath rot incidence. However, low sheath blight incidence was recorded in MO-6, M-210 and Cul-126. Similarly low incidence of sheath rot was noticed in Cul-4-4 (Vytila-3), Cul-126, IR-36 and Cul-153.1. The pre-release culture 169 recorded the highest grain yield (3827.5 kg/ha) followed by Cul. 4 (3210 kg/ha).

Adaptability of the rice culture 24-20 for the southern region

The objective is to find out whether the rice culture 24-20 evolved at KAU is suitable for popularisation in the southern region. Field experiment was conducted at the Vellayani wet lands in 50 cents area during February to May 1986. Rice cul. 24-20 was wet sown in 25 cents and was compared with Annapoorna. The variety Annapoorna was found to be superior to Cul. 24-20 in terms of grain yield and more tolerant to pest attack and disease incidence.

Use of cheaper and efficient sources of phosphatic fertilizers for cowpea in rice fallows

The project aims to assess the comparative effects of different phosphatic fertilizers on cowpea, with a view to (i) finding out a cheaper and efficient fertilizer, (ii) estimating the residual effect of phosphorus applied to cowpea on the succeeding crop of paddy and (iii) working out the economics of each treatment.

It was found that single super phosphate could bring about significantly higher cowpea grain yield over the rock phosphate treatments. In the residual effect of applied phosphorus on a succeeding rice crop, it was found that rock phosphate treatments resulted in higher yield of paddy over super phosphate. Among the rock phosphates, mussorie phosphate performed the best. This means that the residual effect of phosphorus in the soil on the succeeding rice crop was higher in the case of rock phosphates than with single super phosphate.

Fertilizer management in rice variety 'Cheradi'

The experiment was laid out to find out a suitable fertilizer management schedule and time of application of fertilizer for rice variety Cheradi. The study revealed that an increase in the level of fertilizer from 40:20:20 to 70:35:35 kg NPK/ha brought about a progressive increase of 13% in the yield, with an increase in the level of fertilizer from 40:20:20 to 50:25:25 kg NPK/ha, were as the increase in grain yield was reduced to 6% when the level was enhanced from 60:30:30 kg NPK/ha to 70:35:35 kg/ha. Even-though not significant, nitrogen given in three splits, 50% as basal, 25% at active tillering and 25% at panicle initiation stages recorded the highest grain and straw yields.

ICAR ad hoc scheme on cyst nematode, Heterodera oryzae infesting rice in Kerala

A survey of the rice soils in Trivandrum district was done during 1985. A total of 163 soil and root samples were collected and processed for nematode estimation. Results showed that cyst nematode was present in twenty three different locations of Trivandrum district with a range of 0 to 63 nematodes per 100 ml of soil.

During 1986, survey of rice soils in Trichur, Quilon, Palghat and Pathanamthitta was completed. Twenty soil and root samples from Trichur district, 77 soil and root samples from Quilon district, 21 root and soil samples from Palghat district and 40 soil and root samples from Pathanamthitta district were processed for nematode estimation.

It is seen that cyst nematodes are present in 3 samples out of 77 collected from Quilon district, 1 sample out of 20 samples from Trichur district, 3 samples out of 21 from Palghat district.

Survey works continued in other districts of Kerala. Crop loss estimation has been completed. Culturing of nematodes and other works are progressing.

Investigations on the etiology of root (wilt) disease of coconut

The experiment aims at finding out whether or not there is any indication of the presence of pathogenic agents like virus, viroids, mycoplasma and rickettsia like organism in the root (wilt) affected palms.

This involves collection of samples from diseased and healthy palms for nucleic acid extraction followed by gel electrophoresis of the extracts to determine any additional nucleic acid in the diseased material. The second part of the trial envisages the treatment of the diseased palms with antibiotics like Tetracycline and Penicillin for assessing their effect on the disease. Preliminary experiments of PAGE (Polyacryl Amida Gel Electrophoresis) were conducted from the sap of herbaceous plants, but distinct bands could not be developed. Three

different techniques of PAGE were tried later to determine whether there is any indication for the presence of additional nucleic acid in the diseased plants. No clearcut indication has been obtained so far.

Control of rhinoceros beetle in homesteads

The objective is to evaluate the extent to which application of soil insecticides at the bottom of the manure pits will control the pest.

Based on previous results a second experiment was laid out at the Instructional Farm, Vellayani. Soil at the bottom of manure pits were treated with BHC @ 0.1 and 0.2 kg ai/m³ and Aldrin @ 3.05 and 3.075 kg ai/m³ and cowdung was heaped over the treated soil. Result showed that both the doses of BHC and Aldrin were found to be effective in controlling the grubs in the pits.

Bionomics and control of Paradasynus rostratus in coconut

The project aims to study the biology, ecology, nature and extent of damage and to evolve suitable methods for the control of the pest.

Guava was found to be an alternate host of the coried bug. The biology of the insect in guava was studied in detail. Life cycle was completed within 35 to 40 days. Egg mass of the pest was also observed in mango. The stage susceptibility studies in coconut indicated that nuts upto a period of 140 days were susceptible to attack by the bug, resulting in 89 to 95% fall of nuts.

An experiment for fixing the schedule of insecticide application for the control of the pest was started during the year under report. Treatments were given at monthly, bimonthly and trimonthly intervals avoiding the periods of heavy rain.

Results indicated that BHC 0.2%, Carbaryl 0.1% and Endosulfan 0.1% were effective.

SPICES

Survey and control of pollu beetle of pepper

The objective is to assess the extent of damage and reduction in yield caused by pollu beetle. The efficacy of insecticides in controlling the loss is worked out.

The survey on the pest incidence carried out in six panchayats of Ranni (Pathanamthitta) in July 1985 indicated that percentage of spike damage range from 9.88 to 52.35 in different localities. The infestation was maximum in Angadi Panchayat (mean 34.75%). In December, 1985 the percentage of berries infested by pollu beetle was found to range from 3.22 to 12.53 in the different locations, at Ranni. Field experiments at Nedumangad indicated that Endosulfan 0.05% was the best.

FRUIT CROPS AND FLORICULTURE

Flower initiation and fruit development studies in Red Banana

The objective of this project is to find out the actual time of flower initiation in Red Banana for developing an effective manurial schedule for this particular cultivar.

Fifty suckers of uniform age were planted at the Instructional Farm Vellayani. Starting from the 5th month of planting, four plants were uprooted at random every 15 days and dissected to locate the apical meristem.

With the basic information obtained from this trial, the experiment has been laid out again, with suckers of known age.

Nutritional requirements of Red Banana under rainfed conditions

The project envisages to formulate and recommend a fertilizer schedule for Red Banana. Results of the study showed that there was no significant difference between treatments in the number of days taken from planting to shooting. With regard to yield, the TNAU ad hoc recommendations recorded the highest yield of 12.38 kg which was statistically superior to all other treatments. Similar results were obtained in the case of number of fingers per bunch.

The experiment is being repeated with changes in treatment combinations as suggested by the Zonal Workshop.

Control of bunchy top disease of banana using granular insecticides in rice fallows (Adaptive trial)

The objective is to find out the time of application and interval of application of granular insecticides for the best control of the bunchy top disease.

Multi-locational trials were carried out at Maruthoor, Alathur and Kuttianikkadu to fix the interval of application of insecticides by treating the plants, giving the insecticides once in two, three, four and five months. The results indicated that the application of phorate at different intervals was found to be significantly superior to the control in reducing the bunchy top disease of banana.

Use of organic waste/green leaves for the control of nematodes associated with banana

The project aims to evaluate the efficacy of green leaves and organic wastes for the control of nematodes associated with banana.

From the experiment, it was found that the following genera of nematodes attack banana in the area viz. *Pratylenchus*, *Radopholus* and *Helicotylenchus*. The nematode population in soil and root was estimated at 4 months interval. From the nematode lesion index and the grades of the bunches, it was observed that the plants supplied with the panal leaves showed better growth and the least number of lesions on roots. The second best treatment was clerodendron leaves.

In the trial with organic wastes, there was no significant difference.

VEGETABLES AND TUBERS

MLT of pre-release cultures of chillies

The objective is to evaluate the yield of three promising cultures generated through intervarietal hybridisation and selection, under farmers' field conditions at multiple locations before release.

Farm trials at 10 locations were conducted during the summer season of 1986. In addition, a trial was conducted at the department of Plant breeding, College of Agriculture, Vellayani. The VIII Zonal Workshop recommended cultures 57 and 47 for Trivandrum district and further trials for Quilon and Pathanamthitta districts.

Identification of vegetable types of cowpea suitable for cultivation in homestead gardens

The objective is to identify suitable vegetable types of cowpea for cultivation in homestead gardens.

Selections were made during Kharif '83 from different localities. The CYT was conducted during 84 and during Kharif '85. Sel. 7 and Sel. 16 were on par. The CYT was repeated during Kharif '86 and the result showed that selection 7 and Sel. 11 were on par with the highest yield of Sel. 16 and the three were significantly superior to the others.

Genetic improvement of vegetable crops cultivated in the southern districts of Kerala, suited to summer rice fallows

The project aims at varietal improvement of the popular vegetables such as bhindi, brinjal, chillies and cucurbits so that yield potential, adaptability and tolerance to pests and diseases are enhanced.

Bhindi

Eleven elite types were evaluated in three trials. In all the three experiments, the selection AE-1 maintained consistency in yield. This culture has been recommended for farm trials by VIII Zonal Workshop.

Bittergourd

Out of the nine elite types cultivated, the variety MC-8 maintained consistency in yield.

Amaranthus

From the evaluation of nine elite types, selection-8 maintained consistency in yield.

Brinjal

Out of twenty two selections, SM-15 gave the highest yield.

During Kharif '86 the CYT of amaranthus with nine selections and Kannara Local as check variety continued. Selection-8 has consistently given higher yields.

Identification of sweet potato types suitable for summer rice fallows

The project aims to identify sweet potato varieties with high yield potential for cultivation in rice fallows during summer.

The experiment was laid out in the rice fallows during summer 1985-86. The data showed that the variety 'Mutta Vella' gave the highest yield (10 kg/12.96 m² followed by H 4021 (8 kg/12.96m²)

Identification of sweet potato types suitable for uplands

The project aims to identify sweet potato varieties with high yield potential for cultivation in the uplands during Kharif.

A preliminary trial was carried out with 36 varieties/types during Kharif 1983. Out of these, 17 were selected and tested during Kharif '85. Muttavella gave the highest yield followed by H-4021 and Nedinjal Chuvala.

The experiment was repeated during Kharif 86. Result showed that highest yield was recorded by SPC-13 (6250 kg/ha) followed by SPC-18 (5278 kg/ha) and SPC-20 (5278 kg/ha). The incidence of weevil attack was the lowest in the type SPC-13.

Evolving intercropping system in cassava for April-May planting

The objective of this experiment is to evolve an economically suitable system in cassava for April-May planting. Among the intercrops tried groundnut recorded the highest yield which was significantly superior to all others.

Identification of medium duration tapioca varieties suitable for wet lands

Eight medium duration tapioca varieties collected from Trivandrum Quilon, Pathanamthitta were evaluated during Kharif 1986. Results of the study showed that the variety 4/84 yielded maximum, 38.89 t/ha followed by Pravuvella (37.9 t/ha) and Karukannan (35.19 t/ha).

Investigations on the mycorrhizal association of cassava in enhancing the nutrient availability

The project was formulated to isolate mycorrhizal fungus from cassava roots capable of solubilising phosphorus. Survey was conducted in Trivandrum and Quilon districts for the collection of root samples of different cassava varieties. Root samples of eight varieties were thus examined, all of which showed the presence of mycorrhiza.

The results obtained were compared with the occurrence of VAM in M-4, a variety which is popular in both the districts. Maximum index of VAM was observed in the variety M-4.

Control of pests of vegetables in homesteads

The aim was to arrive at common control measures for the pests of vegetables grown in homesteads.

An experiment was laid out in a farmer's field during the summer season of 1985 for the control of pests of vegetables viz., brinjal and bhindi. The granular insecticides Carbofuran and Phorate were applied @ 0.5 kg and 1 kg ai/ha respectively along with seed, and other insecticides were applied as need-based, at two doses each.

The results indicate that application of Phorate along with two need-based application of Carbaryl 0.2% was the best treatment with regard to yield and economics of pest control in brinjal. This was followed by application of Phorate and Quinalphos (0.05%). In bhindi, the best treatment was Carbofuran with one need based application of Carbaryl 0.2%. This was followed by Carbofuran and Malathion (0.1%), Phorate and Malathion (0.1%) and Phorate and Quinalphos (0.05%). All these treatments were equally effective in controlling the major pests of bhindi viz., aphids, jassids, leaf roller and fruit borer.

Determination of waiting periods of insecticides recommended for the control of pests of vegetables in Kerala

The project aims at fixing the waiting periods required for the various insecticides recommended for the control of pests of vegetables in Kerala.

During 1985, waiting periods were fixed for Monocrotophos and Dimethoate in bhindi and for monocrotophos in bittergourd.

In bhindi, the waiting period for Monocrotophos was seven days for unwashed sample and six days for washed sample. For Dimethoate it was 3 days for unwashed fruits and one day for washed fruit.

In bittergourd, the waiting period of Monocrotophos was 10 days for both washed and unwashed fruits. The waiting period of Dimethoate was two days for both washed and unwashed fruits. For Fenthion, the waiting period fixed was seven days for unwashed sample and six days for washed samples.

During Kharif '86 snakegourd plants were grown to estimate the residues of insecticides viz., Malathion, Quinalphos, Fenthion, Dimethoate and Monocrotophos for fixing the waiting periods.

No detectable residue could be found on the 10th day of application. The Quinalphos (0.05%) residue was 2.3 ppm on the first day after application. The corresponding residue on the 3rd, 5th and 7th days after application were 1.17, 0.5 and 0.31 ppm respectively. In the case of Malathion no detectable residues could be found from 5th day onwards.

*Efficacy of different granular nematicides for the control of root-knot nematode *Meloidogyne incognita* on bhindi*

The efficacy of different granular nematicides was tested for the control of root-knot nematode, *Meloidogyne incognita* on bhindi.

Pot culture experiments were conducted with seven different nematicides and one control where in the nematicides Aldicarb, Carbofuran and Phorate were found to be on par for controlling the root-knot nematodes.

Results of the study showed that there was no significant difference in the weight of fruits, height of plants, no. of leaves etc. All these characters showed an increase over the control. Root weight and nematode population in the soil differed significantly. The effect of different treatments on the biometric characters, yield and population of nematode, 100 days after treatment were recorded. Pooled analysis of the two seasons result showed that in all the characters except root weight and nematode population, the effect of the treatment was not significant and consistent. Residue analysis of bhindi fruits was also done and the residues were at non detectable level from the 1st harvest itself. (ie, 47th day after application of Furadan and Thimet).

Influence of stacking methods and insecticidal treatments on the incidence of scale insects on stored tapioca stems

The objective of this project is to evolve a suitable method of stacking for keeping the tapioca stems (after harvest) free of tapioca scale, *Aonidomytilus albus* which infests the crop in the field as well as the stacked stems kept for seed purpose. An effective control measure of the pest was also sought for.

During Kharif 86, attempts were made to rear the scale in potted plants but promising results were not obtained due to non-availability of infested stems.

Control of sweet potato weevil (Cylas formicarius) by drenching insecticides

The project aims at finding out the optimum and minimum number of drenching of insecticides to be given for obtaining effective control of the pest, and to find out an effective dosage of the insecticide for drenching.

The experiment was laid out first in a farmer's field at Kuzhoor (rice fallow). Results of the study showed that drenching sweet potato vines with Fenitrothion 0.1% on the 70th and 80th day gave best protection from *Cylas formicarius* among the vines treated twice and treatment given on 80th day was found to be the best among vines treated once.

PULSES AND OILSEEDS

Adaptive trial in dryland agriculture with (a) cowpea varieties and (b) blackgram varieties (Adaptive trial)

The objective of this trial is to identify cowpea and blackgram varieties suitable to the southern region.

During summer 1985-86, the trial was repeated at three locations with same varieties. The average yield of the three locations showed KM-1 to be yielding most and Co-3 recording the lowest.

Evaluation of the yield potential and adaptability of cowpea and black gram varieties in summer rice fallows

The project envisages to identify suitable cowpea and blackgram varieties with high yield potential and adaptability to the summer rice fallows in the southern districts of Kerala.

Cowpea

A CYT was laid out during this period. The variety Kazhakuttam-1 gave the highest yield (624 kg/ha), followed by C-152 (530 kg/ha).

Black gram

The variety PDU-3 gave the highest yield (505 kg/ha) followed by K. B. 51 (451 kg/ha).

Evaluation of blackgram and horsegram varieties under partially shaded conditions in coconut plantations

The project envisages to identify suitable blackgram and horsegram varieties having high yield and shade tolerance suitable for cultivation in coconut plantations.

Grain yield showed that the variety LBG-20 gave the highest yield, followed by Andoorkonam Local.

A germplasm collection of horsegram with 268 varieties was sown during Rabi 1985. The seeds were collected separately from each variety and stored for raising the crop during Rabi 1986. Twenty varieties have been selected from the germplasm for the CYT during Rabi 1986.

Varietal evaluation for cowpea under partially shaded conditions in coconut plantations

The objective is to identify cowpea varieties with high yield potential coupled with desirable economic attributes and shade tolerance so that they can be profitably cultivated in coconut plantations.

During Kharif 1986, a trial was conducted by including 13 varieties received from AICPIP along with C-152, V-16 and V-26. Results showed significant differences in respect of grain yield. The highest grain yield was recorded by Charodi (250 kg/ha) followed by Co4 (234 kg/ha) and C 152 (222 kg/ha).

Varietal evaluation for groundnut under partially shaded conditions in coconut plantations

During kharif '86 the experiment was laid out with 12 varieties. The varieties differed significantly in respect of pod yield and haulms yield. The highest pod yield was recorded by TG₃ (415 kg/ha) followed by Pollachi-1 (371 kg/ha). The haulms yield was also highest in TG-3 (6000 kg/ha).

Screening of cowpea varieties for resistance against collar rot and web blight disease of cowpea

The objective of this project is to screen a collar rot resistant variety suitable for fallow cropping in rice fields.

A pot culture experiment was conducted with 25 varieties of cowpea. Out of this 25, seven varieties namely V-59, V-87, V-240, V-37, KBC-1, S-488 and CG 104 were found not infected by the cowpea isolate of *R. solani*. The three isolates of *R. solani* did not infect any of the cowpea varieties tested. Seeds of seven varieties found resistant to the organism along with 3 popular checks namely Ptb-1, Ptb-2, and C-152 were multiplied for evaluation in the field during the 3rd crop season of 1985-86. The crop isolate of *R. solani* was multiplied on sand-maize medium and incorporated to the soil at seeding.

Identification of suitable varieties of companion crops for tapioca

The project envisages identification of cowpea varieties to suit the interspace of tapioca during the early growth phase of the latter.

Three field experiments were laid out with eight varieties. The varieties were V-246, New Era, V-26, Kanakamani, Cul.27, Pusa Phalguni HG-22 and C-152.

Since the variety V-26 was consistently the best yielder in all the three trials, it was proposed to conduct farm trials with V-26 as companion crop of tapioca.

Varietal evaluation for groundnut under partially shaded conditions in coconut plantation

The project aims to identify suitable groundnut varieties with high yield potential coupled with desirable economic attributes and shade tolerance, so that they can be profitably cultivated in coconut plantations.

During kharif 86 the experiment was laid out with 12 varieties. Results showed that the varieties differed significantly in respect of pod yield and haulms yield. Highest pod yield was recorded by TG3 (415 kg/ha) followed by Pollachi-1 (371 kg/ha). The haulms yield was also highest in TG-3 (6000 kg/ha).

Studies on rhizobia—Isolation of efficient strains of rhizobium

A preliminary field trial for screening the efficiency of *Rhizobium* cultures for black gram was conducted at the Rice Research Station, Kayamkulam.

A preliminary pot trial for identifying an efficient culture of *Rhizobium* for subabul was conducted using sterilised sand culture technique. The treatments involved different *Rhizobium* cultures used with or without Nitrogen at the rate of 20 kg/ha P_2O_5 and K_2O (30 kg and 10 kg/ha respectively) were uniformly applied. Results showed that a culture of *Rhizobium* originally isolated from *Mimosa pudica* was capable of nodulating subabul.

Control of cowpea aphids in homestead gardens

The project envisages to evolve an effective and economic method of control of cowpea aphids on a cost benefit basis.

Results of the studies indicated that there was significant differences in the incidence of aphids between the plots given need-based treatment of Quinalphos 0.025% and Malathion 0.05% and the plots treated with Carbofuran and Phorate alone. A need based application of Quinalphos 0.025% was found to be the best treatment on the basis of economy. This gave effective and cheap control. Fish oil insecticide was found to be not effective.

Science and Technology Scheme on Mycorrhizal association and forest ecosystems of Kerala

This project aims to study the ecto-mycorrhizae of different forest trees of Kerala.

Survey for the presence of ecto-mycorrhizae in certain species of *Pines* and *Eucalyptus* were completed. Further survey for the presence of ecto-mycorrhizae in Mattupatti region was conducted.

FODDER CROPS

Varietal evaluation for guinea grass under open and partially shaded conditions in coconut plantations

The project aims to identify suitable guinea grass clones with high yield potential coupled with desirable economic attributes under open conditions and as an intercrop in coconut plantations.

The experiment was laid out with 12 varieties under partially shaded conditions in coconut plantations. Four cuttings were taken. The variety FR-600 gave the highest yield, followed by Hamil and FR: 559.

POST HARVEST TECHNOLOGY AND NUTRITION

Studies on mushroom flora of Kerala

The project aims at collection, identification and cataloguing of the mushroom flora of the state.

Collections were made during South-West, North-East monsoon periods from selected localities in Trivandrum, Quilon and Alleppey districts. Out of the forty species of mushroom collected, five species viz. *Agaricus codolensis*, *pleurotus opuntiae*, *Aygrospora marzerols*, *Clitopilus orcellus* and *Stropharia coronilla* were found to be the first records of the country.

During 1986, survey work continued and about 45 sp. were collected and identified. Beds of *Volvariella volvacea* and *Pleurotus* sp. were laid out following polybag methods.

Spawn production of *P. sajor caju* was tried in a mixture of tamarind seed and wheat (1:1) and good mycelial growth was observed in 10 days.

Improvement of bee keeping practices in the homesteads

The project initiated during 1984 aims at evolving methods for eliminating the constraints in bee keeping in order to make it a profitable venture in the homesteads.

After a preliminary survey, twenty bee colonies were selected and procured. Bee equipment including ISI boxes were also purchased. Wax moth and mite infestations were controlled tactfully. As a lean season management practice, the bees are artificially fed with sugar syrup. The natural queen rearing in three selected colonies was exploited with success. Different pollen substitutes were tried, the last being a mixture of skim milk powder, honey and yeast. The acceptance to be assessed.

FARM ECONOMICS, EXTENSION AND STATISTICS

Utilisation pattern of farm information sources by the homestead farmers of NARP

The objectives of the project are to study the utilization pattern of farm information sources and the relationship of farm information source use and adoption behaviour of the homestead farmer. Based on these objectives, a pilot study was conducted for the preparation of a questionnaire. A second pilot survey was conducted based on which the questionnaire was modified. Collection of data is in progress during the period under report.

Basic socio-economic survey of the households in the southern region of the NARP

The main objective of NARP (Southern Region) is to undertake research on crops (particularly tapioca and other tubers) and farming systems (homestead farming system) for the integrated development of the region with a view to maximising productivity of farmers and the net income of the farmers, especially the marginal and small farmers in the region.

A pilot survey was conducted during March '83 among 20 homestead farmers (upto 1 acre) covering different localities in the region.

The collection of data using the approved printed proforma was started in January 1985. Two stage stratified random sampling design was adopted for identifying the farmers in the sample. The farming situations in NARP (SR) were identified as,

- 1 Suburban (wet land and dry land)
- 2 Coastal (wet land and dry land)
- 3 Backwater
- 4 Midland (wet land and dryland) and
- 5 Mid upland (wetland, garden lands & dry lands)

While collecting the data for computing the cost of production of different crops only the major crop (rice, coconut, tapioca, banana and

pepper) were considered. The homestead was taken as a separate unit taking into consideration all the crops grown in the homestead.

The criterion for deciding the farming situation was followed taking into consideration the relative dryland and wet land areas possessed by the farmer. However, this procedure could not be applied in mid-upland situations where rubber, coconut and other cash crops were the major crops. In such areas, paddy cultivation was either not done or done in very small areas (that too by a very few farmers only) when compared to the dryland cultivation. Hence in mid-upland situations of farmer who cultivates paddy was considered as a wetland cultivator, irrespective of the extent of wetland area under his possession and the survey was conducted accordingly.

Field data collection was completed and the data are being analysed using computer facilities.

Pattern of occurrence of rainfall in the southern districts of Kerala

The project aims to study the pattern of occurrence of wet and dry days during the crop seasons and to identify the centres having similar pattern of occurrence of rainfall in the southern districts of Kerala.

During the period under report, data on daily rainfall relating to the southern districts of Kerala were collected. Tabulation and analysis of the data progressed to identify suitable models for the distribution of rainfall in the southern districts of Kerala.

Studies on biennial bearing tendency in perennial crops

The data on yield of west coast tall variety of coconut for a continuous period of twelve years (1968 to 1979) were collected from 348 palms of the C, D and E blocks of R.A.R.S, Pilicode.

Among these 348 palms, 216 were subjected to a fertilizer treatment for four years from 1972 to 1975 with 3 levels each of N, P and K and two levels of magnesium.

The remaining 132 palms received a uniform treatment (0.5 N, 0.32 P₂O₅ and 1.2 K₂O, during the above period. Since the effect of the fertilizer treatment manifests on coconut yield only three to four years after application, the treated palms for the period 1972-75 were also considered as uniformly treated for the study. Of these palms, 53% showed biennial tendency in fruit bearing during the period 1968-75. While only 23% showed the habit during the post experimental period. This reduction in biennial bearing tendency may be attributed to the the treatment effects. Since bienniality was less in the post experimental period, the influence of each treatment in reducing bienniality was examined. The tendency was predominant at various levels of N and K and at higher levels of P. Application of Mg at 0.5 kg per palm, per year was also not helpful for a reduction in bienniality.

PLANT PROTECTION

Investigations on the biology and population dynamics of earthworms and their role in agricultural productivity

A survey was conducted in Trivandrum district for assessing the population of earthworms. Sample collections were made from the backyards of houses, the root zones of crops (coconut, banana, tapioca and paddy) and from the fallow land.

The principal species collected from the garden land was identified as *Lampito marritii*.

Trial to culture earthworms in flower pots was not successful as they did not breed properly under laboratory condition. Another trial was carried out by maintaining earthworms in big flower pots and in cement cubicles under field conditions to study their breeding habits and further work is in progress.

Studies on the population build up of nematodes (Meloidogyne incognita, Radopholus similis and Helicotylenchus sp.) in homestead gardens of Trivandrum district. (Agri. VLY (PP) 129/82—NARP)

The objective is to study the nematodes associated with important crops in the homesteads and to assess their fluctuation in different cropping systems and soil types.

Nineteen homesteads were surveyed. The crop combination in these homesteads were coconut alone, coconut-banana, coconut-banana-tapioca, coconut-arecanut-banana and coconut-pepper. Apart from *Meloidogyne incognita*, *Radopholus similis* and *Helicotylenchus*, other genera like *Tylenchorhynchus*, *Tylenchus*, *Criconeoids* and *Hoplolaimus* were present. The predominant genus found in the samples was *T. lenchorrhynchus* sp.

During Kharif '86 survey was conducted on the same selected 54 homesteads. Apart from the other nematodes, *Rotylenchulus* were also present. According to the frequency of occurrence, *Rotylenchulus* ranked first followed by *Tylenchorhynchus*.

An area of 8.96 ha. of land was handed over to the KAU (on 26-4-86) at Sadanandapuram, near Kottarakkara for establishing the special station, sanctioned under NARP (SR). The station started functioning from 14-5-1986.

Information centre

The Information Centre established for highlighting the activities and achievements of the NARP (SR), continued to function during the year under report. New specimens and charts were included to strengthen the Information Centre.

Visitors

Sri. Parthasarathy, IAS, Gujarat Agricultural University, Dr. S. S. Cheema, Punjab Agricultural University and Dr. C. Suyambulingam, College of Agricultural Engineering, Tamilnadu Agricultural University were visited the station during the year.

A Team of World Bank visited during 8/86.

Members of the Executive Council, Maratwada Agricultural University, Parbhani visited during 11/86.

Dr A. N. Mphru, Faculty of Agriculture, Morogosa, Tanzania and a team visited for appraisal of Phase II of NARP on 2/87.

1.25. COCONUT RESEARCH STATION, BALARAMAPURAM

The station was established in 1963. It is located at Kattachalkuzhy 4 km of south Balaramapuram on the Balaramapuram-Vizhijam route. The area of the farm is 14.13 ha. It is situated at 90 metres above sea level. Soil type is deep red loam soil.

The objectives are to conduct research in coconut in typical red loam soils (Vellayani series) of south Kerala with particular emphasis on Agronomic aspects and plant protection.

Sri K. Sivasankara Pillai, Professor continued to be in charge of the station.

Research

No. of Research projects as on 31-3-87 is four.

Ongoing projects

1. Four field-trials are being continued in the station.
- 1 NPK fertilizer trial starting from young seedlings.
- 2 Spacing-cum-manurial experiment on coconut starting from seedling stage.
- 3 Progeny row trial with T x D and T x GB seedlings
- 4 Screening of high yielding coconut varieties which are tolerant or resistant to different pests and diseases.

Training programmes

Field training was given for final year B. Sc. (Ag) students sent from the College of Agriculture, Vellayani. Field practical in coconut cultivation was imparted to T & V inservice trainees sent from the College of Agriculture, Vellayani.

2 FACULTY OF VETERINARY AND ANIMAL SCIENCES

2.1 COLLEGE OF VETERINARY AND ANIMAL SCIENCES

The College of Veterinary and Animal Sciences was established in 1955 at Mannuthy about 6 KM from Trichur on the National Highway No.47 towards Palghat. The college became a constituent unit of the Kerala Agricultural University in February, 1972. The College has associated with it a Livestock Farm, a Poultry Farm and a Pig Breeding farm. There is also a goat farm and poultry unit in the campus attached to the All India Co-ordinated Project. The college and the residential campus cover an area of 195 hectares.

Dr K Radhakrishnan, Professor (Research Co-ordination) continued to hold charge of the Dean of the Faculty of Veterinary and Animal Sciences. Dr M Krishnan Nair continued as Director, Veterinary Research and Education.

The following 19 Departments viz., (1) Anatomy, (2) Animal Management, (3) Animal Reproduction, (4) Animal Breeding and Genetics (5) Clinical Medicine, (6) Dairy Science, (7) Extension, (8) Microbiology (9) Nutrition, (10) Parasitology, (11) Pathology, (12) Pharmacology and Toxicology, (13) Physiology, (14) Poultry Science, (15) Preventive Medicine, (16) Surgery, (17) Veterinary Public Health, (18) Statistics and (19) Animal Production Economics continued to function during the year.

Two Veterinary hospitals one at Mannuthy and the other at Kokkalai Trichur along with the Livestock Farm, Poultry Farm, Pig Breeding Farm and A. I Centre served as Instructional units of the College.

Faculty Improvement Programme

Dr KV Athman and Dr SP Suresh Nair attended training in Embryo Transfer at IVRI for 2 weeks during December, 1986. Sri N Narayanan Nair, Associate Professor of the Department of Dairy Science attended the training programme on Dairy Plant Management at NDRI, Karnal from 9 to 24th April, 1986, Dr P Prasad underwent a training on milk products at NDRI, Karnal from 10.6.1986 to 1.7.1986, Dr Geevarghese also attended the training programme at NDRI, Karnal during October, 1986. Sri VR Reghunandan, Department of Pharmacology, was deputed to undergo 3 months training in Toxicology at Central Chemical Examiner's Laboratory at Trivandrum during October, 1986 to January, 1987. The staff of the College attended the guest lecture by Dr KP Poulouse of Kottayam Medical College on Epidemiological features of thyroid disorders in Kerala during July, 1987.

The following members of the staff were on deputation or on leave for higher studies.

Dr K Narayanankutty from Poultry Science Department,
Dr P A Peethambaran from Poultry Science Department,

Dr Leo Joseph, from Poultry Science Department,

Dr K Sreedharan Unni, Junior Assistant Professor, Department of Anatomy,

Dr K C Raghavan, Assistant Professor, Department of Animal Breeding and Genetics continued on deputation,

Academic Programme

The student strength is given below,

I. UG Course	Men	Women	Total
I B. V. Sc. & AH 1986	76	32	108
II -do- 1985	89	28	117
III -do- 1984	81	33	114
IV -do- 1983	57	12	69
V -do- 1982	58	18	76
-do- 1981 and earlier	51	30	81
Total	412	153	565

No. of students from other States/Countries with details

	Men	Women	Total
Jammu & Kashmir	6	—	6
Goa	7	1	8
Meghalaya	—	1	1
Delhi	1	1	2
Andhra Pradesh	1	—	1
Laksha Dweep	8	—	8
Bhutan	4	—	4
Zimbabwe	—	1	1
Sudan	2	—	2
Malaysia	1	1	2
Uttar Pradesh	1	—	—
Arunachal Pradesh	2	—	2
Manipur	2	—	2
Assam	—	—	—
Total	35	5	40

No. of students obtained the degree during the year

Men	Women	Total
22	3	25

II. PG Courses				
M. Sc. (Ag.) Stat		Men	Women	Total
	I Year	—	5	5
	II Year	2	7	9
M.V.Sc				
	I Year	7	6	13
	II Year	7	5	12
Ph. D				
	I Year	3	—	3
	II Year	4	—	4
No. of students who obtained degree				
M. V. Sc.		—	—	—
M. Sc. (Ag. Stat)		2	3	5
Ph. D (Vety.)		—	—	—

Study tours conducted

- All India study tour during March–April, 1986
- Study tour to Indo-Swiss Project, September, 1986 (for 1981 batch)
- Study tour to Indo-Swiss Project, Mattupetty for 1982 admission during September-October and
- All Kerala study tour
- Study tour to Parambikulam wild life sanctuary
- Study tour to Veterinary Biological Institute, Palode
- All India study tour for 1982 batch March–April, 1987
- Study tour to Kerala Drugs and Pharmaceuticals, Alleppey
- Study tour to Dhoni Farm, Malampuzha
- South India Study tour during January, 1987.

Details of scholarships during 1986-87

1	ICAR Senior Fellowship	—
2	ICAR Junior Fellowship	5
3	KAU Senior Fellowship	—
4	KAU Junior Fellowship	6
5	ICAR Merit-cum-Means Scholarship	15
6	National Merit Scholarships (Throu- Dir. Collegiate Edn.)	33
7	National Foundation for Teachers Welfare Scholarships	—
8	Government of India National Loan Scholarship	1
9	Scholarship for service personals	—
10	Labour Welfare Fund Board Scholarship	3
11	Educational Concessions SC/ST	56
12	Educational Concessions OBC	5
13	Educational Concessions KPCR	80
14	Commonwealth Fund for Tech. Co-operation	1

15	Backward Class Welfare Department Scholarship—Govt. of Andhra Pradesh	—
16	Edn. concession to students of J & K	—
17	Loan by J & K Bank	—
18	Edn. Concession to Lakshadweep students	14
19	-do- -do- Bhutanese	—
20	-do- -do- Meghalaya	1
21	Fund Board Scholarship to students of Pondichery	—
22	Stipend to students for Goa	7
23	KAU Merit Scholarship (UG)	38

Seminars, Symposia, Workshops attended by scientists

Dr T. Prabhakaran, Professor, Department of Animal Production Economics attended the seminar on Strategies for Animal Health Production Programmes in relation to rural development at Bihar Veterinary College on 22nd and 23rd September, 1986. Dr P.O. George addressed the participants of Summer Institute in Surgery at the Madras Veterinary College on 9th and 10th of May, 1986. Dr R. Padmanabha Iyer, Professor and Head, Department of Veterinary Public Health chaired the seminar on "Meat Hygiene and quality Control" and presented a lead paper on "the role of parasitic diseases of food animals in meat production and Technology, progress and problems of todays India," at Bombay Veterinary College by the Department of Food Hygiene and Veterinary Public Health during June, 1986. Dr M. T Jose, Assistant Professor presented a paper on the effect of different treatment on the shelf life in beef in the above symposium.

Dr R. Padmanabha Iyer and Dr P. Prabhakaran attended the seminar on 'Educational Utilisation of Agricultural Standards conducted by Indian Standard Institute and Directorate of Extension Education, Kerala Agricultural University during December, 1986. Dr R. Padmanabha Iyer attended the seminar on "Impact of Agriculture on Environment in Kerala" conducted by the Directorate of Extension of the Kerala Agricultural University. Dr. George T. Oommen, Junior Assistant Professor attended summer Institute on "Recent advances in meat microbiology with special reference to meat borne infection and intoxications," at the College of Veterinary Science, G. B. Pant University of Agriculture and Technology; Pantnagar during June, 1986. Dr V. Sudarsanan, Professor, Department of Animal Reproduction attended a seminar on Buffalo production at Junagath, Ahmedabad during June, 1986. Sri Narayanan Nair, Associate Professor of the Department of Dairy Science attended training in Dairy Plant Management at NDRI, Karnal during April, 1986. Smt K. S. Ambili, Librarian i/c participated in the National seminar on "Library and information Science Education in India new perspectives" during December, 1986 at Trivandrum.

Dr M. Gopakumar, Department of Pharmacology attended the summer institute in biostatistics held at Trivandrum during May, 1986. Dr. Jacob V. Cheeran, Department of Pharmacology attended the National Symposium on biosphere research during September, 1986 at Udyogamandal, Alwaye. Sri V. R. Raghunandan, Department of Pharmacology attended the seminar on Automobile pollution control during December, 1986 at Ernakulam. He also attended the National seminar on "Save Periyar" during December, 1986 at Alwaye. Dr S. Sulochana, Department of Microbiology attended the National symposium on Viral Pathogenesis held at Vallabhai Chest Institute, Delhi during November, 1986. She also attended along with Dr A. Rajan, Department of Pathology the Indo-US Workshop on virus and human cancer held at Amala Cancer Research Institute, Trichur during December, 1986. Dr Sulochana also attended National Symposium on Avian diseases at Rajendranagar, Hyderabad during December, 1986. The staff members of the Department of Microbiology and Pathology participated in the National Seminar on the Emerging disease of Poultry held at Mannuthy during March, 1987 and they also participated in the National Symposium on Animal diseases held in connection with the annual convention of Indian Society for Veterinary Medicine held at Mannuthy during October, 1986.

Dr G. Mukundan, Department of Animal Breeding and Genetics attended the workshop on Small Animal production system in the South and South East Asia held at Bogar, Indonesia during October, 1986. He also attended a seminar on "Impact of Agriculture on Environment in Kerala" during December, 1986 at the College of Veterinary and Animal Sciences.

Dr Sosamma Iype and Dr B. Nandakumar of the Department of Animal Breeding and Genetics attended a National Symposium on Advances in Cytogenetics, Immuno-genetics and Biochemical Genetics at Karnal during July, 1986.

Dr E. Sivaraman, Department of Nutrition attended the second World Congress on Food borne Infection and Intoxication in West Berlin IVth International Symposium of Veterinary Laboratory Diagnosticians at Amsterdam, National Seminar on Fur Animal Production and Management, Garshi, National Seminar on Resource Management and Induced Mutation using Nuclear Techniques, Izatnagar and the All India Nutrition Research Workers Conference at Udaipur. Dr Mamman J Abraham, Department of Pathology attended the Summer Institute on Recent Advances in the treatment and control of Parasitic Infections of Domestic Animals during June, 1986. Dr K. M. Jayakumar, Department of Clinical Medicine participated in the Summer Institute on "Recent advances in the diagnosis and control of parasitic disease in animals" organised by the Department of Parasitology of the College of Veterinary and Animal Sciences, during June, 1986. Dr G. Nirmalan and Dr K. P.

Sreekumar, Department of Physiology attended the National Annual Convention of the Physiologists of India in September, 1986 at Pantnagar.

Faculty members of the College also participated in the local seminars/workshops, infertility camps, symposia of state level animal disease committee meetings conducted by the Kerala Agricultural University/Department of Animal Husbandry, Dairy Department and other State agencies.

Seminar, Workshops, Training and Exhibition conducted

An All India Summer Institute on the Recent Advances in the Diagnosis and Control of Parasitic Infection in Domestic Animals was organised in the Department of Parasitology from 2-6-1986 to 25-6-1986.

An orientation programme and a seminar on recent advances in Animal Reproduction was conducted for the field veterinarians during December, 1986 by the Department of Animal Reproduction. An advanced training for a period of three months on Animal Reproduction on crossbred cattle was conducted for the Assistant Directors of the Department of Animal Husbandry by the Department of Animal Reproduction.

A fortnight training in disease investigation for field veterinarians of the Animal Husbandry Department was conducted in the Department of Microbiology during August, 1986 and November, 1986.

A training in antibiotic sensitivity test, training in diagnosis of bacterial aetiology of repeat breeding in cattle and its antibiogram and a training in sero-diagnosis of brucellosis, tuberculosis and pasteuriosis were conducted during August, 1986 by the Department of Microbiology.

An exhibition was conducted during October, 1986 at Ollukkara Block in connection with the distribution of broiler rabbits to farmers. Dr A. Rajan was deputed to Chicago (U. S. A.) during October, 1986 as a visiting Scientist for presentation of research paper on cancer. An exhibition demonstrating the various aspects of poultry disease was organised by the Department of Pathology during March, 1987 at Mannuthy. A training programme on disease investigation for field veterinarians of the Animal Husbandry Department was organised by the Department of Pathology on 3-10-1986. The Livestock Inspectors training course of eleven months duration was completed during October, 1986 and a new batch of 106 trainees was admitted during November, 1986 by the Department of Extension. In addition, demonstration classes on scientific management of cattle, swine, poultry and goat were conducted at Palghat, Cheroor, during April and September, 1986 respectively in this Department. An exhibition was conducted in connection with the Silver Jubilee Celebration of the Central Hatchery at Chengannur during January, 1987.

A National symposium on "Recent Advances in Animal Disease Management and Strategy for Improved Health Care by 2000 AD" was organised by the Department of Clinical Medicine during October 1986.

Important visitors to the College of Veterinary and Animal Sciences

Prof. I. Settergren, Director, FAO, Swedish International programme on Animal Reproduction visited on 11-12-1986. Prof. Nilson, Head, Department of Pathology, Royal Veterinary College, Sweden visited during November, 1986. Prof. D. B. Solts, North Western University Chicago visited on 14-12-1986.

Veterinary Hospital, Mannuthy

Veterinary Hospital, Mannuthy was started during the year 1958-59. A total of 9,272 cases (6,232 Bovines, Equines 45, others 2,995) were treated during the period. Thirty three castration 79 major surgical operations and 693 minor surgery cases were attended to. A total of 6,845 RD vaccination, 20 AR vaccination, 164 fowl pox and 4 Foot and Mouth vaccinations were conducted during the period.

NSS activities

The NSS unit of the college functioned as in the previous year by organising Animal Health Camps, Cattle shows, sterility camps, prophylactic vaccinations, seminar on Animal Husbandry practices, distribution of cloth to tribals, campus cleaning, distribution of plants and seed materials to farmers, blood group determination and blood donation to hospitals, repair of road and houses at various places like Appankappu Girijan Colony during April, 1986, Ambalavayal during August, 1986; Trichur Municipal area during September, 1986; Kanjirapally during October, 1986; Peechi during November, 1986; Appankappu during December, 1986; Chirakkekcode during January, 1987 and Kottanellur during March, 1987.

The volunteers of the unit were taken to Ranchi University for participating in the National Integration Camp during February, 1987.

College Library

The college library had 19,257 titles as on 31-3-87 including 180 added during the year. Subscription of 201 journals continued during the year.

Research Highlights

Cattle and Buffaloe

Monovalent sera have been produced for blood group typing by isoimmunisation. A total of 119 animals were screened for Hb polymorphism.

Karyological studies conducted have revealed the occurrence XX/XY and XY/XD chimerism and 44 mixoploidy in cattle.

In a study on the degradability of protein in the rumen of cattle, it was found that wheat bran protein was very susceptible to rumen microbial degradation and protein of yellow maize was more resistant to microbial degradation. Rumen degradability of guinea grass was moderate yellow maize, wheat bran and guinea grass and 23%, 77% and 42% degradability respectively.

Beef tallow can be profitably incorporated in cattle ration upto 8% level in the concentrate ration without adverse effect on palatability or voluntary food intake.

Rabbit

Three meat breeds of rabbit viz., New Zealand White, Soviet Chinchilla and Grey Giant were crossed under a diallel pattern. The cross breeds were found to be superior in litter size and in litter weight at birth and weaning. Growth rate and the dressing percentage were also superior than the non-descript local type rabbits.

Pigs

Nutritional studies on pigs revealed that 20% protein and 3.3 Mcal of DE was found to be optimum in their ration for economic rearing. Slaughtering of pigs at 75 kg body weight was found to be economical.

Animal Diseases

Teat dipping with 0.4 % Iodophor solution and dry cow therapy with Benzathane cloxacillin were found valuable in reducing incidence of mastitis. The sero prevalence of brucellosis in domestic animals was established. The prevalence rate ranged from 2 to 3 per cent. Significant fall in the level of Vit. A, Vit. C and total protein in the blood of cattle were observed under experimentally induced selenosis. The internal organ viz., liver, kidney, brain and heart revealed toxic degenerative lesions. Aflatoxin induced hepatopathy in chicken, ducks and quails was demonstrated to be an important factor associated with mortality in these species. Some of the non-specific anorexia in cattle was identified to be caused by aflatoxin. The pathogenesis of the condition was worked out and the pathological features were described. Break down of immunity and outbreaks of Ranikhet disease in certain instances was traced to mycotoxic hepatopathy.

By experimental studies in goat and pigs the immuno suppressive effect of aflatoxin was demonstrated and the T and B cell functional suppression was attributed to be responsible for field outbreaks of disease.

One of the important factors responsible for posterior paralysis in goats was found to be nephritis. Gentamycin was found to be an effective therapeutic agent.

The dose of Xylazine ketamine combination for immobilisation of elephant was standardised and 28 musth elephants were controlled using the combination. The existence of fluorosis and mercurialism was identified in domestic animals maintained in the floor industrial belt. The highest fluorine level reported from Alupuram was 1.95 ppm in plasma collected from cattle which was 40 times higher than the control animals. The fodder and grasses in this area was found to contain a mean level of 1.284 ppm fluorine which was 100 times higher than the control. The maximum recorded for mercury was 0.12 ppm in blood plasma which appears to be 43 times higher than the control.

The new vaccine strain for New Castle disease virus was handed over to Veterinary biological Institute, Palode for field trials.

No untoward effect has been observed when day old chicks were immunised simultaneously with NDV-F and Marek's disease vaccine.

Formalin in activated vaccine has been prepared from influenza type-A type HgN2 and HgN3 virus and used successfully in ducklings below 4 weeks of age. Analysis of the results of 196 milk samples of suspected mastitis cases received from different parts of the State indicate that enterobacteria is rating first, as against staphylococci reported in the previous year. The drugs of choice for enterobacterial infections were Gentamycin, Chloramphenicol and Streptomycin. For electrophoresis and immuno electrophoresis Agar-Agarose combination was found to be superior over either alone.

Staphylococcus aureus was established to be one of the causative agent for early mortality in broiler chicks.

2.1.1. AICRP on Poultry for Eggs

The AICRP on Poultry Breeding has been started at College of Veterinary & Animal Sciences Campus, Mannuthy on 1-11-1976.

The main objectives of this project are to procure and evaluate available germplasm for their production performance to improve their genetic potentials by adopting advanced breeding techniques to study feasibility of utilising strain/strain crosses for the production of commercial egg type chicks.

Dr A. K. K. Unni continued to be in charge of the Scheme.

The hybrid layer evolved at this centre performed exceedingly well in comparison to hybrids developed at other centres of the project as well as the leading commercials available in the country. The summary of the results have been published by the Anand Testing Centre (ICAR).

2.1.2 ICAR Scheme on mycotoxicosis in domestic animals and Poultry

Dr K. I. Maryamma is continued to be in charge of the Project.

Research work

Different types of feed ingredients, samples of mixed feed and straw received from various livestock stations in the state were screened for the presence of mycotoxins. 1410 samples of feed items were screened for the presence of mycotoxins during the period from 1-4-86 to 31-3-87. On an average 22% of the feed samples contained aflatoxin.

Toxigenic fungi belonging to *Aspergillus*, *Penicillium*, *Fusarium* and other fungi *Claviceps*, *Rhizopus*, *Mucor*, *Absidia* and *Pythium* were isolated from 10% of the samples. These feeds were associated with toxicity syndrome in animals.

Mycotoxicosis like aflatoxicosis, ochratoxicosis and combined toxicosis by ochratoxin and aflatoxin were diagnosed in poultry, pig, goat, cattle, dog and rabbits.

Detailed investigations were carried out on cases of non-specific anorexia syndrome in cattle. It was found to be common during the month of January to April. The incidence appeared as outbreaks during certain periods. Incidence was high in cows. Anorexia, icterus of varying degree and unthriftiness were the common features. Abomasal oedema, ulceration and hepatosis were the characteristic pathological lesions.

Study was conducted in calves to confirm the role of aflatoxin in causing the anorexia syndrome in cattle. It was confirmed that non-specific anorexia.

Immunopathology of experimental aflatoxicosis was studied in goats. Leukocytic response and neutrophil activity were enhanced in the initial phase of the experiment, which gradually declined in the later stages.

The experimental studies conducted in ducks with aflatoxin and ochratoxin showed significant pathoanatomical changes in the testicular tissue and it was clarified that these mycotoxins can cause subfertility and infertility in ducks and the importance of aflatoxicosis and ochratoxicosis in inducing reproductive failure was brought to light.

The pigs which were given aflatoxin became dull, depressed and showed anorexia. Increased ESR, reduction of PCV, haemoglobin and erythrocyte count were observed. As a result of immuno suppressive effect of aflatoxin the pigs in the experimental group contacted mange infection. The controls remained healthy. It was categorically established that outbreaks of mange infection in the field may be precipitated by the ingestion of food contaminated with aflatoxin.

The serum protein and gammaglobulin concentration were significantly low in pigs fed aflatoxin. The observation indicated suppression of humoral immune response.

Gross and histopathological alterations in tissues were studied in detail. From the observations made it was concluded that aflatoxin suppressed the cell-mediated and humoral immune response.

The studies so far carried out have shown that there is high level of contamination of feed ingredients by mycotoxin. This is a potential health hazard for livestock.

By systematic investigation, it was shown that aflatoxin in low doses is an immunosuppressive agent and in field situations consumption of aflatoxin contaminated feed could lead to outbreak of diseases like pneumonia. This could also be an important factor in including breakdown immunity following vaccination in livestock.

It was established that anorexia syndrome in cattle is caused by ingestion of aflatoxin contaminated feed.

2.1.3. AICRP on Utilization of Agricultural byproducts and Industrial Wastes

The All India Co-ordinated Research Project for Investigation on Agricultural byproducts and Industrial Waste material for evolving economic rations for livestock was started in 1967. The major objectives of the project are to identify new resources of livestock feeds and the enrichment of the existing feed sources by physical, chemical and biological means and to carry out suitable trials to assess the nutritive value in terms of palatability, digestibility and their support to other production functions as growth, reproduction, lactation etc.

Accordingly the byproducts which were standardised for animal feeding were tapioca leaf meal, tapioca starch waste, rubber seed cake, coffee husk, tea waste, frog meal, fish silage and prawn waste.

During the VIIth Plan period this project envisages the assessment of animal feeder sources and feeding system of the entire state with special emphasis on crop residues and marine byproducts. Animal nutrition survey forms the major part of the project work. The following projects were completed during the year.

- 1 Growth studies in crossbred calves incorporating dried cocoa pod at 0 and 20% level in concentrate rations.
- 2 Nylon bag digestibility studies on agro-industrial Byproducts.

The results have indicated that cocoa pods can be incorporated as a cattle feed ingredient at 20% level in concentrate ration of growing cattle.

Preliminary survey work was conducted in villages in and around Mannuthy to know the animal management and feeding practices.

2.1.4. Veterinary Hospital, Trichur

This hospital was established 61 years back and is situated on the South Western side of Trichur Town. The area of the hospital is about 0.5 hectares.

The main objective of this hospital is to give all kinds of Veterinary aid to the animals in and around Trichur and to give them protective vaccination against infectious diseases. The most modern trends in the fields of diagnosis and treatment are practiced here. Specialists from different clinical/paraclinical departments of Veterinary College are attending this hospital regularly for this purpose.

A clinical laboratory and an Artificial Insemination Centre are also functioning in this hospital premises.

Dr. K. Ramadas, Professor continued head of this institution during the period under report.

Students of B. V. Sc. and A. H. classes were given practical training in various aspects of animal diseases, treatment and control.

There is no income as such for this hospital. The miscellaneous receipts during the year under report was Rs. 562.70. 19,191 out patients were treated here during the year.

519 operations and 69 castrations were conducted. 7818 birds were treated and vaccinated. 220 PAR vaccinations were given.

2.2 CENTRE FOR ADVANCED STUDIES IN POULTRY SCIENCE

A Centre for Advanced Studies in Poultry Science was established in November, 1985 with the objects of co-ordinating the activities of Poultry Science Education, Research and Extension and also to augment research in certain specified areas.

Dr. A Ramakrishnan continued to be the Director of the centre.

Research

Number of Research Projects as on 31-3-1986 is 2.

Highlights

Poultry

The dietary calcium and phosphorus requirements of caged layer was established as 4.0% and 0.6% respectively in a diet with 2600Kcal ME/kg and 18% protein.

A bibliography on duck was published.

2.3 CENTRE FOR ADVANCED STUDIES IN ANIMAL GENETICS & BREEDING

The Centre of advanced studies in Animal Genetics was started on 31-1-85. The centre was started with a view to intensify research in various branches of Animal Genetics & Breeding such as immunogenetics.

Cytogenetics population genetics germplasm conservation and environmental mutagenesis. Dr G R Mukundan continued to be the Director of the Centre.

During the year Chromosomal analysis of 78 animals belonging to Desi, Jersey crossbred and Brown Swiss crossbred were carried out using peripheral blood leucocyte culture technique.

The diploid chromosome number was found to be 60 'X' chromosome is submetacentric and second largest in the group in Desi and Crossbreds. The 'Y' chromosome revealed acrocentric morphology in Desi and submetacentric in crossbred cattle.

Among 78 animals showing reproductive disorders, subjected to Karyological studies. 75 animals did not show either numerical or structural abnormalities in their chromosomes.

3. FACULTY OF FISHERIES

3.1. COLLEGE OF FISHERIES, PANANGAD

The Fisheries College was established during the year 1979, with the approval of ICAR and the Government of Kerala. To begin with the College started functioning at Mannuthy, but was later shifted to its permanent campus at Panangad, Cochin. The College offers a four-year degree programme leading to the degree of Bachelor of Fishery Science (B. F. Sc.). The intake capacity was 30 students per year, of which 9 seats were reserved for the children of fishermen. The intake capacity was later reduced to 20 per year and the system of teaching has been changed to the Semester. Post-graduate course (M. F. Sc.) is also being offered in the College in the discipline of 'Aquaculture'.

Dr M. J. Sebastian continued as the Dean of the faculty. There are 7 departments, *viz.* Department of Aquaculture, Fishery Biology, Fishery Hydrography, Fishing Technology, Fishery Engineering, Fish Processing Technology and Management Studies. A separate section for Fisheries research is also functioning in the College under the Professor of Fisheries Research. The College has its instructional farm at Panangad.

The scientific staff consists of the Dean, 5 Professors, 9 Associate Professors, 20 Assistant Professors and 18 Junior Assistant Professors. In addition 6 Research Fellows worked under the various research schemes.

Faculty Improvement Programme

Sri C. G. Rajendran, Assistant Professor (Aqua) has been deputed for Ph. D. programme for 3 years w. e. f. 6-11-86.

Details of Extension lectures conducted by the College

Dr P. M. Mathew, Professor (Fish Res.) gave a talk on "fish culture" to a group of trainees from Vikasavani, Kakkanadu, Cochin-21, a voluntary social organisation, who visited the College on 21-10-'86.

Academic programme

Strength of students

i) U. G. Course (B. F. Sc.)	Men	Women	Total
I year (1986 batch)	16	5	21
II year (1984 batch)	21	9	30
II year (1985 batch)	14	3	17
III year (1983 batch)	17	7	24
IV year (1982 batch)	21	4	25

No. of outside students:

Manipur	3
Andhra Pradesh	1
Total	<u>4</u>

No. of students who obtained their degree during the year:

 Men — 22 Women — 8 Total 30

ii) P. G. Course	Men	Women	Total
M. F. Sc. (Aqua) I year (1985)	1	1	2
II year (1984)	2	1	3

No. of outside students : Nil

No. of students who obtained their degree : Nil

Ph. D. programme : Nil

iii) Practical training

 The 4th year B. F. Sc. students were taken on board the vessel, Matsya-I for a duration of 12-14 days under the course "Onboard Fishing Experience".

 The IVth year B. F. Sc. students were given inplant experience including fish processing, quality control, export documentation etc. for a period of one month in different freezing plants in and around Cochin.

Study tours

: Nil

Scholarships to students

Name of scholarship	No. of recipients
Fisheries scholarship	5
Educational concession to SC/ST students	6
" " to OEC	19
ICAR merit-cum-means scholarship	2
National merit scholarship	1
KAU Merit scholarship	6
KPCR scholarship	10
Total	49

Extra-curricular/co-curricular activities

Students' Union Activities

50 students from the College participated in the KAU Student's Union Youth Festival held at Vellanikkara and Mannuthy campuses during the period 21-24th May, 1986. The College retained the Nandini Nandakumar everrolling trophy by securing the maximum points for dance items. The Nandini Nandakumar individual trophy was won by Miss Devika Pillai for her best performance in solo dance. Miss Mercy Thomas of the College was selected as the best actress of KAU.

The valedictory function of the Students Union 1984-85 and various affiliated associations was held on 5-9-'86. Dr M. Saktivel, Director, Marine Products Export Development Authority was the guest of honour on the occasion.

The inaugural function of the Students Union 1985-86 and affiliated associations was held on 6-9-'86. The inauguration of the students Union was done by Sri Amitabhkanth, I. A. S. General Manager, Matsyafed. The Arts Club was inaugurated by the Eminent Writer Advocate CV Sree Raman, while Smt Retnakala S Menon inaugurated the Planning Forum.

The College acted as the host for the Merit Evening held on 27th September, 1986 at Town Hall, Ernakulam to honour the rank holders, athletic champions and individual champions of 9th Youth Festival of KAU, under the auspices of KAU Union 1984-85. Hon'ble Justice Sri K Sukumaran of Kerala High Court presented the awards in the function. Felicitation addresses on the occasion were given by Prof. M. K. Prasad, Principal, Maharaja's College, Ernakulam and Sri C. Radhakrishnan, Eminent Writer. The Patron Sri T. Madhava Menon, I. A. S. also addressed the gathering. In this connection an inter-Collegiate Quiz Competition was also conducted at Fisheries College, Panangad, on 27-9-1986.

N. S. S. Activities

30 volunteers of the College participated in the functional literacy programme. Two volunteers attended the Youth Camp intended for the personality development of Youth of India, held at Vivekananda Centre, Kanyakumari during the period 2-12, August, 1986. The NSS Volunteers of the College celebrated Gandhi Jayanthi Day by way of participating in a construction work organised by the Vyttila NES Block and Youth Club, Kumbalam. Repair of a road at Kumbalam was taken up on that Day. The NSS Programme Officer attended the training course on Leprosy Eradication held at Mitraniketan, Trivandrum on 18th and 19th October. He also attended the training programme on Functional Literacy held at Mannuthy on 20-10-1986. The NSS volunteers of the College conducted a sports meet for local youth at Madavana on 26-1-1987. A one day seminar on "the root cause of Indian poverty" was also conducted by them in February as part of the "Youth week" celebrations.

Tournaments, Championships etc.

The College cricket, hockey and ball-badminton (Men's) teams and the ball-badminton (women's) team participated in the Inter-Collegiate Tournaments held at Mannuthy during the period 15-17/5/86 and 26-29/5/86. The College women's team emerged as the winners in ball-badminton, while the men's teams were runners-up in cricket and hockey.

Sri EU Rajan, Junior Assistant Professor (Physical Education) participated in the National Integration Camp, as the Deputy Contingent Leader of the Kerala contingent, held at Srinagar during the period 15-24, July, 1986. The camp was organised in connection with the International year of peace by Bharat Scouts & Guides.

The College team participated in the inter-collegiate tournaments. T Sudhish, of the College won the individual championship in athletics for the year 1986-87 in the KAU athletic meet held at College of Agriculture, Vellayani during February 1987.

Hostel

The boys were accommodated in the hostel at Panangad campus. Sri IS Bright Singh, Junior Assistant Professor was the Assistant Warden for the year. The total strength of the students in the hostel were 79. Sri MS Raju, Assistant Professor, functioned as the Resident Tutor.

The girl students were accommodated in Y.W.C.A. Hostel and the Athurasramam Working Women's Hostel. The total number of students thus accommodated were 25.

College Library

Total number of books in the library as on 1-4-'86 was 6,960.

The total number books in the library as on 31-3-87 was 7,823 and the number of journals subscribed for as on 31-3-'87 was 21.

Instructional Farm:

Total area: 30 ha (area under possession as on 31-3-87).

Details of crop

The main crop in the campus was coconut. The total number of the coconut palms were 2500. The total yield of nuts during the year was 52010 (for an estimated 2000 palms) with an average yield of 26 nuts per palm.

0.43 ha of pokkali fields in the campus were brought under experimental paddy cultivation under the project paddy-cum-fish culture and produce sold as follows:

Fodder produced	: 400 kg
Paddy seed sold on FT bill	: 478 kg
Fish produced	: 142.380 kg
Prawn produced	: 169.800 kg

In addition, 157 nos. of aquarium fishes produced under the scheme "Ornamental fish culture" have also been sold during this period.

A part of the farm has been converted into fish ponds for instructional purposes which traditional method of prawn culture is practiced in about 2 ha area. The yield of fish and prawn from this during the year was as shown below:

Fish produced	: 1663.190 kg
Prawn produced	: 1230.130 kg
Fish seed produced	: 20,615 nos.

Visitors:

Dr VE Mezainis, Dr F. P. Mayer, Dr M Dupres, Dr E. L. Torrans and Dr H. P Clemens member of the Indo-US Sub Commission on Aquaculture visited the College accompanied by Dr MY Kamal, Assistant Director General (Fisheries), ICAR, on 8-10-1986.

Dr C. C. Negi, Vice-Chancellor, Himachal Pradesh Agrl. University and Dr Salve, Vice-Chancellor, Konkan Krishi Vidyapeeth, Maharashtra, visited the College on 17-2-1987.

Dr Atham D. Tillman, Animal Scientist, Oklahoma. Dr. J. P. Fonterot, Professor of Virginia Polytechnic Institute and State University, U. S. A. and Dr Kiran Singh, Senior Scientist, ICAR, visited the College on 26-2-1987 to discuss the implementation of a scheme for utilization of trash fish and fish waste as livestock feed.

Research highlights

A method was developed for removal of muddy odour from carp meat.

Incorporation of clam meat in the feed increased survival and growth rate of commercially important prawns.

Synthetic amino acid diet did not favour growth in *C. mrigala*.

Prawn production of 416 kg/ha/110 days was achieved from the selective culture of *Penaeus indicus* in pokkali fields as a follow up crop after paddy. Through the culture of fresh and brackishwater fishes in these fields along with paddy fish production upto 242 kg/ha was obtained in 133 days, in addition to the normal yield of paddy.

Common aquarium fishes black molly (*Mollienisia sphenops*) and sword tail (*Xiphophorus hellerii*) showed better growth when fed formulated diet with 40% protein in comparison to those fed with zooplankton or phytoplankton.

Growth of zebra fish (*Brachydanio rerio*) could be increased significantly by supplementing vitamins to a feed formulated with natural ingredients.

Gold fish (*Carrassius auratus*) showed better coloration when fed pigment supplemented diets, in comparison to those fed control diets with no pigment supplement.

3.2. FISHERIES STATION, PUDUVEYPU

The Fisheries Station started functioning on 16-7-1979. An area of 101 ha. of land in Puduveyypu village got transferred to Kerala Agricultural University from the revenue department of Kerala, towards this purpose. Ideally located on the north western side of the Cochin Harbour the station has potentials for getting established as an instructional farm for brakishwater fish and prawn culture. The farm area is partially marshy with lot of mangrove vegetation, low lying water logged canals, ditches and also with sandy soil. Out of the 325 coconut trees and 180 seedlings, 28 Nos. of coconut trees and 47 Nos. of seedlings has been damaged due to the severe drought last year.

Sri K. S. Purushan, Associate Professor continued to be in charge of the station.

Study leave for a period of one year was sanctioned to Shri Jayaprakash for undergoing post Doctoral Research in Fisheries Science in the graduate school at Auburn University, Alabama, U. S. A.

The post of Junior Assistant Professor is not filled up so far.

The post of Research Fellow is lying vacant during the period under report.

In the case of technical staff one more post of Farm Assistant has been created. Besides one post each of Fieldman and Farm Assistant.

This being the Instructional Farm of the Fisheries College, practical training class on Brackishwater Fish Farming is imparted to the B. F. Sc. and M. F. Sc. students of the Faculty. In addition the station is also doing service to other trainees of sister institutions and Universities having Fisheries in their curriculum.

Research

Ten research projects approved by Kerala Agricultural University are carried out at this station. None of the research projects are concluded during the period under report.

Other matters

The station took earnest efforts to cater the needs of fish farmers' for commercial seeds. Apart from our requirement, about 94300 seeds of *Penaeus indicus*, *Chanos chanos*, *Mullet sp.*, *Mugil cephalus* and *Tilapia mossambica* were supplied to different farmers during the period under report.

Agricultural items such as 20 kg fishing nets, 11 goats, 1 calf, 333.34 kg cattle feeds, 23 Aluminium feed trays, 15 plastic trays, 2.46 kg vegetable seeds, 30 kg vegetable mixture, 850 kg coconut mixture, 24 iron frames for chair making and 6 kg plastic canes were distributed to the lab to land farmers. A model nutrition garden was also set up at Government Upper Primary School, Puduveyppu under the auspices of the station.

Besides we have arranged planting of a lot of *Casurina sp* and *Acasia sp* in the border of the campus area in association with the social forestry department.

Construction work of the type IV quarters has been completed during the period under report.

Research highlights

The following inferences could be drawn from the studies undertaken at this station during 1986-87.

The survey of culturable fish and prawn seeds indicates that their availability is drastically dwindling at this place when compared to previous years. The deteriorating environmental conditions do play a vital role in this regard.

The alarming reduction in the post larval recruitment of *Penaeus monodon* during the period under report is quite unique in the history of the station.

The characteristic turbulent conditions of water prevailing (owing to increased nature of siltation and turbidity) is hampering the growth of experimental fishes and prawns. The excessively high pH and such other adverse effect of the habitat quite often results in unpredictable mortalities of the experimental fishes. Adequate measures are warranted to eliminate the stress factors on fish growth.

The slurry bottom habitat seldom promotes diverse benthic fauna having its impact on the growth of prawns and fishes resulting in poor yield and of low quality. This denotes that the present substratum requires further modifications to attain better fish yield.

The remarkable seed recruitment of *Chanos chanos* takes place at this place during the pre-monsoon months while that of *Mugil cephalus* and *Lates calcarifer* are associated with monsoon success.

Of all treatments, manuring and feeding in optimum doses could promote better growth of prawns and fishes.

Combination culture of *Lates calcarifer* and *Tilapia mossambica* could arrest the excessive multiplication of the latter in culture systems.

Further studies should concentrate more on to develop appropriate technology of fish culture suitable to the place giving due regard to the intrinsic and extrinsic factors.

4 KELAPPAJI COLLEGE OF AGRICULTURAL ENGINEERING & TECHNOLOGY, TAVANUR

The 40 hectare campus of Kelappaji College of Agrl. Engineering & Technology (KCAET) is located in Tavanur Village on the southern bank of the Bharathapuzha. Tavanur village in the Malappuram District lies eight kilometres west of Kuttippuram Railway Station and twelve kilometres north of Ponnani. The campus is situated on a hill commanding an enchanging view of the natural scenery around.

The Board of Studies and Faculty Research Council were constituted and their first meeting conducted during the period under report.

Dr P. Basak, continued in the post of Adviser & Dean i/c of the Faculty till 24th January 1987.

Dr A. G. G. Menon, Director of Extension has been in full additional charge of the Adviser & Dean i/c. since then.

Prof G. P. Muhammed, Head of the Department of Farm Power, Machinery & Energy has also been appointed as the Chairman of the Non-Graduate Diploma Programme in the Faculty.

Prof. John Thomas continues to be the Head of the Department of Irrigation & Drainage Engineering.

Dr P. C. Antony, Associate Professor is in charge of the Department of supportive & allied courses of study.

Junior Assistant Professors in Electrical Engineering and Mathematics were selected and posted during the period.

Junior Assistant Professors in Mechanical Engineering and Electrical Engineering and one Assistant Professor in Physics have resigned during the period.

Faculty Improvement Programme

Sri Jobi V. Paul, Assistant Professor, who was in charge of the Department of Agricultural Processing and Structures has been granted study leave to undergo Ph. D. Programme in the Indian Institute of Technology, Madras.

Sri M. Sivaswamy, Assistant Professor, Department of Farm Power Machinery & Energy has been selected for the Ph. D. programme at I. A. R. I., New Delhi. He is granted study leave.

Sri Alexander Seth, Junior Assistant Professor, Department of Land & Water Resources Engineering is on study leave and is undergoing Ph.D. programme at Indian Institute of Technology, Madras.

Sri Jobi V. Paul, Assistant Professor (Agrl. Processing & Structures) attended a training course on "Post Harvest Technology of Plantation Crops" held at CPCRI, Kasargod from 20th to 23rd May 1986.

Sri M. Sivaswami, Assistant Professor (FPME) attended the ICAR co-ordination committee meeting for Farm Implements and Machinery Scheme held at IGFRI, Jhansi.

Dr K. V. Satheesan, Assistant Professor (Plant Physiology) attended a workshop on "Impact of Drought on plantation crops" held at CPCRI, Kasargod.

Dr P. Basak, Advisor and Dean i/c, attended the 14th Convention of Agricultural Universities at Srinagar, Kashmir.

Prof. C. P. Muhammed, Head, Department of Farm Power Machinery & Energy and Sri Abdul Harris, Junior Assistant Professor (Mechanical) attended a work shop on "Thermal Storage" and the National Solar Energy convention at Madurai Kamaraj University.

Faculty Seminar

Seminars on following subjects were conducted:

<i>Topic</i>	<i>Speaker</i>
"Agrl. Engineering- Its evolution & Development	Prof. C. P. Muhammad, Head, Department of FPME
Water Management practices in paddy,	Sri M. A. Peter, Junior Assistant Professor
Mathematical modelling for prediction of environmental pollution	Dr P. Basak, Advisor & Dean i/c

Plastic Surgery on Irrigation
arteries

Sri Alexander Seth
Junior Assistant Professor

Dr H. Raman, Professor & Head, Department of Civil Engineering, I. I. T., Madras visited the campus for exchanging academic views and advise us on the future development of the Campus, setting up of labs and workshops etc. during the period.

Extension activities

The fourth phase of the Lab to Land programme of the Centre, had started during this period. A new group of 25 farm families has been selected for implementation of this programme. The selected families were divided into five groups and each group was provided with sufficient quantity of seeds of high yielding variety of Paddy and necessary technical support.

Three farmers training programmes were, organised on 12th August, 2nd and 30th September '86 in which Scientists from the College imparted training about the various aspects of Scientific paddy cultivation. They also visited the fields of the adopted families and gave on the spot instructions.

Academic Programmes

The following courses have been offered in this College during the period under report.

B. Tech. (Agrl. Engg) — 4 years
Diploma in Agrl. & Rural Engineering (DARE)
Diploma in Agrl. Science (DASc)

Strength of students under each course

U. G. Course	— B. Tech.		
	Men	Women	Total
I year	13	5	18
II year	17	16	33

Number of outside students

I Year B. Tech — 2 boys from Manipur
II Year B. Tech — 3 boys from Assam

Diploma Courses

1) DARE

	Men	Women	Total
I Year	14	—	14
II Year	12	—	12
Final trimester	14	—	14

Number of outside students : Nil

Number of students who obtained
Diploma during the year | 14

2) DASC

	Men	Women	Total
I Year	57	—	57
II Year	57	—	57
Final trimester	15	—	15

Number of outside students

I Year DASC	—	5 boys from Union Territory of Lakshadweep
II Year DASC	—	4 boys
Final trimester	—	2 boys

Number of students who obtained Diploma during the year } 15

Work Experience

Courses amounting to a total of 10 credits were conducted for the students of Diploma Programme in Agricultural Science.

Field training

The students of the seventh trimester of DASC underwent a 3 months field training in the various research stations of the University. Similarly the final trimester students of DARE were given 1½ months training at Kerala Agro Machinery Corporation, State Ground Water Division, Trichur and State Soil Conservation Centre, Chalakudy.

Study tours

Course	Duration	No. of students	Place
DARE	14-5-86 to 17-5-86	14	TNAU Coimbatore, Soil Conservation Institute, Ooty
DARE	9-4-86 to 11-4-86	12	Beypore - Malampuzha Fisheries College, Panangad
DASC		57	CPCRI, Kasaragod, PRS, Panniyur, RARS, Pilicode

Scholarships, awards and aids to students

Name of the scholarship/award/aid	Number of recipients
a) Total educational concessions—	
SC students	6
ST students	2
OBC students	3
b) Total educational concessions under KPCR Schemes	64
c) Educational concessions to Lakshadweep students	5
d) KAU Merit Scholarship (1985-86)	3

Extra-curricular/Co-curricular activities

a) Students union activities

The students union was inaugurated by Sri K. A. Kodungallur in 10th October 1986. Sri Paul Kallanode inaugurated the Arts Club and Sri Thikkodian inaugurated the Literary Club. Various forums and Clubs like planning and debating forum, sports club, garden club, Blood donating forum, film club, womens forum, functioned very actively under the auspices of the students union.

b) Tournaments

Our college team participated in the KAU inter collegiate tournaments in volley ball, basket ball (men & women) cricket, ball badminton and athletics (men & women). Also participated in the Malappuram District Basketball League Championship.

The first annual athletic meet was conducted during the period. Prof. N. S. Ramaswamy inaugurated the meet and Dr P. Basak declared the meet closed.

Projects

All India Co-ordinated Research Project on "Research and development of farm implements and machinery and production of proto-types and the evaluation under different agro-climatic conditions", started at Vellanikkara during September 1980, and brought to Tavanur during January 1986 got extended till 1990. One Associate Professor, one Junior Assistant Professor, 3 Technicians and one Workshopmate are working in this project.

Trials are being conducted to develop farm implements and machinery to find out implements suitable for our farmers. IRRI, TH-8, Paddy Thresher has been found suitable for our condition. IRRI, six Row Rice Transplanter is being developed to suit Kerala conditions.

Adhoc scheme on "Wind energy utilisation" financed by ICAR and envisaged to study the feasibility of wind energy utilisation in Kerala is in progress. One research Associate and one technician are working in this project.

"Design and fabrication of an improved man powered pump".

A bicycle operated diaphragm pump has been designed and fabricated. On testing this gave encouraging results. However, effort is now on to modify the design to increase out.put and suction depth.

"Design and development of an experimental Solar engine."

The work is in progress.

Research projects under NARP

Survey, collection and maintenance of germplasm of betelvine.

Germ plasm of eight varieties of betelvine have been collected and maintained at this centre. Their growth characters, quality parameters and productivity are being studied.

Basic trial on the manurial requirement of betelvine.

The objective of this study is to collect basic information on the manurial requirement of betelvine cultivated as "Kootakkodi"; the system of cultivation prevailing in Malappuram District.

The following parameters were measured:-

1. Growth rate of plant at monthly intervals.
2. Keeping quality of betelvine
3. Total biomass production/harvest.

Evaluation of promising hybrids and cultivars of coconut for alluvial soils of Malappuram District.

The experiment comprises nine different cultivars of coconut. The biometric characters of the palms are measured at periodic intervals. Use of Mussorie Phosphate as a source of phosphorus to transplanted rice.

The experiment is in progress.

Hostels

Hostel	Asst. Warden	Strength
Diploma Hostel	Sri M. Velayudhan Kutty	90
B. Tech Hostel	Prof. C. P. Muhammed	29
Ladies Hostel	Dr (Miss). E. Komala Amma	21

College Library

1061 new books were added to the library during the period and were subscribed to 74 numbers of journals and periodicals.

Instructional Farm

Total area of the Campus	:	40.19 ha
Total cultivable area	:	29.65 ha
A a) Net cultivated area	:	26.15 ha
b) Land left fallow during the year	:	3.5 ha
B Area occupied by buildings and roads etc.	:	4.54 ha
c) Area vacant and not utilised	:	2.0 ha
d) Area not suitable for cultivation	:	4.0 ha.

Cropping activities

Paddy

Out of 10.5 ha. of land available for paddy cultivation 7.1 ha and 3.9 ha was cultivated with paddy during first and second crop season respectively. During 2nd crop season 3.6 ha. was used for maize cultivation.

Average yield of the rice crop during the period

	Season	Average yield kg/ha
Medium Duration	First crop	2509
Medium ..	Second crop	1875
Short ..	First crop	3340
Short ..	Second crop	2399

Fodder maize

Fodder maize was cropped in an area of 3.6 ha. for the dairy animals.. This was done during late 2nd crop season in paddy fields.

Gingelly

Gingelly was raised in an area of 3.9 ha. in summer paddy fallows. Owing to very dry condition the germination and yield of crop was very poor. 99.5 kg. of sesamum seed (KYKM I & II) was collected from the crop.

Vegetables

Different vegetables were raised during the period. Nearly 1 ha. of land was put under vegetable cultivation during summer. The varieties included bitter gourd, snake gourd, bottle gourd, ash gourd, pumpkin, cucumber, tomato, amaranthus, cowpea etc.

Banana

Harvesting of the banana crop (nearly 1100 nos) planted during the year 1985-86 was done during the year under report. Nearly 250 numbers of nendran and 150 numbers of plantain were planted during the year.

Fodder grass

1 ha of land was covered under fodder grass planting.

Perennial crops

Coconut

70 numbers of seedlings were newly planted and 63 numbers were planted in the gaps.

1180 numbers of coconut seedlings were sold to the public.

45,986 number of nuts were collected and disposed during the year. The average yield of the palm is 72 nuts/palm/annum.

Other trees

The following produces were sold from the farm after auction, from the tree itself (the harvesting was done by the party) and the revenue obtained is given below.

Crop	No. of trees	Value obtained Rs. ps.
Cashew	200	919.00
Mango	263	513.00
Jack	261	529.00
Tamarind	25	985.00
Pepper	135	3129.00
Arecanut	536	2610.00
Ceiba cotton	97	1529.00

One 'B' Class meteorological observatory was installed during July '86.

More than 1000 seedlings were planted in the Campus by the Social Forestry Department.

An area of 2 ha (Paddy) were earmarked for the College Stadium. Open drains were dug out along the periphery and 44 numbers of coconut seedlings (5 year old) were transplanted to another location to facilitate the work of Stadium. The work had to be stopped due to hinderance by the farm labourers.

I. Dairy Animals

No. of animals as on 1-4-85	:	52
No. of milking animals as on 1-4-86	:	15
No. of dry animals as on 1-4-86	:	10
No. of pregnant animals as on 1-4-86	:	12
No. of animals as on 31-3-87	:	64
No. of milking animals	:	24
Dry animals	:	9
Pregnant animals	:	9
Stud bulls	:	3
Male calves	:	10
Female calves	:	9
Quantity of milk produced	:	86 litres/day
	:	2580 litres/month
	:	30,960 litres/year
	:	3.6 litre/animal/day

II. Poultry

No. of birds as on 1-4-86	:	190
No. of layers culled	:	169
No. of birds died	:	21
No. of eggs produced	:	15,000
No. of birds as on 31-3-87	:	Nil
No. of broiler birds	:	Nil

III. Cases treated on the Veterinary Hospital

: 2133	a) Bovine :	1520
	Caprine :	318
	Avian :	280
	Canine :	15
	Total :	<u>2133</u>

5. COLLEGE OF FORESTRY

The College of Forestry was started during 1986 in the Kerala Agricultural University with major objectives of imparting forestry education in the U. G. and P. G. level and strengthening research in the field of forestry which is a vital to the development of the state. The location of the College is at Vellanikkara.

Prof. S. M. A. Aslam, Special Officer (Forestry) was in charge of the College.

There are two Associate Professors in the college on working arrangement from the Faculty of Agriculture. The names of these two Associate Professors are furnished below.

1. Dr Luckins C. Babu
2. Dr N. K. Vijayakumar

Three Assistant Professors are also working in this college on working arrangement from the Faculty of Agriculture and Veterinary & Animal Sciences. Among the three, one Assistant Professor has been deputed by the I. C. A. R. to U. S. A. for advanced training in Forestry.

Dr C. Pythal, Dr K. Sudhakara, Dr B. Mohankumar (deputed for training) were the three Assistant Professors.

Four Junior Assistant Professors are also attached to this College. They have deputed for Forestry courses to State Forestry Service Training College at Coimbatore.

Faculty Improvement Programme

Dr S. Mohankumar, Assistant Professor attached to this College has been deputed by the ICAR to the U. S. A. for advanced training in Forestry since 12-9-1986.

Sarvasree (1) Noyal Thomas (2) Premkumar, T. (3) Vidhyasagan, K. (4) Sonney George, Jr. Assistant Professors of this college have been deputed for under-going forestry course in the State Forestry Service Training College, Coimbatore.

A Refresher Training Programme for India Forestry Service Officers of the Government of India was successfully conducted by this College

from 2-2-1987 to 7-2-1987. 33 Officers were participated in the training programme. Experts in the various fields of forestry, agriculture and allied subjects took classes for these officers.

Academic Programmes

Strength of students under each courses

	Men	Women	Total
i) U. G. Course			
I year	16	—	16
ii) P. G. Course			
I year	6	—	6

College Library

There is a library attached with this college. Since the college is in the formative stage, a full fledged library could not be formed.



CHAPTER III

The Directorate of Extension

The primary role of the Kerala Agricultural University is to give functional support to the State Development Department. All Extension Education programmes in the University are planned, organised, conducted, monitored and co-ordinated by the Directorate of Extension at the University level.

The extension education programmes of the University are approved by the Extension Advisory Committee constituted by the University with the Vice-Chancellor as Chairman.

Dr A. G.G. Menon continued as the Director of Extension. Dr GR Nair continued as the Associate Director of Extension.

The extension education programmes of the University are operated through the following extension stations/units, educational institutes and research stations of the University.

- i) Training Service Scheme/Central Training Institute
- ii) Farm Advisory Service
- iii) Communication Centre
- iv) Krishi Vigyan Kendras
- v) National Demonstration Scheme
- vii) Tribal Area Research Centre
- vii) Scheduled Caste Area Research Centre
- viii) Lab-to-Land Programme
- ix) Village Adoption Programme.

Training Programmes

The following training programmes were conducted during the year under report.

Name of Training	No. of batches	No. of persons trained	Venue
1	2	3	4
Training in Plant Protection for Agrl. Demonstrators		69	RARS, Pilicode
"		103	Training Service Scheme, College of Agriculture, Vellayani
T & V Pre-Service Training		73	College of Agri, Vellayani
"		47	RARS, Pilicode
Refresher course for Rural Development Officers of State Bank of Travancore		65	CTI, Mannuthy
Training Social Forestry for Village Extension Officers		140	RARS, Pattambi
"		80	RARS, Kumarakom
"		158	Training Service Scheme, College of Agri, Vellayani
"		144	CTI, Mannuthy
"		17	RARS, Pilicode
Training on Extension teaching techniques for Deputy Directors of Agriculture		14	Training Service Scheme, College of Agri, Vellayani
Short-term training in advanced Agrl. Technology for Joint Directors of Agriculture		14	Central Training Institute, Mannuthy
Training in Advanced Agrl. Technology for Deputy Directors of Agriculture		22	"
Training on Spice Production Technology to the personnel of Cardamom Board		163	College of Hort. Vellanikkara

1	2	3	4
Minikit training programme of Rice including propagation of new technology for Agrl. Officers	2	15	Rice Research Station, Moncompu
"		30	RARS, Pattambi
All India Seminar-cum-Workshop on Agrl. Journalism	1	25	CTI, Mannuthy
All India Seminar-cum-Workshop on Cashew Production Technology	1	23	"
Training on Dairy Co-operative Management, accounting, Kerala Co-operative Societies Acts & Rules for Asst. Directors and Extension Officers	1	10	College of Co-operation & Banking, Mannuthy
Pre-release training in dairying course for different personnel	2	11	College of Vety. & Animal Sciences, Mannuthy
Training on Dairy Extension methods to Extension Officers		10	"
Pre-release training in Poultry Management for defence personnel	1	15	Centre for Advanced Studies-Poultry Science, Mannuthy
Pre-service training for live-stock Inspectors	2	102	College of Vety. & Animal Sciences, Mannuthy
Advanced training in Animal Reproduction	1	12	"
Training on operation & maintenance of X-ray units for L. S. I	1	11	College of Vety. & Animal Sciences, Mannuthy
Advanced training in Poultry Breeding and Genetics for S. M. S	1	9	Centre for Advanced Studies in Poultry Science, Mannuthy

1	2	3	4
Advanced training on disease investigation for Asst. Directors of Animal Husbandry	1	9	College of Vety. & Animal Sciences, Mannuthy
Training in Extension methods and public Relations for Range Officers of Forest Department	2		Training Service Scheme, College of Agrl. Vellayani
Training in Extension methods and Public Relations for Foresters of Forest Department	2		-do-
Training in identification and management of diseases of paddy and coconut for Asst. Directors of Agriculture	1		-do-
Training in control of nematodes and biological of crop pests for Asst. Director of Agriculture	1		-do-

Communication Centre

The major objective of the Centre located at Mannuthy is to provide information support to the extension personnel of the State Development Departments, voluntary agencies, Co-operative Societies, farmers etc. on agricultural technologies through a variety of media. The Communication Centre consists of the information unit, exhibition and graphic service unit and publication unit.

Information and Exhibition and Graphic Service Unit

Farm News Service

a. Newspaper Programme

Under this programme, feature articles, tit bits, agricultural news, question answers and other similar news items were published in 15 leading Malayalam and English dailies. A total of 191 news features in agriculture, animal husbandry, fisheries etc. which were of tropical interest were published in the agricultural column of the news papers during the period.

b. Radio programmes—KAU News

Salient activities and important developments in Kerala Agricultural University are broadcasted every friday from 6.45—6.50 AM from Trichur Station of All India Radio. This programme is relayed from the station at Trivandrum and Calicut. Radio talks by KAU Scientists were also broadcasted from the Stations of All India Radio in Kerala.

c. Agricultural Quiz

A quiz programme in Agriculture was conducted on 10.3.'87 at the Directorate of Extension, Mannuthy. The programme was intended for Agriculture students of the Vocational Higher Secondary Schools in the State. Five schools from the different parts of the state participated in the programme.

d. Production of video programmes

Production of video programmes in collaboration with the Doord-
arsan Kendra, Trivandrum was started in 1986-'87. Video cassettes on
selected items were prepared for circulation/distribution among the con-
stituent institutions of the University and outside extension agencies.

Action to establish a TV studio in the University was initiated
during the period under report. A TV camera, mirror and VCR have been
acquired.

e. Press Releases

A total number of 124 press releases were issued during the year
1986-87

2. Instructional Technology Support

Under this programme, audio visual aids including colour slides,
charts, graphs, posters etc. were prepared to lend instructional technology
support to the institutions under Kerala Agricultural University.

3. Farm News Programme

Two farm news programme items were prepared and despatched to
officers of the State Department of Agriculture during the period.

4. Audio Visual Lab

The audio visual laboratory is well equipped with modern audio
visual equipment. The PA system was arranged for all the University
level functions, Farmer's seminars and other extension activities. Film
and slide shows were also conducted in the Farm Clinics and Farmer's
seminars.

5. Exhibitions

a. Major exhibition

The Kerala Agricultural University participated in the All India
Agricultural and Industrial Exhibition conducted in connection with the
Pooram Festival at Trichur during April-May 1986. The main theme of
the pavilion was 'The Developing University and its Role in the Uplift
of the Weaker Sections of the Society'. The technologies developed by
Kerala Agricultural University in the fields of Agriculture, Animal Hus-
bandry, Fisheries and Agricultural Engineering have been displayed appro-
priately in the pavilion. The pavilion was inaugurated by Sri. Akkan, a
Harijan Farmer on 17.4.'86. Over 9 lakhs of people visited the pavilion
and the pavilion secured 'The Best Stall Prize'.

b' Mini Exhibition

The Regional Agricultural Research Station, Kumarakom and College of Fisheries, Panangad participated in the Industrial, Science and Cultural Exhibition conducted in connection with the Silver Jubilee Celebrations of the St. Berchmen's College at Changanacherry. Kerala Agricultural University participated in the exhibition at Central Hatchery, Chengannur in connection with the Silver Jubilee Celebrations of that Institute. Kerala Agricultural University participated in mini exhibition conducted in Government Polytechnics at Perinthalmanna, Ottappalam, Kodungallur and Trichur.

Publication Unit

Non-periodicals

The following bulletins/monographs/leaflets were published during the period.

- | | | |
|----|-----------------------------------------------------------|-------------------------------------------|
| 1 | Package of Practices Recommendation 1986 (Agriculture) | Published |
| 2 | Technical Bulletin (English) | Cashew Apple Products |
| 3 | " " " | Small scale manufacture of Cocoa products |
| 4 | Technical Bulletin (Malayalam) | തെങ്ങുകൃഷി |
| 5 | " | കാലിത്തീറ്റ |
| 6 | " | ഇഞ്ചി |
| 7 | " | കുരുമുളക് |
| 8 | " | മഞ്ഞരം |
| 9 | " | സസ്യരോഗനിയന്ത്രണം |
| 10 | " | കീടനിയന്ത്രണം |
| 11 | " | വാഴച്ചെടി |
| 12 | " | താറാവു വളർത്തൽ |
| 13 | " | മാവ് |
| 14 | " | ചെറുകിടലത്തിൽ കൊക്കൊ വിഭവങ്ങൾ |
| 15 | Leaf let on Vetiver for fine aromatic oil. | |
| 16 | Leaf let on Palmarosa—An ideal essential oil crop | |
| 17 | Leaf let on Horticulture Therapy for the Old and Retarded | |
| 18 | Leaf let on കാട | |
| 19 | Leaflet on വൻവാത്തുകൾ | |
| 20 | Leaflet on നമുക്കു യോജിച്ച മത്സ്യകൃഷി | |

Remodelling of the script is in progress for bringing our revised edition of,

1	Book in Malayalam	കോഴി വളർത്തൽ
2	Technical bulletin (Mal)	ഇറച്ചിക്കോഴി
3	" "	നെല്ല്
4	" " (Eng)	Nutrition Garden
5	" " "	Vegetative propagation
6	" " (Mal)	തെങ്ങ
7	" " "	വാഴ
8	" " "	മരച്ചീനി
9	" " "	പയറുവർഗ്ഗങ്ങൾ
10	KAU Today	

Periodicals

The following periodicals were published during the period under report.

- 1 Kalpadhenu—4 Nos.
- 2 KAU News letter—10 Nos.
- 3 Agres News —1 No.

Farm Advisory Service:

Farm Advisory Service, which is the field unit of Kerala Agricultural University, offers a farmer contact service by which scientists of Kerala Agricultural University meet farmers, in seminars and discuss various field problems and suggests suitable remedial measures. In addition to this scientists conduct special field visits as a "Diagnostic team" on a referral basis on request from State Development Departments to find suitable solutions to the field problems.

One of the important items of work of Farm Advisory Service is to conduct seminars in agriculture, animal husbandry, and fisheries in the different parts of the state in collaboration with various development departments, other development agencies, co-operative voluntary agencies, input firms and service organisation.

i) Seminars:—

The Farm Advisory Service actively participated and took leadership in the arrangement and conduct of farmers seminar at district level in collaboration with the District Co-operative Banks. District level seminars in the 9 districts were held during the year. Three Regional Seminars viz. at RARS, Kumarakom, Vellayani and Pilicode were conducted during the year. The Scientists also took part as resource personnel in other seminars conducted by other development agencies, input firms and voluntary organisations. During the year Farm Advisory Service involved in 22 seminars.

ii) Front line demonstration:

Farm Advisory Service is conducting front line demonstrations on new technology in the villages adopted by the University to influence the the farmers and extension functionaries and also to win the confidence of them in the new technology.

iii) Consultancy service:

The University offers consultancy services in agriculture, animal husbandry and allied subjects particularly in the following areas:

1. Layout and establishment of ornamental gardens
2. Plantation crops
3. Medical case of elephants

iv) Farm Clinic:

The staff attached to Farm Advisory Service continued to attend the Farm Clinic Programme at Nadathara.

KAU Press:

The Kerala Agricultural University Press at Mannuthy caters to all the printing requirements of the University. The items include books, monographs, technical bulletins, folders, pamphlets, registers, annual report, research report, research journals, magazines, forms, invitation cards, coupons etc.

Sales Counter:

Sales counter attached to the Communication Centre sold vegetable seeds and KAU publications during the year for Rs. 1,24,401.

Krishi Vigyan Kendras

There are three Krishi Vigyan Kendras (KVK) functioning under the University. Skill oriented training courses with practical and vocational education background were regularly conducted by the KVKs. The training programmes conducted in KVKs are based on the principle of 'Learning by Doing'.

The Krishi Vigyan Kendra at Pattambi and the Krishi Vigyan Kendra at Ambalavayal are funded by ICAR. The KVK at Manjeswar function with KAU funds.

a) Krishi Vigyan Kendra, Manjeswar:

Training Programmes:

35 Training programmes were conducted and 1300 participants were trained.

A team from All India Radio, Calicut visited the Kendra and broadcasted a feature on the KVK.

Melas and Seminars:

Two seminars of one day duration each were conducted and 180 persons were trained.

b) Krishi Vigyan Kendra, Ambalavayal

Training Programmes:

196 Training programmes were conducted and 2940 persons were trained.

Village Adoption Programme

Demonstration plots on cultivation of pulses and oil seeds were taken up at Thomattuchal. Twentyfive marginal and small farmers were selected for this. Each farmer was supplied with inputs.

Krishi Vigyan Melas and Seminars

A Kisan mela and Agricultural Seminar was organised at Regional Agricultural Research Station, Ambalavayal on 30-9-1986. Fifty tribal farmers participated in the programme.

c) Krishi Vigyan Kendra, Pattambi.

183 Trainings were conducted and 2909 persons were trained .

Survey work

A total of 712 farm families were surveyed in 19 villages utilise 454 man days. Six Demonstration plots were laid out on crops.

Village Adoption

Two villages viz. Thrithala and Kazhayoor have been attached with KVK to implement Village Adoption Programme of KAU.

National Demonstration Scheme(NDS), Sadanandapuram, Quilon District

This scheme is implemented with the specific objective of transfer of technology to achieve maximum production and net return per unit area of land per unit time.

Crop demonstration

<i>Crop rotation</i>	<i>No. of demonstration conducted</i>
Paddy-Paddy-Pulse	14
Paddy-Paddy-Sesamum	14
Paddy-Paddy	4
Cowpea-Tapioca	1
Cowpea	4
Total	39

Field days/Seminars

58 field days, 4 seminars and 2 Krishi Darshan Programmes were conducted and 1670 persons were participated altogether.

T & V Workshop

Sri K. Raveendran Nair, Associate Professor (SS) is participating in the T & V monthly workshop of Quilon District as a resource person.

Kisan mela

One Kisan mela was conducted at Adinadu, Karunagappally on 2-1-87 in which 195 farmers participated.

Lab-to-Land Programme

The Lab-to-Land programme fully financed by the ICAR was implemented during 1986-'87 also.

The beneficiaries of the programme included marginal farmers, scheduled caste and scheduled tribe people, landless agricultural labourers and fishermen.

Bench mark surveys and farm production plans of these farm families were completed.

An educational follow-up seminar, farm youth training and Kisan Melas were conducted in all the Transfer of Technology Centres.

At Thuravoor near Ankamaly the village where the Lab-to-Land Programme of the Agronomic Research Station is implemented, the new extension approach (tried earlier at Vellayani & Malampuzha) involving group management was tried.

One hundred members of the 'Thuravoor Karshakasamithi' with about 30 ha of paddy land was given technical advice and selected critical inputs. Group management was also introduced as an 'input'. The members of the group obtained substantial increase in paddy yield during the 3rd crop season where the group management was introduced. The beneficiary farmers obtained 35 q/ha of paddy as against 17.5 q/ha for the non-beneficiary farmers in the neighbourhood.

Village Adoption programme

The Kerala Agricultural University had adopted 27 villages in the different parts of the state. These adopted villages were attached to the KAU institution located in the respective areas.

Specific guidelines for undertaking farm trials, frontline demonstrations, social forestry and adult education programmes and for testing improved package of practices recommended by KAU were provided to all centres.

Frontline demonstration on oilseeds such as groundnut and sesamum were conducted in almost all the centres.

The farmers of Trithala and Kizhayoor area were given intensive training in Agriculture, Animal Husbandry, Fisheries and Home Science.

The programme at 'Poonithura' village of Vyttila was mainly the cultivation of cowpea (Kanakamony). Fertilizers, lime and pesticides were supplied for one hectare area.

At Ambalavayal, the pulse programme was taken up in an area of 1.5 hectare during March 1987. The front line demonstration on sesamum conducted in a 20 hectare plot gave an average yield of 200 kg.

The Village Adoption Programme at Panniyoor was confined to oil seed demonstration. The yield of sesamum in the demonstration plot was 400 kg/hectare.

The sesamum demonstration plot at Tavanur recorded an average yield of 450 kg/ha as against a control plot yield of 250 kg/ha.

Scheduled Caste Area Research Centre (AICRP on SCAR), Nilambur

The All India Co-ordinated Project on Scheduled Caste Area Research sponsored by ICAR is being implemented by KAU at Nilambur to develop appropriate technology modules and disseminate them in ways such that the benefits of the new and advanced technology already generated are effectively employed with considerable economic advantages elsewhere would become available to the weaker sections of the society.

Training Programmes:

83 Training programmes were conducted. Altogether 1530 persons were trained.

Exhibition:

The centre actively participated and contributed exhibits, display items etc. in the KAU pavilion of Pooram Exhibition. The centre took part in a local mini exhibition organised by Nilambur Mahila Samajam.

Radio Programmes:

Radio programme on nutritive value of leafy vegetables and programmes and activities of the centre were made.

Lab-to-Land Programme:

Various new technologies were transferred to 25 families.

Tribal Area Research Centre, Amboori and Integrated Development of Kanikkar Tribals:

A total number of 107 families were brought under the Rubber Planting Programme by supplying improved varieties of rubber seedlings.

Rooted cuttings of locally improved variety of pepper namely Karimunda were distributed to 25 farmers of various settlements. 3500 clove seedlings were distributed to 175 farmers.

An Agromet Observatory was set up at the field office in the Karikuzhy settlement. Three trained Kanikkar youth record observations on weather parameters.

Five Kanikkar youths were supplied with a pair of rabbits with an intention to start broiler rabbitry. A demonstration-cum-breeding unit was also started.

Vaccination campaign against devastating diseases such as Ranikhet, pox etc. were conducted at various settlements.

More than 85 fold medicine practices of the tribals were collected and documented.

One hundred smokeless choolas have been installed in 100 selected families.

The thrift habit programme was introduced to 100 families and 55% housewives started accounts in nearby scheduled bank.

Twelve Kanikkar girls were given training in tailoring.

One hundred bee hives were supplied to tribal farmers with an idea to establish 5 bee hives per family.

A rubber rolling machine was established at the field office for the benefit of rubber producing tribal farmers.

National Service Scheme:

During the period under report, eight NSS Units were functioning in Kerala Agricultural University with about 1000 volunteers.

College of Agriculture, Vellayani

A special camping programme of N.S.S. Unit of the College of Agriculture, Vellayani was conducted from 14th to 18th February, 1987 at Malamoode Village, Nedumangad. There were altogether 72 campuses.

Construction of a pond in an area of 400 sq. m. was carried out for irrigation purpose.

A group of volunteers distributed vegetable seeds to 40 selected houses. Necessary technical advice was also given.

Collected 25 soil samples for analysis.

A cattle sterility campaign was conducted on 18-2-1987 and 22 animals were examined by experts.

Anti rabies vaccination was carried out for 30 dogs.

A case study on bamboo workers was conducted on Cherukoor-konam.

Volunteers participated in the developmental activities undertaken by the N. E. S Block, Vyttila. They have helped in the repair works of a road at Kumbalam.

Seven volunteers donated blood to deserving patients.

The volunteers cleaned the premises of Govt. L. P. School Udayathumvathukkal near Panangad. They put up a fencing around the school compound using the locally available materials, they cleaned a well also in the compound.

The volunteers of the college took up the Mass Functional Literacy Programme also. To start with only 10 illiterates were taken up.

The Community Centre at Mullakkara continued to function with facilities for reading newspapers, leaflets etc.

N. S. S. volunteers celebrated Vanamahotsava in the main campus of the university. The students planted 700 seedlings in the KAU School and Main Campus of University. They distributed 1200 seedlings of neem, mango, eucalyptus etc. to the farmers of the adopted village.

Two kitchen gardens were laid out and maintained by the N. S. S. students at Govt. School, Ramavarnapuram and Holy Family Convent School, Mannuthy.

A five day camp was conducted in the Girijan Colony, Thalona, Wynad dt from 9th to 13th August, 1986. A total number of 130 NSS volunteers participated in the camp. The main items were planting banana suckers, coconut seedlings, rooted cuttings of pepper, constructing road and ESP latrines, animal health camp, medical camp etc.

Two front line demonstration plots of sesamum were laid out in rice fallows. Farmers could get an average yield of 300 kg of sesamum/ha.

Rice Research Station, Vyttila

Village Adoption Programme

Poonithura village has been adopted and two demonstration trials on cowpea were conducted. Inputs were supplied and group discussions were held.

Rice Research Station, Kayamkulam

Lab-to-Land Programme

Twenty five farm families were selected in the villages of Keerikad South and Kayamkulam. Seeds of crop plants, fertilizers, and plant protection chemicals were supplied to the beneficiaries. Austrowhite and Black pullets were also distributed to the farmers. □



Engineering Wing

The Engineering Wing of the Kerala Agricultural University consists of Directorate of Physical Plant, Vellanikkara with two divisions, one at Pilicode and the other Panangad. There are five sub-divisions, three at Vellanikkara, one at Mannuthy and one at Vellayani. The control of the construction and maintenance of the buildings, roads, procurement of equipments, vehicles, machinery etc. are the responsibilities of the Director of Physical Plant. Sri C. Unnikrishnan was the Director of Physical Plant during the year.

Budget provision for the year is Rs. 300 lakhs under works (Plan) and Rs. 26.5 lakhs under maintenance and repairs. The expenditure upto 31-3-1986 is Rs. 235.575 lakhs.

The stages of major works are noted below:

At Vellanikkara, formation of 'C' Road along Radio Isotope Laboratory to Ladies Hostel and formation of 'C' Road to Type V and IV quarters, black topping of road to type IV, V, VI quarters and BT of Road to Radio Isotope Lab. are completed. Formation of balance portion of 'B' road is in progress.

Construction of culverts in 'B' road has been completed. Construction of additional ten type II quarters have been completed and allotted for occupation. Works of Training Research Building at Madakkathara, Bachelors Hostel, Trainees Hostel, School Building, Net House, Type I quarters, Ladies Hostel, Canteen building, Glass House, Labour lines for estate workers and providing street lights along the 'A' Road and 'B' Road, office for Pineapple Research Station, GL tank at Vellanikkara etc. have been completed. Works of Insectory building, flat type quarters at Vellanikkara are in progress. Construction of ten numbers of type II quarters are in progress. Construction of a building for accommodating the Co-operative store has been completed. Works for providing street light along road leading to Ladies Hostel and Radio Isotope Lab. and to the road leading to type IV, V & VI quarters and construction of two blocks of Teachers Hostel in Main Campus are in progress. Works for the Administrative Block have been entrusted to

Kerala State Construction Corporation and the work is started. Works of Staff Club at Vellanikkara have been arranged. Construction of a type IV quarters, labour lines, creche building and a waiting shed at Madakkatnara and 2 Nos. of type V quarters at Vellanikkara are in progress.

At Mannuthy, the balance works of Dairy Technology Building have been arranged and nearing completion. Erection of Machinery for Dairy Meat Technology Units also is nearing completion. The works of Rearing House building for hundred experimental animals additional Ladies Hostel, Additional lecture hall, type V quarters under NARP and quarters at Mannuthy are completed. The works of an additional floor to PG Hostel, Metabolism Centre, construction of Layer House and fencing the balance portion of Southern side of Mannuthy Campus are completed. Laying of pipes and construction of pump house, erection of pump sets has been completed for drinking water. Further arrangements, made with Water and Waste water Authority for giving drinking water from Peechi and they have given connection to Mannuthy Campus. Works of Staff Club and a paper store attached to press building are completed. But Electrical work to be arranged.

The Construction of U. G. Hostel for Men is in good progress. Electrical Works for 3 blocks arranged but not started. The flat type quarters 2 blocks for 36 families are nearing completion. Construction of Breeder house in progress.

Providing fencing around Poultry Farm are arranged and is in good progress.

Regarding the works of Fisheries College, Panangad, Construction of four blocks of semi-permanent sheds have been completed. Construction of Dormitory building and Dining block for Dormitory building have also been completed. Construction of type V and IV quarters at Panangad has been completed. The lab. and seed store at Vyttila under NARP are completed. Construction of a type IV quarters at Vyttila and Watchman's quarters at Puduveipu have been arranged and are in progress. Type V quarters at Puduveipu is completed. The plan and estimates for two ACADEMIC BLOCKS & TYPE II quarters have been prepared and the work entrusted to M/s. Kerala State Construction Corporation. The work is hindered due to non-availability of land.

At Vellayani construction of Deep Litter Poultry and the works improvement to protected water supply to Vellayani Campus have been completed. Construction of a Lab. and Library building and Indoor Stadium are in progress. Black topping of the main road in Vellayani Campus is completed. Work of fencing and compound wall is nearing completion. Remodelling of old ladies hostel for Home Science Faculty is in progress.

Under NARP remodelling of Agronomy Lab., Statistics Lab., Plant Breeding, Agricultural Chemistry Lab, construction of Net house and Green House are completed and the works for improvements and remodelling other laboratories in Agricultural College are nearing completion. At Balaramapuram, forming approach road to office has been completed. Works for reclamation of Kayal lands under NARP also have been completed.

At Kottarakkara under NARP a lab. building, type IV quarters, type V quarters, fencing work, Water supply arrangements work etc. have been arranged. These works are in progress. Electrification works to the buildings to be arranged.

Under NARP, Type V, IV and Type II quarters and farm structures at Kumarakom and Moncompu have been completed. Works of Lab. building, Kumarakom under NARP are in progress. The Trainees Hostel at Kumarakom and lab. buildings at Kayamkulam and Lab. at Moncompu under the scheme are also completed.

Under NARP at Pilicode, construction of type IV, V and II quarters and Trainees Hostel, works for the Administrative Building, fencing and compound wall, construction of farm structures are completed.

At Panniyur, construction of demonstrators quarters and works for providing irrigation facilities have been completed. Construction of type II quarters and type IV quarters also are completed.

At Thiruvazhamkundu construction of Cow barns for 100 cows and Milk Chilling Plant are nearing completion. The lab. building and AI Centre are in progress. The construction of sites and formation of farm road has been completed.

At Pattambi construction of type V, IV, II quarters, Net House, Green House, Meteorological laboratory and other farm structures under NARP and construction of the lab. building under NARP has been completed. The construction of Office-cum-Hostel building under KVK and quarters under KVK are in progress. Seed store and Threshing yard under breeder seed project also are completed. Construction of type III flats and type II quarters are in progress.

At Ambalavayal, the works for various buildings under KVK are in progress. Under NARP remodelling of existing building at Pampadumpara and Ambalavayal and construction of Trainees Hostels at Ambalavayal and Pampadumpara are in progress.

At Tavanur, construction of type I and IV quarters construction of labourers waiting shed, seed store and fencing and compound wall are completed. Construction of Type I) quarters and canteen building, cow shed are in progress. Work for providing street lights is stated.

Fencing and compound wall for the farm at Thumburmuzhi is in progress and improvement to water supply arrangements completed. Extension of laboratory building at Chalakudy under NARP is completed. The construction of type V quarters, construction of wall and fencing at Odakkali are also completed. The work of construction of a waiting shed for labourers have been tendered.

At Pampadumpara, the works of construction of type IV quarters are in progress. Construction of a waiting shed at Pampadumpara is completed. The contract for type II quarters has been terminated and the balance works have been re-arranged.

Works for constructing type I quarters. Dean's quarters, Guest House and Poultry House under low cost Housing at Tavanur have been entrusted and the works have been started. Construction of type I quarters under this is in progress.

CHAPTER V

Estate

An area of 379.5615 ha was acquired by the Government of Kerala for the establishment of Kerala Agricultural University and the Estate was handed over to the University on 1-5-1973. An area of 11.8753 ha have been acquired additionally during 1977 and 1981 making the total area to 391.4368 ha.

The Schemes under the Cashew, Pineapple, Pepper, Floriculture and Instructional Farm for Horticulture College have already been started functioning in the Campus. A total of 149.3 ha have been earmarked for the above schemes and farm. An area of 12 ha have been allotted to the National Bureau of Plant Genetic Resources of the Indian Council of Agricultural Research and an area of 14 ha have been allotted for Kerala Agricultural Development Project. 60 ha of land have been earmarked for the Botanical Garden. An area of about 20 ha have been utilised for buildings and roads. About 135 ha are covered with tapping trees which also include the area earmarked for Botanical garden.

An area of 1.5056 ha of land acquired during December, 1979 was allotted to the College of Horticulture for the establishment of germplasm of plantation crops, spices and crop museum.

Replanting Rubber

An area of 7.98 ha have been replanted in Priyadarsini Sub-division in 1978 and 1979 with the following varieties.

	No. of plants
1 RRIM 629	525
2 RRIM 623	325
3 RRIM 600	1300
4 RRII 105	8318
Total	<hr/> 10468 <hr/>

Timely cultural and manurial operations are being carried out as per the technical advice. The subsidy from the Rubber Board is being availed of.

Expenditure and Receipts

A quantity of 28.381 tonnes of rubber was produced during the year. There was a stock balance of 21.605 tonnes of rubber as on 31-3-1987. The total expenditure during the year was Rs. 15, 54, 991.30. The total receipts from estate during 1986-87 was Rs. 14, 36, 791.31.



Finance & Accounts

Sri K. K. Pankajakshan, continued to be the Comptroller of the University.

The budget estimates 86-87 envisaged an expenditure of Rs. 17.87 crores by assuming a grant of Rs. 12.68 crores from State Government and the balance from other sources like ICAR, University's own income, Department of S&T, Department of Environment, Ministry of Agriculture, N. S. S. I. S. R. O., UNICEF etc. The opening balance as on 1-4-86 was fixed at Rs. 35.68 lakhs, and the closing balance on 31-3-87 was estimated at Rs. 1.48 lakhs. The allocation earmarked for Research was 42%; Education 40% and Administration and Extension each 9%.

Receipt from State Government

The State Government released Rs. 808.17 lakhs to the University during 86-87. The amount comprises of Rs. 588.07 lakhs under non-plan and Rs. 220.10 lakhs under plan.

Receipt from ICAR

During 1986-87 the University had received an assistance of Rs. 154.25 lakhs from the ICAR. This includes Rs. 56.27 lakhs released for developmental expenditure under the item 'Estt. and Development of Agricultural Universities'.

Internal Revenue

During the year 86-87, the University had raised an income of Rs. 127 lakhs from its properties, farms and colleges against an estimate of Rs. 113 lakhs.

Other sources: - Income under other sources includes assistance received from DST, ISRO, UNICEF, NSS etc. The funds received from these sources come to around Rs. 55.37 lakhs in 1986-87.

A broad break-up of expenditure is shown below.

Non-plan	Rs. 940.95 lakhs
Plan	396.43 lakhs
ICAR Schemes	183.71 lakhs
Other Schemes	37.06 lakhs
Total	<u>1558.15 lakhs</u>

□



Appendix I

MEMBERS OF THE STATUTORY AUTHORITIES

GENERAL COUNCIL

EX-OFFICIO MEMBERS

- The Chancellor
- The Pro-Chancellor
- The Vice-Chancellor
- The Secretary to Government (Agrl.)
- The Secretary to Government (Development)
- The Secretary to Government (Finance)
- The Director of Agriculture
- The Director of Animal Husbandry
- The Director of Dairy Development
- The Director of Fisheries
- The Chief Conservator of Forests
- The Registrar of Co-operative Societies
- The Dean, Faculty of Agriculture, KAU
- The Dean, Faculty of Fisheries, KAU
- The Dean, Faculty of Veterinary & Animal Sciences, KAU
- The Dean, Faculty of Basic Sciences & Humanities, KAU
- The Dean, Faculty of Agrl. Engg. & Technology, KAU
- The Director of Extension, KAU
- The Director of Research, KAU
- The Director of Student's Welfare, KAU

ELECTED MEMBERS

Members of Legislative Assembly (4 nos)

- Sri S. Govinda Kurup, Member, Legislative Assembly, Kalakkad Veedu, Adinad North, P. O. Karunagappally.
- Sri E. T. Mohammed Basheer, Member, Legislative Assembly Soumyam, Mapram, P. O. Cheruvayoor, Malappuram Dist.
- K. C. Joseph, Member, Legislative Assembly, Congress House, Sreekantapuram.
- Sri K. V. Surendranath, Member, Legislative Assembly, Indian Communist Party, Kerala State Council Office, Thycaud, Trivandrum.

Representatives of Students of Post-Graduate Courses (2 Nos)

Anil Kumar, K. S. (84-11-34), P. G. Student, Department of Soil Science & Agricultural Chemistry, College of Horticulture, Vellanikkara.

R. Prakash (84-21-10), Ph. D. student, Department of Agricultural Extension, College of Agriculture, Vellayani, P. O., Trivandrum.

Representatives of Students of Graduate Courses (2 Nos.)

Jacob, P. K. (81-03-78), B. V. Sc. & A. H. Student, College of Veterinary & Animal Sciences, Mannuthy, P. O., Trichur.

Najeebkhan, A. (84-03-14), B. V. Sc. & A. H. Student, College of Veterinary & Animal Sciences, Mannuthy, Trichur.

Representatives of the students of Diploma Courses and Certificate Courses (1 No.)

Sajeevan, P. B. (84-D1-19), D. A. Sc. student, Kelappaji College of Agricultural Engg. & Technology, Tavanur, Malappuram District.

Representatives of Teachers of Faculties (other than Deans)

(not more than 4—One from each Faculty)

Faculty of Agriculture

F. M. H. Khaleel, Assistant Professor, Inservice Training Scheme, Mannuthy, P. O., Trichur.

Faculty of Veterinary & Animal Sciences

Dr V. Raju, Assistant Professor, College of Vety. and Animal Sciences, Mannuthy, P. O., Trichur.

Faculty of Fisheries

Dr P. M. Mathew, Professor (Fisheries Research), College of Fisheries, Panangad, Ernakulam.

Representative of Non-teaching staff (1 No.)

Sri V. Balagopalan, Section Officer, Regional Agricultural Research Station, Ambalavayai-673 593, Wynad District.

Representatives of Presidents of Panchayaths (4 Nos)

Vacant

Representative of Mayors of Municipal Corporations & Chairman of Municipal Councils (1 No.)

Vacant

MEMBERS NOMINATED BY THE CHANCELLOR

Agricultural Scientists (2 Nos)

Sri P. Mukunda Menon, Rubber Production Commissioner, Rubber Board, Kottayam.

Dr K. V. Peter, Professor of Olericulture, College of Horticulture, Vellanikkara, Trichur, 680 654.

Farmers (5 Nos.)

Sri Raghavan Pozhakkadavil, M. L. A., P. O. Karalam, Irinjalakuda, Trichur Dist.

Professor Alexander Zachariah, St. Joseph's College, Devagiri, Calicut.

Sri Thiruppuram Thankayya, Teacher, Erayanvila House, Thirupuram P. O., Trivandrum District.

Sri Therambil Ramakrishnan, M, L. A., 'Krishna Kripa', Trichur.

Sri C. Haridas, Ex. M. P. 'Swapna', Ponnani, Malappuram Dist.

Non-Official Representatives (3 Nos)

Co-operation

Sri O. Lukose, Ex. M. L. A., Kappumthala, Kaduthuruthy, Kottayam Dist.

Fisheries

Sri V. T. George, Retd. Director of Fisheries, XLVI/972, Chittoor Road, Pachalam, Cochin-12.

Animal Husbandry

Sri A. V. Hamza, Athakka Veedu, Ponnani Nagaram, Malappuram Dt.

Non-Official Representative of Plantation Industry (1 No.)

Sri Kunhabdulla Haji, Valayil House, Kaniyampaka, Wynad, Dist.

Woman Social Worker (1 No.)

Smt Jameela Ibrahim, Advocate, Quilon

Engineer who has specialised in Agricultural Engineering or Irrigation (1 No.)

Sri E. Chandrasekhara Pillai, Retd. Deputy Chief Engineer, 'Karthika', Valappally, P. O., Changanacherry, Kottayam Dist.

Educationist (1 No.)

Prof. K. J. Kurien, Poovathungal House, Thudanganad. P. O. (via), Thodupuzha, Idukki Dist.

Representatives of Agriculture Labour (2 Nos)

Sri K. P. Chelli, Mankada. P. O., Malappuram Dist.

Sri M. R. Kottara, Kuyinakkad, Quilon.

Representative of Plantation Labour (1 No.)

Sri K. A. Kurien Master, Alakode, P. O, Cannanore Dist.

OTHER MEMBERS

Representatives of University Senates (3 Nos) of

Calicut	:	Vacant
Cochin	:	Vacant
Kerala	:	Sri S. Subramonyan Potti, T. C. 14/1680, Sanskrit College Road, Trivandrum.

Representative of Indian Council of Agrl. Research (1 No.)

Dr Vellayathum, Asst. Director General, I. C. A. R, Krishi Bhavan,
Dr Rajendra Prasad Road, New Delhi-1.

ACADEMIC COUNCIL

Members

The Vice-Chancellor, Kerala Agricultural University

The Dean, Faculty of Agriculture, Kerala Agricultural University.

The Dean, Faculty of Veterinary & Animal Sciences, Kerala Agricultural University.

The Dean, Faculty of Fisheries, Kerala Agrl. University,

The Dean, Faculty of Agrl. Engg. & Technology, Kerala Agricultural University

The Director of Research, Kerala Agricultural University

The Director of Extension, Kerala Agricultural University

The Director of Students Welfare, Kerala Agricultural University.

The Registrar, Kerala Agricultural University.

The Director of Agriculture, Trivandrum

The Director of Animal Husbandry, Trivandrum.

Members nominated by the Chancellor from among the Heads of Departments of the Faculties (6 members)

Dr V. Gopinathan Nair, Professor & Head, Department of Plant Breeding, College of Agriculture, Vellayani, Trivandrum.

Prof. S. Balakrishnan, Head, Department of Plantation crops & Spices, College of Horticulture, Vellanikkara, Trichur.

Dr V. Radhakrishnan, Prof. & Head, Dept. of Agrl. Economics, College of Horticulture, Vellanikkara, Trichur.

Dr C. P. Neelakanta Iyer, Prof. & Head, Dept. of Animal Reproduction, College of Veterinary & Animal Sciences, Mannuthy, Trichur.

Dr K. M. Alikutty, Prof. & Head, Department of Clinical Medicine, College of Veterinary and Animal Sciences. Mannuthy.

Prof. C. P. Mohammed, Head, Department of Farm Power & Machinery, Kelappaji College of Agrl. Engg. & Technology, Tavanur, Malappuram Dist.

Members nominated by the Chancellor from the staff of the Research Stations of the University

Dr R. Raveendran Nair, Associate Director, Regional Agricultural Research Station, Kumarakom, Kottayam Dist.

Dr K. P. Rajaram, Associate Director, Regional Agricultural Research Station, Pilicode, Kasaragod Dist.

Prof. N. Rajappan Nair, Associate Director, Regional Agricultural Research Station, Pattambi, Palghat Dist.

Members nominated by the Chancellor from among those connected with service in Agriculture, Animal Husbandry, Forestry, Fisheries, Dairy Development, Co-operation & Community Development Departments (not more than 5 members)

Vacant

Members nominated by the Chancellor from among the Scientists from the ICAR and/or its institutions, from other Universities in India or from among well-known Scientists in India

Dr Kaul, Asst. Director General (Hort), ICAR, New Delhi

Dr Rajamma Devadas, Hon. Director, Sri Avinashalingom, Home Science College, Coimbatore.

Dr M. K. Nair, Director, Central Plantation Research Inst., Kasargode.

Sri M. R. Nair, Director, Central Institute of Fisheries Technology, Cochin.

Dr Vellayathum, Asst. Director General, ICAR, New Delhi.

Elected members—One member each from among the post-graduate students and the Research students of the University

Sri Rasheed Sulaiman. V. (86-11-29)

P. G. Student, Department of Agrl. Extension, College of Horticulture, Vellanikkara, Trichur.

Sri Ahamed P, Ph. D Student, Department of Agricultural Extension, College of Agriculture, Vellayani, Trivandrum.

Elected members—one member elected by the Teachers

Faculty of Agriculture

Sri T. U. George, Professor (Agrl. Botany), Rice Research Station, Vyttila, Ernakulam Dist.

Faculty of Agrl. Engg. & Technology

Sri Jippu Jacob, Associate Professor, Kelappaji College of Agrl. Engg. & Technology, Tavanur.

Faculty of Fisheries

Dr J. Rajasekharan Nair, Assistant Professor, College of Fisheries, Panangad, Ernakulam Dist.

Faculty of Veterinary & Animal Sciences

Vacant

BOARD OF STUDIES .

FACULTY OF AGRICULTURE

Dean, Faculty of Agriculture, KAU
Heads of Department under the Faculty

Chairman
Members

Agronomy
Agricultural Botany
Agricultural Entomology
Agricultural Economics
Agricultural Engineering
Agricultural Extension
Agricultural Statistics
Horticulture
Plant Pathology
Soil Science & Agrl. Chemistry
Plant Breeding
Plantation Crops
Pomology, Floriculture & Landscaping
Olericulture
Processing Technology.

Two specialists

Dr T. Kumaraswamy, Dean (Retired), III, Vakil street,
Kovilpatti-627 701.

Dr N. P. Jayasankar, Joint Director, Central Plantation Crops Research Institute, Regional Station, Kayamkulam, Krishnapuram-690 533

Such other members

Dr R. R. Nair, Assoc. Director of Research, RARS, Kumarakom
Sri. F. M. H. Khaleel, Assistant Professor, Inservice Training Scheme,
Mannuthy.

Student Representatives

Sri M. J. Joseph. Ph. D. Student, College of Horticulture,
Vellanikkara

Sri Sankaranarayana Sarma, M. Sc. (Ag) Student, College of Agriculture, Vellayani.

Special Invitees

Director of Agriculture, Trivandrum

Dean i/c, K. C. A. E. T, Tavanur

Associate Dean, College of Horticulture, Vellanikkara

Assoc. Dean, College of Co-operation & Banking, Mannuthy

Professor & Head, College of Rural Home Science, Vellayani

Special Officer (Forestry), College of Forestry, Vellanikkara

FACULTY OF VETERINARY & ANIMAL SCIENCES

Dean, Faculty of Vety. & Animal Sciences
Heads of Departments under the Faculty

Chairman
Members

Anatomy

Animal Management

Dairy Science

Preventive Medicine

Microbiology

Parasitology

Pharmacology

Poultry Science

Surgery

Animal Breeding & Genetics

Animal Reproduction

Extension

Nutrition

Pathology

Physiology & Bio-Chemistry

Statistics

Clinical Medicine

Veterinary Public Health

Two Specialists

Dr A.Ram Mohana Rao, Dean of Post Graduate Studies, Andhra Pradesh Agrl. University, Rajendranagar, Hyderabad-500030.

Dr M. Krishnan Nair, Director, Veterinary Research & Education, College of Vety. & Animal Sciences, Mannuthy.

Such other members

Dr K. Radhakrishnan, Professor (RC), College of Vety. & Animal Sciences, Mannuthy.

Dr T. Prabhakaran, Professor of Animal Production Economics, College of Vety. & Animal Sciences, Mannuthy.

Student Representatives

NIL

Special invitees

Director of Animal Husbandry, Trivandrum

Director of Dairy Development, Trivandrum

FACULTY OF FISHERIES

Dean, Faculty of Fisheries Chairman
Heads of Departments under the Faculty Member
Aquaculture
Fishery Biology
Fishery Hydrology
Processing Technology
Fishing Technology
Fisheries Engineering
Management studies

Two Specialists

Dr M. J. George, Joint Director (Retd), 120- Giri Nagar, Cochin-682020

Dr P. U. Varghese, Project Director, Prawn Farm Project Complex, Marine Products, Export Development Authority, 36/563 T. D. Road, Cochin-582011.

Such other members

Dr P. M. Mathew, Professor (F. R.), College of Fisheries, Panangad.
Sri F. M. H. Khaleel, Asst. Professor, Inservice Training Scheme, Mannuthy.

Student Representatives

NIL

Special Invitees

Director of Fisheries or his nominee
General Manager, Matsyafed or his nominee.

FACULTY OF AGRICULTURAL ENGINEERING

Dean, Faculty of Agrl. Engineering & Technology Chairman
Heads of Departments under the Faculty Members

Specialists

Prof. R. K. Sivanappan, Director, Water Technology Centre, Tamil Nadu Agrl. University, Coimbatore

Dr C. M. Jacob, Visiting Professor, Department of Agrl. Engineering, University of Nairobi, Kenya.

Such other members

Dr K. C. George, Professor & Head, Department of Agricultural Statistics, College of Veterinary & Animal Sciences, Mannuthy

Dr T. G. Rajagopalan, Director of Students Welfare i/c, Kerala Agricultural University Headquarters, Vellanikkara

Student representative

NIL

Special invitees

Mr K. R. Saxena, Director, Central Board of Irrigation & Power, Government of India, New Delhi.

Mr Vasudevan Pillai, State Agrl. Engineer, Department of Agriculture, Government of Kerala, Trivandrum

Mr V. A. P. Naik, Chief Engineer, Kerala Agro Industries Corporation, Trivandrum.

Mr. T. P. George, Professor i/c. of Post-Graduate Programmes in Agrl. Engineering, College of Horticulture, Vellanikkara.

Dr. Raghavan Nambiar, Professor of Civil Engineering, Regional Engineering College, Calicut.

Director of Agriculture, Trivandrum or representative

Dr. D. M. Thampi, Profesaor, College of Fisheries, Panangad, P.O., Cochin-682506.

Dr C. Sreedharan, Professor, College of Horticulture, Vellanikkara.

Dr R. Gopalakrishnan, Head, Division of Extension & Education, C.W.R.D.M., Calicut.

EXECUTIVE COMMITTEE

EX-OFFICIO MEMBERS

The Vice-Chancellor, Kerala Agricultural University, Vellanikkara-Trichur.

The Secretary to Government, Department of Agriculture, Secretariat, Trivandrum.

The Secretary to Government, Development Department, Secretariat, Trivandrum.

The Secretary to Government, Finance Department, Secretariat, Trivandrum.

Other members—Members representing the ICAR

Dr Vellayathum, Assistant Director General, Indian Council of Agricultural Research, Krishi Bhavan, Dr Rajendra Prasad Road, New-Delhi-1.

Elected Dean of Faculty

Dr. M. J. Sebastian, Dean, Faculty of Fisheries, College of Fisheries, College of Fisheries, Panangad. P. O. Cochin 682 506.

Elected Teacher

Sri F. M. H. Khaleel, Assistant Professor, Inservice Training Scheme,
Mannuthy. P. O, Trichur.

Elected Non-official Members

Sri. Therambil Ramakrishnan, M.L.A, Krishna Kripa, Trichur

Sri. A. V. Hamza, Athakka Veedu, Ponnani Nagaram, Malappuram
District, Pin. 679 583.

Sri. Raghavan Pozhakkadavil, M. L. A, P.O. Karalam, Irinjalakuda,
Trichur District.

Sri O. Lukose, Ex. M. L. A., Arukuzhuppil, Kappumthala, Kadu-
thuruthy, Kottayam Dist.

Appendix II

SUB COMMITTEES OF THE EXECUTIVE COMMITTEE

FINANCE COMMITTEE

Vice-Chancellor	Chairman
Secretary, Finance	Member
Secretary to Government (Agriculture)	"
Sri Therambil Ramakrishnan, Ex. M. L. A.	"
The Comptroller	Convenor

PLANNING AND DEVELOPMENT COMMITTEE

Vice-Chancellor	Chairman
Secretary to Government (Agriculture)	Member
Sri Raghavan Pozhakadavil, Ex. M. L. A.	"
Sri Therambil Ramakrishnan, Ex. M. L. A.	"
Sri O. Lukose, Ex. M. L. A.	"
Sri A. V. Hamza	"
The Comptroller	Member—Convenor

RESEARCH REVIEW SUB COMMITTEE

Vice-Chancellor	Chairman
Sri Raghavan Pozhakadavil, Ex. M. L. A.	Member
Sri Therambil Ramakrishnan, Ex. M. L. A.	"
O. Lukose, Ex. M. L. A.	"
Sri A. V. Hamza	"
The Director of Research	Member—Convenor

SPORTS BOARD

Vice-Chancellor	Chairman
Chairman of Student's Welfare Committee	Member
Deans of Faculties & Associate Dean (Hort)	"
Registrar	"
Students members in the General Council	"
Director, IAT Tavanur	"
Junior Asst Professor (Phy. Edn.) or Officers i/c of sports	"
Dy. Director of Students Welfare (S & G)	Member—Convenor

ESTABLISHMENT COMMITTEE

Sri Raghavan Pozhakadavil, Ex. M. L. A.	Chairman
Sri Therambil Ramakrishnan, Ex. M. L. A.	Member
Sri A. V. Hamza	"
Sri O. Lukose, Ex. M. L. A.	"
Dr M. J. Sebastian, Dean, Fisheries	"
The Registrar	Member—Convener

STUDENTS WELFARE COMMITTEE

Sri A. V. Hamza	Chairman
Sri Raghavan Pozhakadavil, Ex. M. L. A.	Member
Sri Therambil Ramakrishnan, Ex. M. L. A.	"
Sri O. Lukose, Ex. M. L. A.	"
Director of Students Welfare	Member—Convener

WORKS COMMITTEE

Vice-Chancellor	Chairman
Sri A. V. Hamza	Member
Sri O. Lukose, Ex. M. L. A.	"
Dr M. J. Sebastian, Dean, Fisheries	"
Director of Physical Plant	Member—Convener

SUB COMMITTEES OF THE GENERAL COUNCIL

STATUTE SUB COMMITTEE

Sri Raghavan Pozhakadavil, Ex. M. L. A.	Chairman
Sri Therambil Ramakrishnan, Ex. M. L. A.	Member
Sri O. Lukose, Ex. M. L. A.	"
Sri A. V. Hamza	"
Sri F. M. H Khaleel	"
Dr V Raju	"
Dr P. M. Mathew	"
Sri P. K. Jacob	"
The Registrar, Kerala Agrl. University	Member—Convener

ASSURANCE COMMITTEE

Prof. Alexander Zacharias	Chairman
Sri C Haridas, Ex. M. P	Member
Smt Jameela Ibrahim	"
Sri M. R. Kottara	"
Sri Thirupuram Thankayya	"
Sri K. G. Chandrasekhara Pillai	"
Sri V. T. George	"
The Registrar, Kerala Agrl. University	Convener

ACCOUNTS COMMITTEE

Sri S. S. Potti	Chairman
Prof. K. J. Kurien	Member
Sri K. A. Kurien Master	"
Sri K. P. Chelly	"
Dr K. V. Peter	"
Sri V. Balagopalan	"
The Comptroller, Kerala Agri. University	Convenor

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Director of Research	Secretary

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Prof. K. U. Kurien, Nirmala College, Moovattupuzha (Povathumkal House, Thundanganad P. O., Muttom, (Idukki Dt)
Sri FMH Khaleel, Assistant Professor, Inservice Training Scheme, Directorate of Extension, Mannuthy

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Director of Agriculture, Kerala State or his nominee, Vikas Bhavan, Trivandrum-695 033.
Managing Editor, Agricultural Research Journal of Kerala, College of Horticulture, Vellanikkara.
Associate Director, Regional Agricultural Research Station, Pilicode, Kasaragod Dist. 670 353.

Associate Director, Regional Agricultural Research Station, Pattambi, Pattambi, Palghat Dist. 670 396.

Associate Director, Regional Agricultural Research Station, Ambalavayal, Wynad Dist. 673 593.

Associate Director, NARP (SR), College of Agriculture, Vellayani, Trivandrum Dist. 695 522.

Professor of Agronomy, Regional Agricultural Research Station, Kumarakom, Kottayam Dist. 686 566.

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Associate Director of Research (AR & T), Directorate of Research, KAU, Vellanikkara.

Associate Director of Research (Pig.), Directorate of Research, KAU, Vellanikkara.

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Director of Dairy Development, Pattom, Trivandrum-695 004.

Associate Director of Research (V & AS), Directorate of Research, KAU, Vellanikkara.

Editor, Kerala Journal of Vety. Research, College of Vety. & Animal Sciences, Mannuthy.

CO-OPTED MEMBERS (FISHERIES FACULTY)

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Dr KH Alikunhi, Retd. Fisheries Advisor to Govt. of Kerala, Crescent Hatchery & Prawn Farm, Alamanar, Eriad, Kodungalloor, Trichur Dist.

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Sri K. K. Nair, IFS (Retd), Retd. Chief Conservator of Forests, Komath House, Cannanore Road, Calicut-673 011.

Dr T G Alexander, Head of the Division of Soil Science, Kerala Forest Research Institute, Peechi 680 653.

Dr Thomas Issac, Centre for Development Studies, Ulloor, Trivandrum

Dr A N Namboodiri, Director, Tropical Botanical Garden Research Institute, Palode, Trivandrum.

Mr Joseph Alappat, Thoppil, Green Gardens, Karanchira, P. O

Dr A Venugopalan Nambiar, House No. 176, Nehru Nagar, Trichur

Professor & Head, Department of Applied Chemistry, University of Science and Technology, Cochin

The Director, Central Tuber Crops Research Institute, Trivandrum.

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- University Officers & Head of Institution (3)** : Director of Extension
Kerala Agricultural University
Mannuthy
Dean, College of Agriculture,
Vellayani
Associate Dean,
College of Horticulture, Vellanikkara
- Associate Directors (8)** : Associate Director of Research
(AR&T) Directorate of Research,
Vellanikkara
Associate Director of Research
(M&E) Directorate of Research,
Vellanikkara
Associate Director of Research (Pig.)
Directorate of Research, Vellanikkara
Associate Director, NARP
High Range Region, Regional Agrl.
Research Station, Ambalavayal
Associate Director, RARS, Pattambi
Associate Director,
NARP (Southern Region)
College of Agriculture, Vellayani
Professor of Agronomy, RARS,
Kumarakom
Associate Director, RARS, Pilicode
- Project Co-ordinators (17)**
- Rice** : Prof T. F. Kuriakose,
Professor of Agronomy
Agrl. Research Station, Mannuthy
- Spices** : Dr Abi Cheeran
Professor of Horticulture (Pepper)
College of Horticulture, Vellanikkara
- Cocoa & Beverage Crops** : Dr R. Vikraman Nair
Professor of Horticulture (Cocoa)
College of Horticulture, Vellanikkara

Cashew	: Prof K. K. Vidhyadharan, Professor of Horticulture (Cashew) College of Horticulture, Vellanikkara
Fruits & Floriculture	: Prof S. Balakrishnan, Professor, College of Horticulture, Vellanikkara
Pulses & Oilseeds	: Dr V. Gopinathan Nair, Professor of Plant Breeding, College of Agriculture, Vellayani
Essential Oils & Medicinal Plants	: Prof E. V. G. Nair, College of Horticulture. Vellanikkara
Post Harvest Technology & Nutrition	: Dr G. Sreekantan Nair, Professor of Horticulture, College of Horticulture, Vellanikkara
Sugarcane, Cotton & Miscellaneous Crops	: Dr K. M. N. Namboodiri, Professor of Agrl. Botany, College of Horticulture, Vellanikkara
Fodder Crops	: Sri G. Raghavan Pillai, Professor of Agronomy, College of Agriculture, Vellayani
Plant Protection	: Dr M. C. Nair, Professor of Plant Pathology, College of Agriculture, Vellayani
Soils & Agronomy	: Dr P. Padmaja, Professor, (Soils & Agronomy,) College of Horticulture, Vellanikkara
Farm Economics & Extension	: Dr G. T. Nair, KVK, RARS, Pattambi
Agro Meteorology	: Dr P. Balakrishna Pillai, Prof of Agricultural Meteorology College of Horticulture, Vellanikkara
Cropping Patterns & Farming Systems	: Dr V. K. Sasidhar, Professor, Department of Agronomy, College of Agriculture, Vellayani
Vegetables & Tuber Crops	: Dr K. V. Peter, Professor, Department of Olericulture College of Horticulture, Vellanikkara
Coconut, Arecanut & Oil Palm	: Prof K. Kannan, Associate Director, RARS Ambalavayal

Heads of Departments other than Project Co-ordinators

Professor Department of Soil Science & Agrl. Chemistry, College of Agriculture, Vellayani	Dr R. S. Aiyer
Professor, Department of Plant Pathology, College of Agriculture, Vellayani	Dr K. I. Wilson
Professor, (Stat), College of Veterinary & Animal Sciences, Mannuthy	Dr K. C. George
Professor, Department of Agrl. Extension, College of Agriculture, Vellayani	Dr A. M. Thambi
Professor, Department of Horticulture, College of Agriculture, Vellayani	Dr S. R. Nair

Secretary

Professor (Research Co-ordination), College of Agriculture, Vellayani	Dr M. M. Koshy
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Director of Research Kerala Agricultural University	Chairman
Dean, Faculty of Veterinary & Animal Sciences	Member
Director of Extension, KAU	"
Associate Director of Research (V & A S)	"
Heads of Departments in the Faculty of Veterinary & Animal Sciences	"
Professor (Farms)	"
Director, Veterinary Education & Research	"
Professor, Co-ordinated Project on Agrl. by products	"
Dr C. R. Anathasubramaniam, Professor, (Project Co-ordinator), Cattle & Buffalo	"
Dr Radhakrishna Kaimal, Professor (Research Co-ordination)	Secretary & Convenor

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Director, CPCRI, Kasaragod or his nominee	"
Director of Agriculture, Trivandrum on his nominee	"
Director of Extension, Kerala Agrl. University	"
Professor of Agronomy, College of Agri., Vellayani	"
Professor of Plant Pathology, College of Agriculture, Vellayani	"
Professor of Agricultural Botany, College of Agriculture, Vellayani	"
Professor of Horticulture, College of Agri., Vellayani	"
Professor of Entomology, College of Agriculture, Vellayani	"
Associate Directors (5 Nos.)	"
Associate Directors of Research—Headquarters-3	"

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Dean, Faculty of Vety. & Animal Sciences, Kerala Agricultural University	"
Director of Extension, KAU	"
Director of Research, KAU	"
Dean, Faculty of Fisheries, KAU	"
Associate Dean, College of Horticulture, KAU	"
Professor (Research Co-ordination) Faculty of Veterinary & Animal Sciences, KAU	"
Professor (Research Co-ordination) Faculty of Agriculture, KAU	"
Registrar, KAU	Convenor

Appendix III

LIST OF STAFF AT THE HEADQUARTERS

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Registrar.	: Sri K. Sethumadhavan (till 2/87)
Comptroller	: Sri K. K. Pankajakshan
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Deputy Comptroller	: Sri A. I. Alex
Deputy Registrar (Acad)	: Sri T. R. Sankunny
Assistant Registrar (Admn.)	: Smt V. A. Saraswathy Bai
Recruitment Officer	: Sri P. M. Chandran
Assistant Comptroller	: Sri P. V. Gopalakrishnan Nair
P. A. to Registrar	: Sri A. K. Abdul Khader
P. A. to Comptroller	: Smt. V. B. Leelavathy Amma
Senior Office Superintendent	: Sri O. U. Chandran
Section Officer (Hr. Gr.)	: Smt V. Chandrika
Section Officers	: Sri P. X. Francis ,, V. R. Sankarankutty Smt. D. A. Syamala Sri T. Aravindan ,, K. K. Subramonian ,, K. Chandramohan ,, V. C. Bharathan Pillai Smt V. V. Radhamma Sri K. A. Mohammed ,, K. I. Chakkunny ,, K. Ravikumar Smt T. A. Zainaba Beevi ,, E. K. Bharathy Sri Pius Fernandez Smt V. R. Vijayamma Sri K. N. Pushpangadhan ,, K. P. Sreedharan ,, A. Basil

Senior Office Superintendents : Smt P. O. Elsy
 Sri T. K. Prabhakaran
Malayalam Translator : Smt K. N. Chandralekha
Senior Grade Assistants : Sri N. K. Achuthan
 Smt P. V. Nalini
 Sri N. K. Unnikrishnan
 Smt A. D. Omana
 Sri M. N. Vijayakumar
 „ P. V. Sreekumaran
 Smt Susy Mathew
 „ K. P. Saramma
 „ K. Thankam
 „ P. E. Haleema Beevi
 „ R. Thankamony
 „ G. Rema Bai
 Sri K. A. Varied
 „ P. V. Raveendran
 Smt A. T. Gracy
 „ M. A. Urmiladevi
 Sri A. Abdulkarim
 Smt V. Chandrika
 Sri V. S. Skandakumar
 „ V. A. Achuthan
 „ N. K. Mohanakumar
 „ K. K. Sadeesan
Grade-I Assistants : Smt S. Valsaia
 „ A. Santhakumari
 „ S. Rajalakshmy Amma
 Sri M. Radhakrishnan
 Smt. P. V. Remani
 „ K. N. Lalithamma
 Sri K. R. Suresh
 Smt V. Chellamma
 „ J. Jeslet Mercy
 „ C. Usha
 „ T. K. Ambika
 Sri K. C. Joseph
 „ M. Muhamed Basheer
 Smt N. Mary Joseph
 Sri K. S. Paul
 „ K. Dinesan
 Smt P. A. Geetha
 Sri N. P. Valsan
 „ P. L. Tony
 „ T. Jagadeesan

	Sri M. E. Rajan
	Smt A. Daisy Anto
	„ N. P. Thankom
Gr.-II Assistants	: Sri P. Krishna Prakash
	Smt T. B. Latha
	„ K. P. Vasanthakumari
	Sri V. R. Pius
	„ N. P. Unnikrishnan Nair
	Smt M. P. Narmada
	Sri P. V. Mohanan
	Smt P. E. Jasmine Beevi
	Sri K. Gireendra Babu
	Smt T. Sudha
	„ Mary Joseph
	Sri T. C. Jose
	Smt K. K. Sunitha
Senior Grade Assistant	: Sri B. Sukesan
Office Superintendents	: Smt K. M. Mary
	Sri V. P. Asokan
	„ P. Haridasan
Senior Grade Typists	: Sri R. Sadan
	Smt M. A. Bhargavi
Grade I Typists	: Smt V. C. Mariamma
	„ K. A. Valsala
	„ P. Sarada
	„ K. Girija
	„ A. Vasantha
Senior Grade Typist	: Smt H. Khadeeja Beevi
Gr. I Typists	: Smt Lillykutty Sebastian
	„ K. Padmavathy
Grade II Typist	: Smt P. Prasannakumari
Drivers	: Sri P. M. Yousuf
	„ V. R. Kochu
Drivers (HDV)	: Sri I. T. Rappai
	„ P. V. Sudhakaran
Drivers (LDV)	: Sri V. Gopalakrishnan
	„ K. O. John Stephen
	„ M. V. Karappan
	„ M. S. Reghu
	„ P. K. Sasidharan
	„ N. A. Sukumaran
	„ V. N. Dasan
	„ V. K. Karunakaran.

Binder	:	Sri R. Vijayan
Clerical Assistants	:	Sri T. N. Aravindakshan Smt M. M. Kamini
Duffedar	:	Sri T. S. Keralavarman
Duplicator Operators	:	Sri P. A. Francis ,, A. V. Poulouse
Bus Attendants	:	Sri K. S. Narayanan ,, Beer Bahadur Singh ,, T. G. Radhakrishnan ,, V. A. Ouseph
Lab Assistant Grade-III	:	Smt K. V. Padmavathy
Special Grade Peon	:	Sri C. O. Varunny
Gourgha Watchman		Sri Silak Bahadur
Peon		Sri V. I. Balan
Class IV		Sri M. K. Thankappan ,, V. S. Mohammedkutty ,, V. A. Mathew
Peon	:	Sri V. Krishnan Smt P. D. Rosa Sri T. V. Devu ,, E. K. Padmanabhan
Class IV		Sri M. K. Muraleedharan ,, John Mendez Smt C. P. Kousallia Sri Sankaran Vadakkath
Peons	:	Smt K. L. Fathima Beevi ,, K. K. Chandra Sri C. Govindan
Watchman	:	Sri T. R. Ravendran
Class IV	:	Sri K. V. Chetty ,, V. Gopinathan ,, R. G. Babu Smt P. I. Kunji Mole Sri T. Sasi Smt K. K. Madhavi

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Senior Grade Typists	:	Sri K. K. Damodaran Smt P. Subashini ,, K. Saraswathy Amma
Grade-I Assistants	:	Smt P. E. Haleema Beevi Sri K. Subramonian ,, K. Haridasan
Grade-I Typists	:	Smt S. Akhileswary ,, T. K. Sukumari
Grade-II Assistants	:	Smt M. A. Sujatha Sri P. A. Jacob Joe Smt. S. Satheedevi ,, A. K. Valsala
Grade-II Typist	:	Smt P. Vilasini
Driver (LDV) Gr. I	:	Sri K. P. Jose
Higher Grade Peons	:	Sri C. C. Velukutty ,, P. K. Bhaskaran
Peons	:	Sri N. P. Chandran Smt V. C. Ammini
Driver	:	Sri K. A. Mohammedkutty
Duplicator Operator	:	Sri I. R. Govindan
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Deputy Director of Students Welfare i/c	:	Sri O. K. Paul
Junior Asst. Professor	:	Smt P. J. Manga
Senior Grade Assistant	:	Sri P. M. Balakrishnan

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Director	:	Dr N. Sadanandan
Grade-I Typist	:	Sri S. Sudhakaran Nair
Peon	:	Sri Govindan

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Assoc. Professor (Safety Officer) : Smt M. V. Kamalam
Lab Assistants : Sri A. P. Augusty
Smt K. P. Padmavathy

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Personal Assistant to
Director of Physical plant : Smt Elizabeth Thomas
Asst. Exe. Engineer (Ele.) : Sri P. M. James
Financial Assistant : Smt K. Padmavathy
Assistant Engineer (Hr. Grade) : Sri K. S. Suresh Babu
" C. Jose Mathew (Under
suspension)
Head Draftsman : Smt T. L. Elsy
Section Officers : Sri A. Basel
" C. Sasikumaran Nair
Senior Grade Assistants : Smt M. K. Shailaja
" A. K. Lyla
" E. K. Prabhavathy
" N. Usharani
1st Grade Assistants : Sri P. V. Sreedharan
" K. Dineshan
" K. N. Radhakrishnan
Smt K. S. Vijayalakshmy
Grade II Assistants : Smt Mable Philip
" K. K. Valsa
" V. K. Shobhana
Sri M. W. Wilson Raj
Senior Grade Typists : Smt Akhileswary
" S. Radhamma
1st Grade Typists : Smt P. Sarojini Ammal
" Rosey K. Francis
Draftsman (Higher Grade) : Sri A. P. Jose
Draftsman (1st Grade) : Sri G. Padmanabhan
" M. R. Mohanan
" B. Lukose
" K. T. Vasudevan
Driver Grade II : Sri P. K. Sasi
Senior Office Superintendent : Sri T. K. Prabhakaran

Office Superintendent : Sri V. T. Kurian
 Blue Printer-cum- : Sri T. T. Ousephunny
 Stereo operator
 Peon (Higher Grade) : Sri C. V. Vijayan (Now working)
 Peons : Sri C. Krishnan
 " V. A. Pareeth
 " P. K. Kunhiraman
 Smt V. Saraswathy

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 Asst. Exe. Engineer i/c : " M. Reghunathan
 Asst. Exe. Engineers : Sri K. Antony Francis
 " T. K. Rajan
 " M. N. Raghavan
 " Chandrasekharan Achari
 " P. Sreekumaran
 " A. V. Balakrishnan
 " T. K. Sugathan
 " E. K. Gokulan

Assistant Engineers : Sri P. M. Paulson
 " T. M. Reghunath
 " P. M. Vasudevan
 " K. V. Ramanunny
 " P. R. Govindan
 " K. Savy Joseph
 " K. V. Chakkochan
 " A. J. Anto
 " P. Raman
 " Jose George
 " J. Selvanose
 " T. K. Abdul Khader
 " Joseph K. Manavalan
 " M. F. Antony
 " A. D. Vincent
 " T. S. Sukumaran
 " P. Karunakara Panicker
 Smt K. R. Sarojini
 " M. Vijaya Kumari

Draftsman (1st Grade) : Sri G. Raveendran
 " K. S. Vasoo
 " T. A. Rappai
 " A. K. Rajan

	Sri R. Raveendran Nair
	„ G. Santhakumaran
	„ G. Sasidharan Nadar
	„ M. Mohammed Ismail
	„ K. T. Vasudevan
Grade II Draftsman	: Sri A. P. Satheesan
Technician Grade II (Ele.)	: Sri C. A. Varghese
Assistant Lineman	: Sri K. V. Ravi
Bull-dozer Operator	: Sri M. R. Shanmughan
Road Roller Driver	: Sri M. K. Bhaskaran
Technician Grade I	: Sri P. K. Vijayan
	„ T. S. Govindan
Pump Operators	: Sri V. B. Yusaf
	„ M. V. Parameswaran
	„ R. Kumaran Nair
	„ V. K. Parameswaran
	„ K. M. Baby
	„ T. P. Jose Mathew
	„ C. R. Kochu
	„ M. K. Balakrishnan
	„ A. Narayanan
	„ K. K. Francis
Section Officers	: Sri A. D. Vincent Samuel
	„ K. Prabhakara Nadar
Senior Grade Assistants	: Sri K. Narayanan Namboodiri
	Smt L. Syamala Devi
	„ M. Rugmini
	„ A. A. Kousallia
	Sri N. Vijayakumar
	„ K. Natarajan
Grade I Assistants	: Sri Govinda Pillai
	Smt C. K. Prabhavathy
	„ C. Santhakumari
	„ Lucy Mary
	„ V. M. Ammini
Grade II Assistants	: Smt Rajalakshmy
	Sri C. Chandran
Office Superintendent	: Sri K. Muraleedharan
	Smt M. K. Jainuva
	„ M. I. Balamani
Senior Grade Typists	: Smt B. Sathivathy Bai
	„ S. Valsaia Devi

Grade I Typists	:	Sri P. Nataraja Pillai Smt K. Vimala
Peon (Higher Grade)	:	Sri Nesan
Cleaner-cum-Conductor	:	Sri K. M. Handdra (on leave)
Watchman	:	Sri V. A. Pailey ,, N. C. Murugan ,, K. K. Balan
Peons	:	Smt V. Ammini Amma Sri K. A. Sankaran ,, V. L. Antony ,, K. P. Kumaran ,, M. K. Gangadharan
Drivers	:	Sri A. S. Sukumara Marar ,, K. M. Subramanian ,, K. Vikraman Nair

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Associate Director of Extension	:	Dr G. R. Nair
Editor (Publications)	:	Sri R. T. Ravi Varma
Section Officer	:	Sri V Balagopalan
Steno to DE/	:	Sri K. Sadasivan Nair
Office Superintendent		
Steno to ADE/	:	Smt P. P. Rosy
Office Superintendent		
Senior Grade Assistants	:	Sri K. V. Sugunan Smt P. K. Elsy ,, Shirly Bai George ,, M. N. Radhamma ,, M. Baby ,, D. Vijayamma
Grade II Assistants	:	Smt K. N. Chandralekha ,, E. Hymavathy
Grade I Typists	:	Smt P. N. Savithri Sri K. J. Lonan
Driver	:	Sri C. L. Antony
Peons	:	Sri C. R. Chandran Smt P. D. Annamma
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Professor (Agronomy)	:	Sri A. I. Thomas
Assoc. Professor/	:	Sri I. P. Koshy
Professor (Agronomy)	:	Dr V Muraleedharan Nair
Assoc. Professor (Hort)	:	Sri N. Ramachandran Nair

Professor (Animal Science)	: Dr U. T. Francis
Assoc. Professor/	: Dr K Sasidharan Pillai
Professor (Plant protection)	: Dr Babu M Philip
Asst Professor (Fish)	: Dr K. V. Jayachandran

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(Extn)	: Sri Joy Mathew
Jr Asst Professor	: Sri K. Abdul Kareem
	„ Jose Joseph

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Asst Professor (Pub)	: Sri Ranjan S. Karippai
Asst Professor (Ani. Sci)	: Dr Amritha Viswanath
Asst Professor (Fish)	: Sri C. Mohanakumaran Nai
Language Editor (Mal)	: Smt K. Mrudula Devi

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Jr Asst Professor (E & G)	: Sri G Surendran
Chief Artist	: Sri G Gopinathan Nair
Section Officers	: Sri K. R. Mohanan
	„ P. Gopinathan
Sr Grade Assistant	: Smt K P Mary
Technician Gr. I/	
Audio-visual Operator	: Sri K. Sukumaran
Sr Office Supdt./Typist	: Sri N. Somarajan
	: Smt. B. Sukumari Amma
Artist	: Sri P. S. Kesavan Namboodiri
	„ Ganapathi
Dark Room Assistant	: Sri A. Sulaimankutty
Farm Assistant (Agri)	: Sri M. J. Kochappan
Sr Grade Farm Assistant	: Smt K. P. Ambika
Assistant Grade I	: Smt P. Vijayakumari
Assistant Grade II	: Smt N. V. Thankom,
	Sri K. Balakrishnan,
	„ K. Mohanan,
	Smt K. Sarojini
	„ P. Indira Devi
Drivers	: Sri P. K. Sasidharan
	„ M. A. Joseph
Peons	: Sri M. Jabbar
	Smt V. S. Bhargavi
	„ M. S. Ammini

Watchman : Sri Silak Bhadur
Sweeper-cum-Sanitation worker : Smt P. J. Thankom

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Central Training Institute, Mannuthy

Prof of Extension i/c : Dr G. Balakrishnan Pillai
Asst Professor (Hort) : Sri N. K. Parameswaran
Jr Asst Professor (PP) : Smt Sheela Paul
Farm Asst Grade II : Sri P. M. Joshy
Asst Grade II : Sri K. Balakrishnan
Asst Grade II (Provi.) : Sri K. S. Mohandas
Typist Grade II (") : Smt A. A. Ramlath
HDV Driver : Sri P. K. Devassy
Peon : Sri K. L. Devassy

Training Service Scheme, Mannuthy

Asst Professor (Trg) : Sri FMH Khaleel
Typist Grade I : " K. C. Mohankumar
Duplicator Operator : " C. A. Divakaran
Farm Asst Grade II : " K. Gopalakrishnan Nair

Training Service Scheme, Tavanur

Asst Professor (Agri) : Sri P. Ahamed
Farm Asst (Agri) Sr Grade : " N. Saidalikutty
Typist Grade II : Smt A. J. Mary

Training Service Scheme, Vellayani

Assoc Professor : Sri O. Abdul Rahiman Kunju
Asst Professor : Dr C. Bhaskaran
Sr Office Superintendent : Sri N. Somarajan
Asst Grade II : Smt R. S. Saroja
Farm Asst (Agri) Grade II : Sri K. S. Prasannan
Peon : " P.Arjunan

UNICEF Training Cell, RHS, College, Vellayani

Asst Professor (FS & N) : Smt S. Chellammal
Jr Asst Professor : " S. Symakumari
(Child Development)
Jr Asst Professor : " V. Girija Devi
(Home Science Extension)
Jr Asst Professor : " Achamma Chandy
(Food Science Nutrition)

KRISHI VIGYAN KENDRAS

Krishhi Vigyan Kendra, Manjeswar

Professor of Agronomy : Sri I. P. Sreedharan Nambiar
Jr Asst Professor : " B. Jayaprakash Naik

Farm Asst (Agri)	:	Sri N. Rajan
Assistant Grade-II	:	„ P. M. F. Babu
Typist Grade II	:	Smt Sreelekha
Peon	:	Sri K. K. Velayudhan

Krishi Vigyan Kendras for Tribals, Ambalavayal

Training Organiser (Agron)	:	Sri P. Chandrasekharan
Training Assistants		
„ (Home Science)	:	Smt S. Subaida Beevi
„ (Animal Science)	:	Dr A Radhamma Pillai
„ (Plant Protection)	:	Sri T. P. Manomohandas
Section Officer	:	„ C. Arumughan
Typist Grade II	:	Smt E. C. Thankamani
Driver Grade I	:	Sri M. Unneenkutty
Hostel Attendant	:	„ K. Bapputty
Peon	:	„ M. V. Radhakrishnan
Sweeper	:	„ V. Alikkutty
Watchman/Attendant	:	„ K. Koya
		„ M. C. Krishnan

Krishi Vigyan Kendra, Pattambi

Training Organiser (Professor Extension)	:	Dr G. T. Nair
Training Associate	:	Sri P. J. Ittyarah
Professor (Agronomy)		
Professor (Horticulture)	:	Dr M. N. C. Nair
Jr Asst Professor (Home Science)	:	Smt Chandralatha
Training Assistants Hort.	:	Sri R. Kesavachandran
Poultry Science (Assoc Professor)	:	Dr O. J. George
Fisheries (Asst Prof)	:	Dr G. S. Narayanan
Home Science (JAP)	:	Smt Omana Pavunny
Section Officer	:	Sri Sivanandan
Asst. Grade II	:	„ V. R. Padmanabhan
Farm Asst Grade II	:	„ C. Gireesan
Driver Grade II	:	„ Sasidharan
Watchman	:	„ K. Kesavan
Cook-cum-Caretaker	:	
Hostel Attendant	:	„ C. Gopalakrishnan

Scheduled Caste Area Research Centre, Nilambur (AICRP)

Senior Scientist	:	Sri P. Rajendran
Asst Professor (Home Science)	:	Smt Jasmine Zachariah
Farm Asst (Vety) Grade I	:	Sri M. K. Vijayakumar
Farm Asst (Agri) Grade II	:	„ A. Abdurahiman
Typist Grade I	:	Smt K. T. Vijayalakshmi

Tribal Area Research Centre (TARC), Amboori (AICRP)

Co-ordinator	:	Dr R. S. Aiyer
Assoc. Professor	:	„ Harikrishnan Nair
Asst Professor (Agron)	:	Sri V. Sreekumar
Specialist (Health)	:	Dr V. N. Radhakrishnan
Jr Asst Professor (AH)	:	„ Rajkamal
„ (AH)	:	„ Anilkumar
„ (Home Science)	:	Smt C. Nirmala
„ („)	:	„ K. Rari John
Jr Asst Professor (Health)	:	„ Maduri Devi
Home Science Helpers	:	„ Jayakumari
		„ B. Vasanthakumari
		„ P. Chinnamma
Driver	:	Sri S. Balachandran Nair
Clerk-cu-Typist	:	Smt P. Vasanthakumary
Peon	:	Smt K. Kunji

Integrated development for Kanikkar Tribals

Helper	:	Sri M. Sasikumar
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National Demonstration Scheme, Sadanandapuram

Assoc. Professor (Prof.)	:	Dr K. Sasidharan Pillai
Associate Professor (SS)	:	Sri K. Raveendran Nair
Asst. Professor (Agron.)	:	Sri I. Johnkutty,
Asst. Professor (Hort.)	:	Sri C. S. Jayachandran Nair
Farm Asst. Gr. II	:	Sri P. K. Rajasekharan
		„ D. Prasannakumar
		„ K. C. Sanuprasad
Driver Grade II	:	Sri P. S. Babu

Lab-to-Land Programme Village Adoption Programme

Co-ordinator	:	Sri A. I. Thomas
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KAU Press

Press Manager	:	Sri K. Rajappan
Section Officers	:	Sri Appu Chettiar
		„ O. Vinodakrishnan
		„ K. Parameswaran
Office Superintendent	:	Sri. K. Paul Sextus
General Foreman	:	Sri G. Narayana Pillai
Senior Foreman	:	Sri P. I. Lonappan
Assistants Sr. Grade	:	Sri. P. Aliyar

	Smt T. Ramadevi
	Sri K. P. Sreedharan
	Smt A. K. Kamala Bai
	„ K. K. Beena
Printers (H. G.)	: Sri V. R. Kumaran
	„ T. P. Joseph
	„ C. Viswanathan
Compositors (H. G.)	: Sri V. Subramonian
	Smt K. M. Thankamma
	„ P. A. Elsy
	Sri V. Rajendran
	Smt. K. Leela
Binders (H. G.)	: Sri K. R. Vijayan
	Smt P. T. Annie
Printers (L. G.)	: Sri P. R. Aravindakshan
	„ N. J. Samuel
	„ P. Prabhakaran
Binders (L. G.)	: Smt. M. Kamamma
	„ S. Sarojini Amma
Proof Readers	: Smt Sherly Sam
	Sri K. K. Sadasivan
Computer	: Smt K. Santhakumari
Security guard (Class IV)	: Sri K. Saji Antony
Peon (H. G.)	: Sri M. Somasekharan
Sweeper-cum-Attendant	: Smt P. Meenakshy

Horticultural Therapeutic Programme

Scientist-in-charge : Dr M. Sreekantan Nair (Professor)
(Part-time)

Krishi Darshan Programme

Co-ordinator : Sri Joy Mathew (Asst. Professor)
(Part-time)

National Service Scheme

Programme Co-ordinator : Dr. A. G. G. Menon,
Director of Extension (Part-time)
Dr S. Skariah Oommen
Sri P. A. Rajan Asari
„ S. Motilal Nehru
Dr P. Balakrishna Pillai
Sri A. Augustine
„ V. Raju
„ M. K. Rajagopalan
„ T. M. Sankaran
Dr U. Ramachandran

Appendix IV

LIST OF STAFF IN THE VARIOUS CAMPUSES

COLLEGE OF AGRICULTURE, VELLAYANI

Dean-in-charge : Dr M. M. Koshy

Department of Agronomy

Professors : Dr V. K. Sasidhar
Sri E. P. Koshy
" M. Oomen
" G. Raghavan Pillai
" M. R. C. Pillai
" K. P. Madhavan Nair
Dr M. Achuthan Nair

Asst Professors : Smt M. Meera Bai
" Lekha Sreekantan
Sri K. Viswambharan

Jr Asst Professors : Smt S. Lakshmi
" K. R. Sheela
" Sansamma George

Department of Soil Science & Agricultural Chemistry

Professors : Dr R. S. Aiyer
" Alice Abraham
" Thomas Varghese

Associate Professors : Dr S. Pushkala
Sri Babukutty

Assistant Professors : Sri P. Rajendran
" M. Subramonia Iyer
" C. Sundaresan Nair
Smt P. Prabhakumari
" Sumam George

Junior Asst. Professor : Sri Sam T. Kurumtholical

Department of Plant Pathology

Professors : Dr K. I. Wilson
" M. C. Nair
" S. Balakrishnan
" Susamma Philip
" P. Karunakaran

Associate Professors	:	Dr Sasikumar Nair ,, A. Sreedharan
Assistant Professors	:	Dr P. Sivaprasad ,, S. Bhavani Devi
Junior Assistant Professors	:	Sri Gokulapalan Smt V. K. Girija ,, Lulu Das Sri Babu George Smt Kamala Nayar

Department of Plant Physiology

Professors	:	Dr S. Seshadrinath ,, P. D. Vijayagopal
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Department of Plant Breeding

Professor & Head	:	Dr V. Gopinathan Nair
Professor	:	Dr R. Gopimoney
Professors (NARP)	:	Smt S. Santhakumari Dr P. Manikantan Nair
Associate Professor (AICRP Forage)	:	Dr J. Sreekumari Amma
Assistant Professors	:	Sri S. G. Sreekumar Dr Sverup John
Assistant Professor (NARP)	:	Smt P. Manju
Jr. Assistant Professor (AICRP Forage)	:	Sri K. M. Abdul Khader
Farm Supervisors Gr II	:	Smt J. Vimala Sri R. Nelson
Farm Assistant Sr Gr/Hr. Gr	:	Smt S. Sachee Devi
Farm Assistant Gr I	:	Sri K. S. Ajayakumar ,, S. R. Rajeevan
Lab Assistants	:	Smt D. Savithri Amma ,, S. Santha
Sr Office Supdt.	:	Smt V. Subaida Beevi
Peon	:	Sri K. Narayana Das
Class IV	:	Smt K. Lilly Bai

Department of Agricultural Botany

Professor & Head	:	Dr N. Krishnan Nair
Professor	:	Sri K. Gopakumar Dr P. D. Vijayagopal
Associate Professors	:	Dr S. T. Mercy Smt N. Kamalam Dr D. Chandramony
Assistant Professor	:	Smt P. Maya Devi
Jr Assistant Professor	:	Sri D. Wilson Smt V. A. Celine

Farm Assistant	:	Sri P. Gopinathan Nair
Lab Assistants	:	Sri V. K. Sadasivan Pillai ,, C. Bhanu ,, N. Appu
Peon	:	Smt C. Krishnamma
Department of Horticulture		
Professor	:	Dr S. Ramachandran Nair
Associate Professor	:	Sri V. K. Mammen
Assistant Professors	:	Dr K. Vasantha Kumar Smt G. R. Sulekha Sri Philipose Joshwa
Jr. Asst. Professors	:	Sri N. Mohan Babu Smt V. L. Sheela
Farm Supervisors (Gr. II)	:	Smt K. Panky Sri L. Davy Smt J. Vimala
Farm Assistants Gr. I	:	Sri V. John George ,, M. K. Vijayan
Lab Assistants Grade-III	:	Sri P. Alexander ,, J. Thankan
Gardeners	:	Sri G. Parameswaran Nair ,, G. Nagappan
Department of Entomology		
Professor & Head	:	Dr N. Mohandas
Professors	:	Dr K. V. Mammen ,, George Koshy ,, G. Madhavan Nair ,, K. P. Vasudevan Nair Sri K. K. Ravindran Nair Dr John Kurian ,, A. Visalakshi
Associate Professors	:	Dr D. Dale Smt K. Saradamma ,, K. Santhakumari
Assistant Professors	:	Smt S. Naseema Beevi ,, Suma Paulose ,, D. Ambika Devi Sri C. Nandakumar ,, P. Reghunath Dr P. B. Gopinathan

	Smt K. Sudharma
	„ M. S. Sheela
	„ T. Nalinakumari
	„ Hebsy Bai
	Sri Arthur Jacob
Jr. Asst. Professors	: Smt K. S. Premila
	Sri Thomas Biju Mathew
Research Fellow	: „ B. Cletus
Senior Office Supdt.	: „ K. Velappan
Graduate Tech. Assistant	: Smt A. Lekshmikutty
Farm Supervisor	: „ S. Thanka Bai
Farm Asst. Senior Grade	: Sri M. Rajretnam
Farm Asst. Gr. II	: Sri S. Prabhakaran
Lab Asst. Gr. II	: „ L. Samkutty
	: „ R. Sivanandan
Lab Assistant Gr. III	: Smt B. Sakunthala
	: Sri P. Thankayyan
Peon	: Smt K. Valsalakumari
Watchman	: Sri V. Soman Nadar

Department of Agricultural Statistics

Professor	: Sri P. V. Prabhakaran
Associate Professor	: Dr P. Saraswathy
Assistant Professor	: Sri Vijayaraghava Kumar
Jr. Asst. Professor	: Smt Brijit Joseph
Technical Assistants	: Sri. C. T. Mukundan
	Smt P Saraswathy
Junior Programmer	: Sri C. E. Ajith Kumar
Typist Gr. I	: Smt N. Ponmoni Mohana
Senior Office Superintendent	: Sri N. Somarajan

Department of Agricultural Extension

Professors & Head	: Dr A. M. Thampi
	„ B. Babu
Assoc. Professors	: Sri O. Abdul Rahiman Kunju
	Dr G. Balakrishna Pillai
Assistant Professors	: Dr R. Murafeedhara Prasad
	„ C. Bhaskaran
	Sri Motilal Nehru
	Smt S. Shylaja
	„ G. Sobhana
	Sri P. B. Padmanabhan
	Smt N. P. Kumari Sushama
Senior Office Supdt.	: Smt D. Hymavathy
Sr. Grade Typist	: Smt. C. Padmavathy
Lab Assistant Gr. I	: Sri K. Kesavankutty

Lab Assistant Gr. II	:	Sri K. Surendran Pillai
Photographer	:	Sri M. S. Kuriakose
Artists	:	Sri G. Ganapathy ,, P. S. Kesavan Namboodiri ,, V. Chandranandan
Farm Assistant	:	Smt Vimala Bai
Duplicator Operator	:	Sri S. Dickson
Peons	:	Sri Sreedharan Nair ,, V. Thomson Nadar

Department of Agricultural Economics

Professor	:	Sri K. S. Karayalar
Junior Asst. Professor	:	Smt A. M. Santha

Department of Animal Husbandry

Assoc. Professor	:	Dr Skriah Oommen
Assistant Professors	:	Dr M. R. Rajan ,, H. Subramonia Iyer
Junior Assistant Professor	:	Dr R. Vijayan

Department of Physical Education

Assistant Professor	:	Smt A. C. Marykutty
Jr. Asst. Professor	:	Sri S. P. Pazhanian Pillai

Department of Agricultural Engineering

Professor	:	Dr A. N. Rema Devi
Assistant Professor	:	Sri V. Ganesan

Instructional Farm, Vellayani

Assistant Professor	:	Smt M. Suharban
Junior Asst. Professors	:	Sri Anilkumar ,, Gregory Zachariah Smt P. Sheela
Farm Supervisors Gr. I	:	Sri V. Chakrapani ,, K. C. Achuthan
Farm Supervisor Grade II & Senior Gr. Farm Assistants Higher Grade	:	Sri K. Gopinathan Nair ,, K. C. Retnakaran Nadar ,, N. Govindan Smt B. Indirabai Amma ,, A. Belsy ,, H. Rachel ,, K. Rosamma ,, K. S. Suchatha
Technician Grade II	:	Sri V. Gopinatha Kurup
Tractor Driver	:	Sri R. Thankappan
Field Supervisor	:	Sri V. Krishna Pillai
Administrative Assistant	:	Sri J. I. Valsalam

Section Officer	:	Sri S. Bhaskarapillai
Senior Grade Assistants	:	Smt J. Remadevi Amma " C. R. Padmakumari
I Grade Assistants	:	Sri S. Viswakumaran Nair " C. Prabhakaran Smt C. Sherly Mathew
II Grade Assistant	:	Sri M. Valsan
Senior Grade Typist	:	Sri S. Raghavan
Jeep Driver (LDV)	:	Sri M. Xavier
Peon (Higher Grade)	:	Sri A. Sivasankaran Nair
Gardeners	:	Sri G. Parameswaran Narr " G. Nagappan
Farm Mali	:	Sri K. Divakaran Nair " G. Chellayyan Nadar " C. Krishnankutty
Watchmen	:	Sri J. Thampikunjan " E. Lazer Nadar
Sanitation worker	:	Sri V. Joshuva
Establishment farm workers	:	Sri R. Vijayan " D. Kesavan Nair " P. Francis " B. Raveendran Nair " C. Gopalakrishnan " C. Premakumaran Thampi " J. Soman " K. Sasidharan " P. Vijayakumar " A. Thajudeen " P. Thankappan " B. Kamalasan Panicker Smt K. Kamalakshy " M. Sarasamma " M. Thankamma

COLLEGE OF RURAL HOME SCIENCE, VELLAYANI

Professor	:	Dr (Mrs) L. Prema
Associate Professors	:	Smt N. K. Vimalakumari " Mary Mathews
Assistant Professors	:	Smt Mary Ukkru " V. Usha " Chellammal " Syamakumari " P. V. Nandini " Prasanna kumari

Jr Asst Professors : Smt A. Mumtaz Beegam
 „ M. Rejani
 „ Saffi Cheriyam
 „ Lizy Behanan
 „ Achamma Chandy
 „ P. Geetha
 „ Norma Xavier

COLLEGE OF HORTICULTURE, VELLANIKKARA

Associate Dean : Dr P. K. Gopalakrishnan
 (upto 1.3.87)
 Dr C. C. Abraham (2.3.87 to 31.3.87)

Centre for Advanced Studies on Humid Tropical Tree Crops & Environmental Horticulture

Director : Dr M. Aravindakshan
 Professor : Dr P. D. Vijayagopal
 Associate Professor : Dr Luckins C. Babu
 Assistant Professors : Dr K. Gopikumar
 Sri A. Augustin
 „ N. K. Parameswari
 „ K. Aravindakshan
 Junior Asst Professor : Smt C. K. Geetha
 Farm Assistant : Sri N. T. Satheesh Babu
 Typist Senior Grade : Smt T. Valsala
 Driver : Sri A. S. Sukumara Marar

Department of Pomology & Floriculture

Assistant Professors : Dr P. K. Valsalakumari
 Smt Valsamma Mathew
 „ A. K. Babylatha
 „ Lila Mathew
 Junior Asst Professor : Dr Sarah T. George
 Farm Supervisor : Smt P. K. Vijayalakshmi
 Farm Assistant : Sri C. B. Sugathan
 Lab Attender : Sri K. R. Prabhakaran

All India Co-ordinated Floriculture Improvement Project

Assistant Professor i/c : Dr P. K. Rajeevan
 Jr Asst Professor : Smt K. B. Sheela
 Mali : Sri K. Krishnankutty
 „ K. Sachinmayan

Department of Plantation Crops and Spices

- Professor and Head : Dr G. Sreekantan Nair
(Professor, Man power Development Scheme i/c)
Sri S. Balakrishnan
- Assistant Professors : Dr Joseph Philip
Sri B. R. Reghunath
Dr C. Ramachandran
Smt Rema Menon
- Jr Asst Professors : Smt T. Premalatha
,, P. K. Sudhadevi
,, M. R. Shylaja (on working arrangement to KADP)
- Farm Assistants (Agri) : Sri V. Kunju
,, S. Rajan

All India Co-ordinated Research Project on Spices—Sub Centre for Research on Ginger and Turmeric

- Assistant Professors : Smt P. A. Valsala
Dr Koshy Abraham
- Farm Asst Gr II : Sri C. B. Venugopal

Manpower Development Scheme of Coffee Board

- Professor : Dr G. S. Nair
- Assistant Professor : Dr E. V. Nybe
Smt Prasannakumari Amma

Department of Soil Science & Agricultural Chemistry

- Professors : Dr P. Padmaja
Smt K. Leela
,, G. Droupathi Devi
Dr N. P. Chinnamma
- Asst. Professor : Dr K. C. Marykutty
Sri Samuel Mathew
Smt P. K. Sushama
- ,, (Bio-chem) : Dr Saleena Mathew

Coconut Root (wilt) Disease Project (CRWDP)

- Professor : Dr A. I. Jose
- Associate Professor : Dr V. K. Venugopal
- Jr. Asst. professor : Smt K. Ushakumari
- Lab Assistants Gr. III : Sri P. Unnikrishnan
,, K. K. Prabhakaran
,, K. Thankamani

Department of Agricultural Meteorology

Professor	:	Dr P. Balakrishna Pillai
Assistant Professor	:	Sri A. V. R. Kesava Rao
Farm Assistant Sr. Grade	:	Sri V. M. Mathew
Farm Assistant Gr. I	:	Sri P. M. Poulose

AICRP on Weed Control

Asst. Professor	:	Dr C. T. Abraham
Jr. Asst. Professors	:	Smt E. K. Lalitha Bai
	:	Sri P. A. Joseph
Farm Asst Gr. II	:	Sri C. A. Mathew
Driver	:	Sri V. R. Chandran

Department of Agronomy

Professors	:	Dr C. Sreedharan
	:	Sri E. V. G. Nair
Associate Professor	:	Dr M. Achuthan Nair
Asst. Professors	:	Dr P. K. Ashokan
	:	„ J. Thomas
	:	Smt. S. Sreedevi
	:	Dr R. Gopinathan
Jr. Asst. Professor	:	Sri V. Krishnakumar
Farm Supervisor Gr. II	:	Smt K. Padmakshy
	:	„ J. T. Jasmine
Farm Assistant Gr. I	:	Sri P. B. Bhashajan .
Lab. Assistant Gr. III	:	Sri P. K. Velayudhan
Peons (Class IV)	:	Sri K. P. Ommer
	:	Smt T. Mariam

Department of Agricultural Botany

Professors	:	Dr K. M. Narayanan Namboodiri
	:	Sri K. Gopakumar
Associate Professors	:	Dr Luckins C. Babu
Asst Professors	:	Smt Achamma Oommen
	:	Sri V. V. Radhakrishnan
	:	Smt K. T. Prasannakumari
Farm Assistants	:	Sri M. C. Chandran
	:	„ Satheesh Babu

Department of Olericulture

Professor & Head	:	Dr. K. V. Peter
Asst Professors	:	Sri V. K. Raju
	:	Smt Salikutty Joseph
Jr Asst Professors	:	Smt P. Indira
	:	Sri P. G. Sadhankumar

Technical Assistant : Smt C. M. Omana
 Farm Assistants Gr. I : „ P. K. Kalyani
 Sri K. S. Thankappan
 „ M. T. Varghese

Department of Agricultural Engineering

Professor : Sri T. P. George
 Assistant Professor : Sri Sankara Narayanan
 Jr. Asst. Professor : Smt K. P. Vishalakshy
 (SIDA Project)

Department of Agricultural Statistics

Associate Professor : Sri V. K. G. Unnithan
 Asst. Professors : Smt Graceamma Kurien
 „ T. K. Indira Bai
 „ P. Soudamini
 „ K. A. Mercy

Department of Agricultural Economics

Professors : Dr V. Radhakrishnan
 „ K. Mukundan
 Assistant Professor : Sri K. J. Joseph
 Jr. Asst. Professors : Smt S. Rajeena
 „ Jessy Thomas

Department of Physical Education

Assistant Professors : Smt Susy V. John
 Sri E. Soman
 Markers : Sri K. L. Devassy
 „ M. G. Ramakrishnan
 Administrative Officers : Sri P. K. Ramachandran Nair
 (upto 13-4-1981)
 „ T. P. Ponnai
 (from 14-4-1986)
 Section Officers : Sri V. Venugopalan
 „ K. Sreerangan
 „ N. Viswambharan
 „ P. Gopinath
 Office Superintendent : Smt P. V. Brazitha
 Senior Grade Assts : Sri K. N. Pushpangadan
 „ P. K. Manikutty
 „ B. Sukesan
 Smt K. K. Thankamony
 „ P. T. Thakamony
 „ C. C. Rosily

Senior Grade Typists	: Sri K. A. Joy, " S. Sudhakaran Nair
	: Smt P. R. Sarojini " T. Valasla
Grade I Assistants	: Sri P. V. Sreedharan " Y. Rajas
	: Smt C Sobhañakumari " T. Vijayalakshmy " K. S. Omana " V. R. Santhakumari " Baby Saroja " Leelamma Augustine
Grade I Typists	: Smt C. J. Catherine " B. Leela Bai Amma " M. L. Sosannam " S. Geetha Bai " Lillykutty Sebastian
Grade II Assistants	: Sri A. Pradeep " V. N. Narayanan " V. R. Padmanabhan
	: Smt K. N Alemelu
LDV Drivers Grade II	: Sri K. Radhakrishnan " T. L. Francis " M. V. Karappan " K. K. Thankappan " A. S. Sukumara Marar " M. Mukundan
Higher Grade Peon	: Sri M. N. Sivaraman
Peons	: Sri K. V. Ramachandran " R. B. Ibrahim " P. I. Gulmuhammed Smt M. V. Kunjai " O. A. Ushakumari " M. V. Eliamma
Watchmen	: Sri A. I. Thomas " N. P. Chandran " T. Kunçhen " P. Narendran

COLLEGE OF FORESTRY, VELLANIKKARA

Special Officer (Forestry) in charge of the College	: Sri SMA Aslam
Associate Professors	: Dr Luckins C. Babu " N. K. Vijayakumar

Assistant Professors	:	Dr C. Pythai ,, K. Sudhakara ,, B. Mohankumar (Deputed for training)
Junior Asst. Professors	:	Sri Noyal Thomas ,, T. Premakumar ,, K. Vidhyasagaran ,, Sonney George
Research Associate	:	Dr (Mrs.) B. Ambika Varma
Section Officer	:	Sri Kunhoosa
Assistant Grade I	:	Smt V. R. Santhakumary
Typist Grade I	:	Sri I. A. Surendran
Driver	:	Sri N. A. Sukumaran
Peon	:	Sri V. Gopinathan

COLLEGE OF CO-OPERATION & BANKING, MANNUTHY

Associate Dean i/c : Dr C. A. Jos'

Department of Co-operation

Professor	:	Dr C. A. Jos
Assistant Professor	:	Sri T. Paranjothi
Junior Asst. Professors	:	Sri A. T. Philipose ,, A. M. Jose ,, K. Ramesha ,, E. Vinaikumar

Department of Banking

Junior Asst. Professors	:	Smt Molly Joseph ,, Jaya S. Anand Sri K. M. George ,, K. Satheesh Babu
-------------------------	---	---------------------------------------------------------------------------------

Department of Co-operative Management and Accounting

Associate Professors	:	Dr N. Rajan Nair Sri P. C. Mathew
Assistant Professors	:	Sri Philip Sabu ,, K. P. Mani ,, A. Sukumaran ,, M. Mohanan
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 " K. N. Aravinda Ghosh
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 " P. G. Baby

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 " M. V. Sukumaran
 Associate Professors : Dr N. Narayanan Nair
 " R. Rajendrakumar
 Assistant Professors : Dr V. Prasad (study leave)
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 Assistant Professor : Dr M. R. Subhadra
 Junior Asst Professor : Dr S. Ramkumar (from Nov. 1986)

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 " R. Madhusoodanan Pillai
 " G. Krishnan Nair
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 " M. Mini

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 " C. T. Thomas
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 " N. Kunjukutty
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 " Annamma Kurian

AICRP Bye Product Scheme

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" V. Sathyanesan
" C. George Varghese
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- Junior Assistant Professors : Dr Lucy Jacob
" K. Devada

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- Professors : Dr A. Rajan
" K. M. Ramachandran
(Tumour Project)
" K. I. Maryamma
(Mycotoxicosis Scheme)
- Associate Professors : Dr K. V. Valsala
" T. Sreekumaran
- Assistant Professor : " V. Vijayakumar (DST Scheme)
- Junior Asst Professor : Dr N. Divakaran Nair
(Mycotoxicosis)
" M. Gopalakrishnan Nair
" T. V. Anilkumar
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" Zacharias Cherian
" Jacob V. Cheeran
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(Immobilisation Scheme)
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" G. Venugopalan
" M. G. Ramakrishna Pillai
" K. P. Sadanandan

Associate Professors : Dr K. P. Surendranath
 Sri P. K. Ismail
 Assistant Professor : Dr P. T. Philomina
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Department of Poultry Science

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 „ R. Sabarinathan Nair
 Associate Professor : Dr G. Reghunathan Nair
 (Centre for Advanced Studies in
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 „ Sabu Kuruvilla
 „ P. A. Peethambaran
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 „ Leo Joseph (on study leave)

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 Junior Assistant Professor : Dr P. T. A. Usha

Department of Veterinary Public Health

Professors : Dr R. Padmanabha Iyer
 „ M. Soman
 „ P. Prabhakaran
 Associate Professor : Dr E. Nanu (on deputation)

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Junior Assistant Professor	:	Dr George T. Oommen
Department of Statistics		
Professor	:	Dr K. C. George
Assistant Professors	:	Sri K. L. Sunny Smt Narayanikutty Sri M. Jacob Thomas " S. Krishnan
Junior Assistant Professor	:	Sri Mathew Sebastian
Veterinary Hospital, Mannuthy		
Professor	:	Dr N. M. Aleyas
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Assistant Grade II	:	Smt Brijit Kuruvilla Sri K. V. Jayasankar Smt K. K. Sunitha " P. Mohini
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Office Superintendent	:	Sri K. G. Balakrishnan Smt H. Razia Beevi
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Professor (Botany)	:	Sri K. M. George
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 Professor & Chairman (NGDP) : Sri C. P. Muhammed
 (Professor holding charge)

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Assistant Professor : Smt J. Renukumari (JAP)

Department of Irrigation & Drainage Engineering

Professor : Sri K. John Thomas
 Assistant Professors : Sri M. S. Hajilal (JAP)
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Department of Farm Power, Machinery & Energy

Assoc. Professor : Sri Jippu Jacob
 Asst. Professor : Sri M. Mathew John (JAP)

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 Assistant Professor : Dr E. Komala Amma

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 Jr. Asst. Professor (Maths) : Smt V. P. Lakshmikutty
 Jr. Asst. Professor (Elec. Engg.) : Smt Geetha V. Menon

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Jr. Asst. Professors (PP)	:	Sri M. A. Peter ,, P. Rajendran Smt T. J. Rehumath Niza
,, (Phy. Edn.)	:	Sri M. Velayudhankutty
,, (Agro)	:	P. V. Habeebur Rahman

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Section Officer	:	Sri C. Assainar
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Technicians Grade II	:	Sri K. T. Ramachandran ,, V. K. Asokan ,, K. Aravindan
Technicians Grade III	:	Sri K. Vasudevan ,, P. Balakrishnan
Librarian	:	Sri P. A. Parameswaran
Lab Asst. Grade II	:	Sri P. Krishnan Kutty Nair
Lab Asst. Grade III	:	Sri P. K. Chandran
Driver Grade I	:	Sri N. V. Krishnan
Peons (Hr. Gr.)	:	Smt K. Rohini Sri P. Kunhikutta Menon Smt K. V. Madhavi
Peon	:	Sri Jayaprakash
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Sweeper-cum-Attendant	:	Smt V. Kuttimalu
Scavenger	:	Sri A. Burhanudeen
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Senior Grade Typist	:	Sri K. P. Abdurahiman

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Trade Assistants (Carp.)	:	.. A. K. Padmanabhan
(Smithy)	:	.. V. P. Kannan
(Fitting)	:	.. C. S. Krishnan
(Turning)	:	.. T. P. Aboobacker
(Auto & Tractor Mech.)	:	.. C. Velayudhan
Lab Assistant Gr. III	:	Sri Theyyunki Menon
Peons	:	Smt C. Ponna
		Sri T. P. Vijayan
		.. M. Abdurazack
		.. C. Narayanan
Pump Operator	:	Sri M. K. Balakrishnan
Driver (HV)	:	Sri P. V. Sudhakaran
Driver (LV)	:	Sri M. V. Ramachandran
Bus Attendant	:	Sri M. Jabbar
Technician Gr. III	:	Sri B. S. Suresh
Technician Gr. III (Agr. Mech.)	:	Sri K. O. Porinchu
Workshopmate	:	Sri T. N. Balan
Research Associate	:	Sri Hamza Mollakkadavath
Technician	:	Sri M. Sivadasan
Senior Gr. Farm Assistants	:	Smt R. V. Balamani
		Sri K. Sethumadhavan
Farm Assistants Agri. Gr. I	:	Sri C. Subramanian
		.. V. P. Ramakrishnan
Farm Assistant Vety. Gr. I	:	Sri K. Velayudhan
Gardener (Hr. Gr.)	:	Sri K. Mammikutty
Lab Assistant Gr. III	:	Sri P. V. Kumaran

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		Sri N. N. Ramankutty
(Oil Tech.)	:	Sri P. K. Narayanan Nambiar
(P. P.)	:	Sri P. K. Sathiarajan
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(P. Breed)	:	Sri K. C. Chandry
		.. S. Sukumaran Nair (Professor)
		.. P. C. Balakrishnan
(Ento)	:	Smt Sumangala S-Nambiar
(Meteo)	:	Dr GSLHV Prasad Rao
(Genetics)	:	Dr N. K. Vijayakumar
(Stat.)	:	Sri Abdurazak
(Micro)	:	Sri K. P. Mammootty

Assoc. Professor (Hort)	:	Sri A. Rajagopalan
(Agresto)	:	Dr K Sudhakara
		Col. A. K. Ramachandran Nambiar
Asst. Professors (Pl. Path)	:	Sri T. C. Radhakrishnan
(Hort)	:	Dr Shyam S Kurup
(Ento)	:	Sri A. M. Ranjith
(Agro)	:	Sri K. Bhaskaran Nambiar
(Econo)	:	Smt C. Latha Bastine
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		„ K. A Kurian
		„ K. J. Loveson
		„ A. Sasidharan
		„ P. N. Ratheesan
		„ M. K. Sreedharan
		„ M. V. Premarajan
Lab Assistants Gr. III	:	Sri V. Narayanan
		„ T. Raghavan
		„ T. Venu
		„ K Abdul Rahiman
Non-plan		
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(Chem)	:	Sri N. N. Ramankutty
Asst. Professors (Bot)	:	Sri P. K. Ramachandran Nambiar
		Dr K. Sudhakara
(P. P.)	:	Smt A. Naseema
Jr. Asst. Professor	:	Sri M. Govindan
Section Officer	:	Smt C. M. Radhakutty
Sr. Gr. Assistants	:	Smt S. Droupady
		Sri K Balachandran
		Smt M Leela
Grade I Assistants	:	Smt T. Lakshmikutty
		Sri E. V. Sasidharan
		„ V. V. Kunhambu
Sr. Gr. Typist	:	Smt P. Radha
Farm Supervisor Gr. II	:	Sri M. M. Sankaran
Sr. Gr. Farm Assistants	:	Smt K. Rugmini Amma
		Sri Basil Rodrigues
		„ A. Vijayan
Tractor Driver	:	Sri P Sasidharan Nair
Administrative Officer	:	Sri K. A. Appu Chettiar
Typists Gr. I	:	Sri K. Ravindran
		Smt V. P. Syamala
Typist Gr. II	:	Smt M. Sulekha
Driver Gr. II	:	Sri A. V. Kunhikrishnan
Peon	:	Sri V. Kunhiraman

Training Scheme

Farm Asst. (Agri)	:	Sri N. Saidalikutty
Asst. Gr. II	:	Sri P. M. F. Babu
Oil Engine Driver	:	Sri P. K. Sadanandan
Jeep Driver	:	Sri T. M. Sukumaran
Hr. Gr. Peons	:	Sri K Raman ,, P. Raghavan
Peon	:	Sri T. K. Chandran
Watchman	:	Sri K. K. Ramakrishnan
Junior Programmer	:	Sri T. P. Abdul Jabbar

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Professor (Breeding)	:	Dr C. A. Joseph ((On working arrangement at Moncompu)
Associate Professor (Plant Pathology)	:	Sri S. Sasikumaran
Assistant Professor (Bot) (Pl. Path)	:	Sri K. K. Ibrahim Sri P. K. Unnikrishnan Nair
Farm Supervisors Gr. II	:	Sri M. Rajaratnam ,, C. Brigidson
Field Supervisor	:	Sri K. Unnikrishnan
Farm Assistant Sr. Grade	:	Sri P Raghavan
Farm Assistant Grade-I	:	Sri P. J. Joseph
Farm Assistants Grade-II	:	Sri A. Ramakrishnan ,, K. Lakshmanan ,, K. A. Kurian ,, A. Sasidharan
Administrative Assistants	:	Smt K. Pankajakshi Sri K. Prabhakara Nadar ,, R. Rajendran Unnithan
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Typist Grade-II	:	Smt K. Pushpavalli
Lab Assistant Hr. Grade	:	Sri V. Achuthan
Peon Higher Grade	:	Sri K. Chindan
Peon	:	Sri P. Narayanan
Jeep Driver	:	Sri K. Sreedharan
Watchmen	:	Sri M. P. Narayanan (Post shifted from RARS, Pilicode) ,, T. Kunhiraman

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Jeep Driver Gr I	: Sri M. Unneenkutty
Peon Hr Gr	: Sri K. Raman " K. Gopalan Nair " K. R. Chandrasekharan
Watchmen Hr Gr	: Sri T. Kunhappa " P. Moosa
Watchman	: Sri K. Ibrahimkutty
Farm Assistant Gr I (Supernumerary)	: Sri T. P. Ali
Farm Supervisor Gr I	: Farm Assistant Sr Gr is working
Farm Supervisor Gr II	: Sri I. Gershan (FA Gr II)
Sr Gr Farm Assistants	: Sri K. M. Vijayakumar " V. K. Kumaran Smt P. Padmavathy

Farm Asst (Agri) Gr I : Sri A. Kunhimohammed
 Farm Assts Gr II : Sri K. M. George
 „ T. K. Omanakuttan
 „ P. P. Philip
 Field Supervisor : Sri K. Raghavan
 Tractor Driver Gr II : Sri M. Mohammedkutty
 Oil Engine Driver : Sri A. Varghese

REGIONAL AGRICULTURAL RESEARCH STATION, PATTAMBI NON-PLAN

Professors : Sri K. I. James
 „ P. K. G. Menon
 Associate Professor : Smt P. Chandrika
 Assistant Professor : Sri T. Premanathan
 Farm Supervisors : Sri K. P. Kesava Menon
 Smt P. T. Sarada
 Sri Abraham K. Cheru
 Farm Assts Sr Grade : Sri V. Kunju
 „ P. Bhaskaran
 Smt N. S. Gertrude
 Sri G. Raveendran Asari
 „ C. P. Mohammed
 „ Abdul Azeez
 Farm Assistant Grade I : Sri P. K. Rajasekharan
 Farm Assts Gr II : Sri C. Gireesan
 „ M. Rajendran
 „ M. J. Joseph
 Section Officers : Sri N. Soman
 „ K. P. Koyamu
 „ K. Rengaswamy
 Sr Office Superintendent : Sri K. Mammoo
 Office Superintendent : Sri M. P. Ramankutty Nair
 Sr Gr Typist : Smt S. Seemanthini
 Sr Gr Assistants : Smt P. Meenakshikutty
 Sri M. G. Rajendra Babu
 „ M. P. Ahammed
 „ P. M. Cherukutty
 Smt K. Parukutty
 Gr I Assistants : Smt N. V. Thankamani
 „ K. P. Kalliani
 Lab Assistants : Sri T. Gangadharan
 „ P. Sankaran
 „ M. P. Sankaran
 „ T. Ramakrishnan
 „ M. Vasu

Clerical Assistant	: Sri V. Bhaskaran
Peons Hr Grade	: Sri T. Raman
	.. K. Vasu
	.. K. P. Narayanan
Technicians	: Sri A. Satheeshkumar
	.. E. Abdul Hakkim
Watchmen	: Sri Suryabhadur
	.. V. P. Mammy
	.. P. Mohammed
	.. C. Mohammedkutty
Head Peon	: Sri A. Chamy
NARP	
Associate Director	: Sri N Rajappan Nair
Professors	: Dr K. P. Rajaram
	.. K. P. Chinamma
Associate Professor	: Sri D. Alexander
Assistant Professors	: Sri Selvin Jebaraj Norman
	.. V. R. Ramachandran
	.. K. Viswambharan
	.. M. A. Hassan
	Dr Jacob John
	Smt K. K. Santha
	Sri B. Mohankumar
	Sri Baby P. Skaria
	Smt V. P. Neema (JAP)
Administrative Officer	: Sri P. K. Ramachandran Nair
Typist	: Smt V. Santhakumari
Duplicator Operator	: Sri C. Kunhan
Lab Assistants	: Sri V. P. Balasubramanian
	.. K. Achutha Kurup
Drivers	: Sri A. Krishnan
	.. K. Parameswaran
NARP Eruthempathy	
Associate Professor	: Sri M. Ommen
Farm Assistants Gr. II	: Sri T. R. Sudevan
	.. P. A. Abdul Majeed
Peon	: Sri Balakrishnan
AICRP	
Professors	: Dr K Karunakaran
	Sri V. P. Sukumara Dev
Associate Professors	: Sri P. J. Tomy
	.. L. Nadarajan
	Smt K. T. Alice

Assistant Professors : Sri A. Sreedharan
 Dr Kamalam Joseph
 Farm Assistants : Sri K. K. Vijayakumar
 „ P. A. Mony
 „ Mohammed Ali
 „ C. B. Venugopalan

**Chemistry on Submerged Soils
 (Scheme was terminated w. e. f. 31-3-87)**

Assistant Professors : Dr Kamalam Joseph
 Sri K. Anilkumar
 Farm Assistants Gr. II : Sri Sreenivasan Palassery
 „ M. Rajendran
 Assistant Gr. II : Sri O. Sethumadhavankutty
 Lab Assistant Gr. II : Sri A. Govindan Nair
 Lab Assistant Gr. III : Smt P. Santhakumari

Research on Pulses

Junior Assistant Professors : Sri P. P. Joy
 Smt V. P. Neema
 Farm Assistants Grade II : Sri Yoosuf
 „ K. O. Shahul Hameed
 „ T. Velayudhan
 Assistant Grade I : Sri A. V. Sreenivasa Rvhavan
 Peon : Sri A. Mamoom
 Lab Assistant Gr III : Sri K. R. Ganesh
 Sweeper : Sri P. Kunhilakshmy

NSP & BSP

Assistant Professor : Smt C. A. Rosamma (JAP)
 Mechanic : Sri K. V. Johnny
 Farm Assistant (Vety) Gr I : Sri P. Balakrishnan

**BANANA RESEARCH STATION, KANNARA & PINEAPPLE
 RESEARCH STATION, VELLANIKKARA**

Associate Professor : Dr K. Pushkaran
 Assistant Professors : Smt S. Prasannakumari Amma
 Dr E. V. Nybe
 Sri B. R. Reghunath
 Smt T. Radha
 Sri Job Sathya Kumar Charles
 Smt S. Estelitta (JAP)
 Junior Assistant Professors : Smt A. K. Babylatha
 „ A. Suma
 Farm Supervisor (Agri) : Sri C. K. Vijayan
 Farm Assistant Gr I : Sri P. R. Sathyan

Farm Assistants Gr II	: Sri V. J. Paul
	" M. N. Pavithran
	" C. I. Surendran
	Smt R. Jayanthi
Oil Engine Driver (Hr Gr)	: Sri K. Narayanan
Laboratory Assistants	: Sri K. R. Gopalakrishnan
	Smt K. V. Padmavathy
	Sri P. Madhavankutty
Administrative Assistant	: Sri S. Sheik Abdul Karim
Clerk Typist	: Sri K. K. Parameswaran
Assistant Gr II	: Sri U. P. Davis
Mali/Watchman-Class IV	: Sri C. M. Prabhakaran
	" T. Bhaskaran
	Smt P. Subhadra
	Sri K. S. Chandrasekharan
Peon/Messenger	: Smt. K. Sosamma
	" K. Sarada
Peon Higher Grade	: Sri T. Achuthan Nair

REGIONAL AGRICULTURAL RESEARCH STATION, KUMARAKOM

Root (wilt) Scheme

Professor (Agro)	: Sri U. Mohammed Kunju
Professor (PP)	: Dr James Mathew
Professor (Ent)	: Sri D. Joseph
	" Dr P. J. Joy
Professor (PP)	: Dr K. M. Rajan
Asst. Professor (Agro)	: Sri K. C. Rajan
Asst. Professors (Ag.Bot)	: Smt P. Mayadevi
	: Dr D. Chandramony
" (SS)	: Sri Sam T. Kurumthottickal
Junior Asst. Professor	: Smt Alice Antony
	" Elizabeth K. Cyriac
Office Superintendent	: Sri K. K. Gopikuttan Nair
Senior Gr. Farm Assistant (H. G)	: Smt. N. Kamalamma
Farm Assts Gr. I	: Sri K Sasidharan
Farm Assts Gr. II	: Sri K. C. Varghese
	" K. V. Kuttappan
Lab Assisat Gr. II	: Sri V. K. Vasu
Driver (LDV) Gr. II	: Sri K. Uthaman
RARS (A)	
Assistant Professor (PP)	: Sri G. Mathai
Section Officer	: Sri H. Salahudeen
Office Superintendent	: Smt C. B. Merlin

Assistants Gr. I : Sri P. G. Sreekantha Pai
 : " K. P. Rajan
 Driver Gr. II (LDV) : " T. M. Francis
 Peon (Hr. Gr.) : Sri T. K. Sreedharan
 Bus Attendant : Sri V. V. Vasu
 Sweeper-cum-attendant : Smt A. P. Meenakshy
 Watchen (Hr. Gr.) : Sri K. K. Thankappan
 : " M. Easo
 Watchman : Sri P. K. Sukumaran
 Pump Operator : Sri C. C. Punnen

RARS (B)

Farm Supervisor Gr. I : Sri P. Damodaran
 Sr. Gr. Farm Assistants (H. G.) : Sri K. K. Viswanathan
 : " E. K. Sukumaran
 : " John David
 Farm Assistant (Sr. Gr.) : Sri V. P. Rajappan Nair
 Farm Assistant Gr. II : Sri M. V. Sasidharan Nair

IRP (A)

Jr. Asst. Professor (Aqua) : Dr J. Rajasekharan Nair
 Assistants Gr. I : Smt. M. N. Radhamma
 : " Sophiamma Joseph
 Watchman : Sri G. G. Mohanan

IRP (B)

Farm Assistant Gr. I (Vety) : Sri O. K. Sukumaran
 Fisherman : Sri P. Viswanathan

NARP

Professor (Eco) : Sri E. R. Narayanan Nair
 Professor (Extn) : Sri P. Ramachandran Nair
 Associate Professors (Aqua) : Dr K. G. Padmakumar
 Bengre Santharam
 Assistant Professors (W.S) : Sri Abraham Varghese
 : " N. K. Sasidharan
 Asst. Professors (Ento) : Dr Babu Philip
 : Sri P. A. Rajan Asari
 (Micro) : Dr P. Sivaprasad
 : Sri B. Balakrishnan
 (Bio-chem) : Dr Sosamma Cherian
 (Aqua) : Dr K. G. Padmakumar
 (Hort) : Smt Sabina George, Thekkayam
 : Sri Sajan Kurian (JAP)
 : Dr Joseph Philip

Assistant Professors (Pl. Br)	:	Sri K. Sreekumar
(JAP officiating)	:	Sri K. A. Inasi
(Ag. Engg)	:	Sri Jose Abraham (JAP)
Professor (Ag. Chem)	:	Sri K. Chandrasekharan Nair
Research Fellow (Fisheries)	:	Sri Anikumar
Administrative Officers	:	Sri Philip, K. Kurian
	:	„ M. Nakulan
Assistants Grade-1	:	Sri P. M. Mani
	:	Smt Annamma Varghese
	:	Kum. C. R. Rethi
Typists Grade-1	:	Sri M. C. Jayakumar
	:	„ K. C. Mohanakumar
	:	Sri N. A. Raju
	:	Smt T. K. Ponnamma
Driver Gr. I (HDV)	:	Sri P. C. Kurian
Peons (Hr. Gr.)	:	Sri A. A. Pankajashan
	:	„ M. Easo
Peon (Hr. Gr.)	:	Sri N. Purandaran
Duplicator Operators	:	Sri K. K. Raghavan
	:	„ K. Rajendra babu Pillai
Artist	:	Sri P. K. Surendran
Lab Assistants Gr. III	:	Sri N. Prakasan
	:	„ V. K. Vasu
	:	Smt P. S. Ratnam
	:	„ Mary Sebastian
	:	Sri P. V. Gopinathan
Tractor Driver	:	Sri K. G. Prakasan
	:	(Provisional)

CARDAMOM RESEARCH STATION, PAMPADUMPARA

Professors (Pl. Path.)	:	Dr P. Karunakaran (upto 24-6-86)
	:	„ C. K. Peethambaran
	:	(from 25-5-86)
Associate Professor	:	Sri C. K. Prabhakaran Thambi
Asst. Professor (Ent.)	:	Sri C. M. George
Asst. Professor (Pl. Br.)	:	Sri K. P. Kuriakose, JAP
Farm Supervisor Gr. II	:	Smt L. Indira
Farm Asst. Sr. Grade	:	Smt K. Devaky
Farm Assistants (Agri.) Gr. II	:	Sri K. C. Varghese
	:	„ C. G. Pradeep
Lab. Assistant Gr. II	:	Sri P. V. Joseph
Farm Assistants Gr. I	:	Sri V. P. Prasad
	:	„ T. V. Kuttichan
Administrative Assistant	:	Sri L. Wilson

Asst. Gr. I	: Sri M. R. Ramachandran Nair
Asst. Gr. II	: Sri M. P. Vijayachandra Babu
Typist Grade II	: Sri K Chandrakumar
Jeep Driver Grade III	: Sri K. Chacko
Peon (Sr Grade)	: Sri K. Sankara Pillai
Field Supervisor (Hr Gr)	: Sri K. N. Raghavan
Watchmen	: Sri K. Raghavan Pillai
	„ K. V. Thankappan
	„ Chako Chandy
	„ M. K. Sivaraman

AROMATIC & MEDICINAL PLANTS RESEARCH STATION, ODAKKALI

Professors	: Sri E. V. G. Nair Dr. J. Thomas (Asst Professor in-charge)
Junior Asst Professors	: Smt K. Geetha „ K. S. Shylaraj
Graduate Lab Assistant	: Smt K. K. Santhakumari Amma
Lab Assistant Grade I	: Sri T. K. George
Lab Assistant Grade II	: Smt T. N. Kousalya
Farm Supervisor	: Smt V. V. Mariamkutty
Farm Assistants Sr Grade	: Sri E. N. Sudhakaran Nair „ V. James
Administrative Assistant	: Sri C. S. Asokakumar
Assistant Grade I	: Smt Annamma Varghese „ K. P. Premakumari
Typist Grade II	: Smt E. R. Vilasini
Peon	: Sri M. M. Poulouse
Watchman	: Sri P. T. Kalidasan
Sweeper cum attendant	: Sri K. B. Sivaramakurup

CROPPING SYSTEMS RESEARCH CENTRE, KARAMANA

Professor	: Dr Tajuddin
Assistant Professors	: Sri S. M. Shahul Hameed „ Yageen Thomas „ M. Subramaniam Iyer „ K. P. Jagan Mohan „ S. Devanesan Dr Saifudeen Smt Swadija
Junior Assistant Professors	: Smt P. B. Usha „ Sudharmai Devi „ Sansamma George

Farm Assistants Grade II	:	Sri David Dharmakumar
		„ L. Mohan Das
		„ K. Justin
		„ M. Saifudeen
		„ D. Sulochanan
Administrative Officer	:	Sri Sasidharan Pillai
Assistants Grade I	:	Sri N. Parameswaran Nair
		„ M. Ponmanimohana
		„ Smt Sukumari Amma
Peon	:	Sri P. K. Sukumaran Nair
Chowkidar	:	Sri R. Raghavan Pillai
Watchman	:	Sri P. Madhavan Nair
Attendant	:	Sri K. Pappachan
Part time Sweeper	:	Smt Bharathy
Lab Assistant Grade III	:	Sri G. Enose

RICE RESEARCH STATION, VYTTILA

Professors	:	Sri T. U. George
		Dr V. Thomas Alexander
Junior Assistant Professor	:	Smt Reena Grittle Pinhero
Farm Supervisor	:	Smt M. J. Annakutty
Farm Assistants	:	Sri Haridas
		„ E. R. Soman
		„ M. C. Sachidanandan
		Smt Padma Narayana Pillai
Administrative Assistant	:	Sri-M. Abubakker Khan
Assistant Grade I	:	Sri K. M. Vincent Perera
		Smt K. Vinaya Bai
Peons (Hr Grade)	:	Sri V. Vasu
		„ N. S. Reghunandan
Watchman	:	Sri Sebastian

CASHEW RESEARCH STATION, ANAKKAYAM

Junior Assistant Professor	:	Smt P. V. Nalini
Farm Asst (Sr Grade)	:	Sri Aboobacker
Assistant Grade I	:	Sri C. Rajagopalan
Peon	:	Sri C. Muhammed
Mali	:	Smt P. P. Ummachu

CASHEW RESEARCH STATION, MADAKKATHARA

Professor	:	Sri P. G. Veeraraghavan
Assistant Professor	:	Sri I. Sitarama Rao
Junior Assistant Professors	:	Smt V. A. Celine
		Sri V. Kunchu

Farm Assistant Grade II : Sri N. R. Rajan
 Assistants Grade II : Sri E. Shamsudeen
 „ Sreekanthapai.
 Mali : Sri K. S. Radhakrishnan
 Smt P. K. Kamalakshy
 Sweeper : Sri P. S. Ratnakumaran

RICE RESEARCH STATION, KAYAMKULAM

Professors : Sri K. Balakrishna Pillai
 „ K. Raveendran Nair
 Smt S. Santhakumari
 Sri B. Gopimony
 Associate Professors : Dr K. Sivan Pillai
 Sri M. G. Vasavan
 Dr. Bhavani Devi
 Assistant Professors : Sri Abraham Varghese
 „ P. V. Joseph
 Junior Assistant Professors : Smt Sushamakumari
 Sri Sunny K. Oommen
 Farm Supervisor : Sri A. E. Mendez
 Farm Assistants Grade I : Sri M. Varghese
 „ N. Vasudevan
 Farm Assistants Grade II : Smt S. Nazeema
 Sri G. Udayakumar
 „ K. C. Sanuprasad
 „ T. K. Vijayan
 „ V. J. Rajmohan

RICE RESEARCH STATION, MONCOMPU

Professors : Dr C. A. Joseph
 Sri P. K. Chellappan Nair
 „ B. Thomas
 Dr L. Remadevi
 Associate Professors : Smt K. S. Remamoni
 „ N. Rema Bai
 „ Susamma Mathai
 Assistant Professors : Sri Jim Thomas (on study leave)
 „ S. Bhaskaran („)
 „ Purushothaman
 Smt D. S. Radha Devi
 „ Susan George
 „ C. A. Mary

Junior Assistant Professors	: Smt S. Leenakumari ,, Annie Koruth ,, Sheela Paul ,, R. Devika Sri Babu George (on study leave)
Junior Statistician	: Smt P. R. Krishnakumari Amma
Farm Supervisor	: Sri K. Chellappan
Farm Assistants	: Sri C. O. Mathai ,, Ayyappan Pillai
Farm Assistant (Sr. Gr.)	: Sri C. S. Joseph
Farm Assistant Grade I	: Sri T. J. Mathew
Field Supervisor	: Sri V. Thankappan
Lab Assistants Grade III	: Sri Vasudevan ,, N. Sivadasan
Administrative Assistant	: Smt Mary Amma Eapen
Assistants Sr. Gr.	: Sri K. P. Rajendraprasad Smt Sarasamma
Assistants Grade I	: Sri V. Govindarajan ,, V. P. Raveendran
Typist Grade I	: Smt P. K. Sreedevi Amma
Class IV Employees	: Sri George A Muricken ,, K. Lalu ,, P. G. Balakrishnan ,, Joseph Peter
Drivers	: Sri C. C. Chacko ,, M. D. Janardhanan
Boat Helper	: Sri P. K. Thankappan

AGRONOMIC RESEARCH STATION, CHALAKUDY

Professor	: Dr G. Ravindranathan Pillai
Associate Professors	: Smt G. Santhakumari Sri Jose Mathew (Asst. Professor i/c) Smt Lissy Devi Chirayath (J. A. P. i/c)
Assistant Professors	: Sri Kuruvilla Varughese ,, C. S. Gopi Dr K. A. Mariyam Smt K. Ushakumari (J A P i/c) ,, E. V. N. Sheela
Farm Supervisor	: Sri R. Chandran Pillai

Farm Assistants Gr. I	:	Sri T. C. Sidharthan Smt T. A. Vasanthy Sri P. V. Reghunathan " V. Unnikrishnan " P. K. Reghu (Gr. II) " N. M. Mohanan
Farm Assistants Gr. II	:	Smt T. A. Vasanthy Sri P. N. Sadasivan " P. K. Reghu " A. A. Abdulla
Lab. Assistants Grade II	:	Sri T. R. Balakrishnan Smt Prasannakumari Sri P. K. Anandan
Administrative Assistant	:	Sri D. Gilbert
Assistant Grade I	:	Sri K. F. Mathew
Assistant Grade II	:	Smt Sathee devi
Typists Grade II	:	Smt P. K. Sara " P. K. Devaky (Provisional)
Drivers	:	Sri V. Karunakaran " M. P. Paul
Peon	:	Sri K. Radhakrishnan
Oil Engine Driver cum Pump Operator	:	Sri K. A. Subran
Plough man	:	Sri K. C. Mathew

AGRICULTURAL RESEARCH STATION, MANNUTHY

Project Co-ordinator (Rice)	:	Prof. T. F. Kuriakose
Assoc. Professor (Agro.)	:	Sri S. Janardhanan Pillai
" (Bot.)	:	Prof. P. A. Varkey
Asst. Professors (Agro.)	:	Dr P. V. Balachandran " T. M. Kurian
" (Bot.)	:	Smt M. R. Kanakamany (JAP holding charge)
" (Ag. Engg.)	:	Smt Latha A Koshy (JAP holding charge)
Jr. Asst. Professors (Agro.)	:	Sri P. A. Joseph Smt E. K. Lalitha Bai
" (Che.)	:	Smt K. P. Prasanna
" (Bot.)	:	Smt Tessa Joseph
Design Engineer	:	Smt Susan Cherian JAP
Administrative Assistant	:	Smt S. Vanaja
Senior Grade Assistants	:	Smt P. A. Lekshmy " K. P. Narayanikutty
Assistants Grade II	:	Smt M. Komalam
Senior Grade Typist	:	Smt P. Reetha Joseph

Peons	:	Smt I. Parukutty Sri C. R. Velayudhan
Jeep Drivers	:	Sri N. K. Antony ,, P. S. Kabeer
Watchmen	:	Sri Man Bahadur ,, M. K. Ramakrishnan ,, P. V. Kumaran
Lab. Asst. Gr. III (Sr.)	:	Sri C. K. Dharmadas
Farm Supervisors Gr. II	:	Sri T. K. Mithran Smt P. G. Yamuna
Senior Gr. Farm Assts. (Hr.Gr.)	:	Smt Rachel Sri N. T. George Smt S. Kamala Bai
Senior Gr. Farm Assistants	:	Sri S. Krishnan Chettiar Smt B. Radha Sri T. Gopalan
I Grade Farm Assistants	:	Smt L. Radhammal Sri V. John George ,, K. Vijayanarayan
Field Supervisor	:	Sri T. Raman Nair
Technicians Grade III	:	Sri K. O. Porinchi ,, T. R. Viswambharan
Grade I Typist	:	Smt K. Padmavathy
Technicians Grade III	:	Sri K. M. Muralidharan ,, N. Sambasivan Nair
Lab. Asst. Grade III	:	Sri T. V. Parameswaran
Workshop Attender	:	Sri C. J. Joseph

LIVESTOCK RESEARCH STATION, THIRUVAZHAMKUNNU

Associate Professor	:	Dr P. P. Balakrishnan Sri N. K. Sasidharan
Asst. Professor	:	Dr C. K. Sreedharan Unni
Farm Supervisors (Agri) Gr. II	:	Sri K. Chellappan ,, C. N. Raghavan
Farm Assistants (Agri) Gr. I	:	Sri M. Ummer ,, V. M. George
Farm Assistant (Vety). Gr. I	:	Sri P. P. Narayana Panicker
Farm Assistants (Agri) Gr. II	:	Sri K. G. Mohan Das ,, R. Reghu ,, Sreenivasan Palasseri
Farm Assistants (Vety) Gr. II	:	Sri M. Sukumaran
Technician Gr. II	:	Sri A. Sankaran
Administrative Assistant	:	Sri T. N. Sankunny
Assistant Grade I	:	Sri K. Balachandran Nair

Assistants Grade II	: Sri P. R. Ajith Kumar ,, P. Muraleedharan Smt M. D. Kunjamma
Drivers Grade II	: Sri T. M. Abdul Kader ,, T. Moidu
Driver Grade I	: Sri P. M. Mohammed
Maistry	: Sri K. Krishnan ,, K. Ramakrishnan
Peon Special Grade	: Sri K. Mohammed
Lab. Asst /Technician	: Sri C. Mohammed Usman
Watchmen	: Sri M Ramachandran ,, A. Chachunni ,, P. Vasudevan ,, C. Kumaran ,, K. Manukuttan ,, C. Chami
Field Supervisor	: Sri C. Sankaran Nair

AICRP ON AGROFORESTRY

Special Officer (Agro Forestry)	: Sri V R. Krishnan Nair (Headquarters at Vellanikkara)
Asst. Professor (, ,)	: Sri N. K. Sashidharan
Farm Assistants (Agri.) Gr. II	: Sri P. S. Sanalkumar ,, Thomas Chirakandathil
Lab. Assistant Grade II	: Sri P. Bharathan
Driver Grade III	: Sri M. P. Unnikrishnan
Peon	: Sri P. Narayanan Nair

UNIVERSITY VETERINARY HOSPITAL, KOKKALAI

Professor	: Dr K. Ramadas
Asst. Professor	: Dr M. R. Saseendranath
Farm Supervisors	: Sri C. K. Lakshmanan ,, E. Sreedhara Marar
Farm Supervisor Grade II	: Smt A. Sarojam
Pharmacist	: Sri C. K. Alias
Assistant Gr. I	: Sri K. K. Sadeesan
Assistant Sr. Grade	: Smt A. Subhalakshmi Ammal
Attendant Special Grade	: Sri M. K. Sheik Abdul Rahiman
Attendant Gr. I	: Sri K. O. Varghese
Permanent Servant	: Sri K. S. Radhakrishnan
Sweeper cum Scavenger	: Smt K. N. Saraswathy

PIG BREEDING FARM, MANNUTHY

Assistant Professor	: Dr K. S. Sebastian
Farm Supervisor	: Sri K. M. N. Kartha
Farm Assistant (Vety.) Gr. I	: Sri K. K. Sashidharan Nair

Farm Assistant (Vety.) Sr. Gr.	: Sri K. P. George
Assistant Grade I	: Smt Suma Varghese
Assistant Grade II	: Smt T. D. Annie
Watchman	: Sri T. M. Kesavan
Peon Higher Grade	: Smt K. K. Karthiayani
Pig Attendant	: Sri P. B. Velayudhan

AICRP ON GOATS, MANNUTHY

Associate Professor	: Dr C. A. Rajagopala Raja
Asst. Professors	: Dr T. V. Viswanathan
Junior Asst. Professors	: Smt T. K. Ajitha Dr P. Gangadevi ,, M. O. Kurian ,, T. V. Anil Kumar
Farm Assistants	: Sri K. Krishnankutty Smt V. Indira Sri C. Ramachandran ,, K. T. Sivasankaran ,, J. K. Narayanan
Assistants Gr. I	: Smt P. R. Sreedevikutty ,, P. P. Annamma
Assistants Grade II	: Smt Mabel Philip ,, K. M. Chandralekha ,, M. K. Chandrika Sri. K. Rajendran
Driver	: Sri C. T. Louis
Class IV	: Sri A. G. Rajendran ,, P. Rajagopalan ,, P. K. Karappan

AICRP ON AGRICULTURAL BYE PRODUCTS, MANNUTHY

Professor	: Dr P. Ramachandran
Assistant Professor	: Dr George Mathew
Farm Assistants (Vety.)	: Smt A. Leela Sri P. A. Francis ,, K. R. Sivaraman
Mechanic	: Sri K. P. Sudarsanakumar
Assistant Grade II	: Sri V. N. Sreekumar
Lab. Attendant	: Sri P. V. Sreedharan

FISHERIES RESEARCH STATION, PANANGAD

Professor	: Dr P. M. Mathew
Research Fellow	: Miss Sheena Stephen
Fisherman	: Sri M. S. Moni ,, K. S. Gopi

SUGARCANE RESEARCH STATION, THIRUVALLA

Scientists/Professor	:	Sri Sukumaran Nair
Associate Professors	:	Sri K. C. Chandy Dr Neelakantan Potty
Junior Assistant Professors	:	Sri Sajen Kurien Smt Jessy M. Kuriakose
Farm Supervisor Gr. II	:	Sri A Mohammed Kunju
Farm Assistant Grade I	:	Sri M. Kamaruddin ,, E. K. Sukumaran
Senior Grade Assistants	:	Sri Abdul Salam Smt B. Thankamani
First Grade Assistant	:	Smt S. Usha Devi
Senior Grade Typist	:	Sri V. Bhagaval Singh
Drivers	:	Sri P. Moideen ,, O. R. Sasidharan
Peons	:	Sri Bhaskaran Smt S. Kala Devi
Watchmen	:	Sri S. Rajeev ,, P. Narayana Pillai
Research Fellow	:	Sri Babu George

COCONUT RESEARCH STATION, BALARAMAPURAM

Professor	:	Sri K. Sivasankara Pillai
Assistant Professor	:	Smt P. Sukumari Dr M Vijayan
Farm Supervisor Gr. II	:	Sri K Chellappan
Senior Gr. Farm Assistant (Higher Grade)	:	Sri N. Madhavan Nair
Administrative Assistant	:	Smt B Rugmini Amma
Senior Grade Assistant	:	Smt N. Sujatha
Assistants Grade-I	:	Smt J. Jeslet Mercy ,, R. Vasumathy
Typist Grade-I	:	Sri K. Gopikuttan Nair
Higher Gr. Peon	:	Sri N Prabhakaran Nair
Special Grade Mazdoor	:	Sri J. Vijayan
Watchmen	:	Sri G. Raghavan Pillai ,, K. Mohanan

NARP, SOUTHERN REGION, VELLAYANI

Associate Director	:	Dr N. Mohanakumar
Associate Professors	:	
,, (Soil Science)	:	Sri P. R. Ramasubramonian
,, (Plant Breeding)	:	Dr P. Manikantan Nair*
,, (Agrl Statistics)	:	Dr P. Saraswathy

Assistant Professors	
.. (Soil Science)	: Smt R. S. Shehana
.. (Plant Breeding)	: Smt P. Manju
.. (Nematology)	: Smt M. S. Sheela
.. (Agrl Extension)	: Smt S. Shylaja
.. (Agrl Statistics)	: Sri R. Balakrishnan Asan
.. (Horticulture)	: Smt G. R. Sulekha
Farm Assistants (Agrl) Gr I	: Sri M. K. Vijayan
	.. S. R. Rajeevan
	.. K. S. Ajayakumar
Laboratory Assistants Gr I	: Smt S. Saraswathy Amma
	Sri M. Krishnan Nair
Drivers Grade II	: Sri R. Soman Nair
	.. T. K. Remanan
	.. I. T. Rappai
Photographer	: Sri M. S. Kuriakose
Duplicator Operator	: Sri D. Madhusoodhanan Nair
Bus Attendant (Mini Bus)	: Sri P. M. Varghese
Administrative Officer	: Sri P. C. Raveendran Pillai
Typist Grade I (Steno)	: Smt S. Majida Beevi
Assistants Grade I	: Smt V. Chandrika
	Sri P. Gopinathan Nair (Gr II)
Assistant Grade II	: Sri M. S. Sanalkumar
Typists Grade I	: Sri S. Raghavan
	Smt S. Ramani

SPECIAL STATION, KOTTARAKKARA

Associate Professor	
.. (Horticulture)	: Sri M. K. Mammen*
.. (Soil Science)	: Sri Abdul Hameed*
Assistant Professors	
.. (Agronomy)	: Smt S. Chandini
	.. S. Sobhana**
.. (Agrl. Entomology)	: Sri C. Nandakumar
	Smt K. Saradamma
.. (Plant Pathology)	: Smt K. K. Sulochana
	Sri Abraham
.. (Economics)	: Smt A. M. Santha
	.. Elsamma Job
Farm Assistants (Agrl) Grade I	: Sri P. A. Samkutty
	.. Raveendran
Laboratory Assistants Gr I	: Sri J. Dasayyan Nadar
	.. K. Kunju Pillai
Tractor Driver	: Sri P. S. Vijayakumaran Nair

* Norms promoted Professors

** Junior Assistant Professor posted against Assistant Professor

Appendix V

LIST OF PUBLICATIONS

FACULTY OF AGRICULTURE

1. SCIENTIFIC ARTICLES/BOOKS

a. RARS PILICODE

- P. C. Balakrishnan, G.S.L.H.V. Prasada Rao, and R.R. Nair, (1987). Head Unit requirement for germination of coconut cultivar WCT—a preliminary study. Paper presented in the National Seminar on Agrometeorology of Plantation Crops held at Pilicode.
- P. C., Balakrishnan, K., Kannan, and R. R. Nair, (1987). Effect of partial removal of husk from the stalk end of coconut seednuts on germination and growth of seedlings. *Indian Coconut Journal* 17: 9-10
- M. Govindan, and D. Purushothaman (1986). Occurrence of *Azospirillum* spp. the nitrogen fixing bacteria in certain plantation crops. *Indian J. Microbiol.* 125: 141-143.
- M. Govindan, (1986). Chemotactic response of *Azospirillum* isolated from the root environment of certain plantation crops. Paper presented in the workshop on beneficial microbes in tree crop management held at CPCRI, Kasaragod, 8-9 Sept. 1986.
- M. Govindan, and N. K. Vijayakumar (1986). Effect of certain plant protection chemicals as the diazotroph, *Azospirillum* occurring in the root environments of black pepper. Seventh Symposium on Plantation Crops (Abstracts of papers) 52.
- M Govindan, (1987). Seasonal variation in the population of the diazotroph, *Azospirillum*. Paper presented in the National Seminar on Agrometeorology of Plantation Crops held at RARS Pilicode, 12-13th March 1987.
- G. S. L. H. V. Prasada Rao. (1986). Effect of drought on coconut production. *Indian Coconut Journal*, 17 (8) 11-12
- G. S. L. H. V. Prasada Rao. (1986). Effect of water logging on coconut productivity. Presented at Vth Annual Convention and Seminar on Hydrology held at MACT, Bhopal during 15-17 July 1986.
- G. S. L. H. V. Prasada Rao and R. R. Nair, (1986). Influence of weather on nut development in coconut. Presented at PLACROSYM VII, held at Coonoor during 16-19 October 1986.

- G. S. L. H. V. Prasada Rao, and R. R. Nair, (1987). Influence of soil texture on the thermal regime of coconut rhizosphere. Presented at the National Seminar on Agrometeorology of Plantation Crops, held at RARS Pilicode during 12-13 March 1987.
- G. S. L. H. V. Prasada Rao, and R. R. Nair (1987). Vertical profiles of air temperature and vapour pressure in coconut gardens and open space. Presented at the National Seminar on Agrometeorology of Plantation Crops held at RARS Pilicode during 12-13 March 1987.
- T. C. Radhakrishnan, (1986). New record of leaf blight of nutmeg (*Myristica fragrans*). *Indian Phytopathology* 39: 492
- A. Rajagopalan, and P. K. Gopalakrishnan, (1985). Qualitative analysis in *Kaempfloria galanga* L. *Indian Cocoa, Arecanut and Spices J.* 8 (4) 103-5
- A. Rajagopalan, and P. K. Gopalakrishnan, (1985). Growth, yield and quality of *K. galanga* L as influenced by planting time and type of seed material. *Agricultural Research Journal of Kerala* 23 (1)
- A. Rajagopalan, R. R. Nair, and G. S. L. H. V. P. Rao, (1987). Water requirement of young T x G hybrids. Paper presented in the National Seminar on Agrometeorology of Plantation Crops held at RARS Pilicode, March 12-13, 1987.
- A. M., Ranjith, P. Abdurazak and Sumangala. S. Nambiar (1987). The influence of weather on the larvae populations of cockchafler beetle in coconut—National Seminar on Agrometeorology of Plantation Crops, March 1987.
- Shyam S. Kurup and N. K. Vijayakumar, (1987). Relative degradation of chlorophyll in black pepper (*Piper nigrum* L.) varieties during moisture stress. Paper presented in the National Seminar on Agrometeorology of Plantation Crops held at RARS Pilicode, March 1987.
- T. C. Radhakrishnan, and G. S. L. H. V. Prasada Rao, (1987). Impact of drought on the stem bleeding disease of coconut. Paper presented in the National Seminar on Agrometeorology of Plantation Crops held at RARS, Pilicode March 1987.
- K. Sudhakara, K. Kannan, and I. P. S. Sreedharan Nambiar, (1986). Effect of defoliation on the productivity of coconut palm (*Cocos nucifera* L.) cv WCT. Paper presented at VIIIth Symposium on Plantation Crops (Abstracts-6)
- Thomas Varghese (1986). Classification of laterite soils of Kerala (India) according to soil taxonomy. Paper presented in the VII International Soil Classification Workshop, Brazil.

Technical Bulletin

- R. R. Nair, (1986). *തെങ്ങുകൃഷി* Communication Centre, Kerala Agrl. University.

Pepper Research Station, Panniyur

- K. K. Ibrahim, P. K. Unnikrishnan Nair and Mathew Kurian (1986). Prediction of rainfall at Taliparamba by statistical methods *Agric. Res. J. Kerala* 24 (1) 78-9
- K. K. Ibrahim, V. Sukumara Pillai, S. Sasikumaran (1985). Genotypic and Phenotypic correlation among some quantitative characters in black pepper (*Piper nigrum* L) and their implications in selection *Agri. Res. J. Kerala* 23 (2) p. 150-3
- K. K. Ibrahim V. Sukumara Pillai, and S. Sasikumaran (1985). Methods for the estimation of leaf area in black pepper (*Piper nigrum* L) and nature of association between various traits relating to leaf lamina *South Indian Horticulture* 33 (5) 316-22
- K. K. Ibrahim, V. Sukumara Pillai, and S. Sasikumaran (1985). Morphological relationship of variety Panniyur 1 with Malabar and Travancore groups of black pepper (*Piper nigrum* L.) *Indian Spices* 22 (4) 2-3
- K. K. Ibrahim, V. Sukumara Pillai, and S. Sasikumaran (1985). Genotype x season interaction and stability parameters in black pepper (*Piper nigrum* L) *Agri. Res. J. Kerala* 23 (2) 154-62
- K. K. Ibrahim, V. Sukumara Pillai, and S. Sasikumaran (1986). Comparative genetic variability within open-pollinated seedlings of certain varieties of black pepper (*Piper nigrum* L). for yield. *Indian Cocoa, Arecanut & Spices J.* 9 (4) 85-86
- P. K. Unnikrishnan Nair, S. Sasikumaran, V. Sukumara Pillai, and G. S. L. H. V. P. Rao (1987). Influence of weather on foot rot disease of black pepper (*Piper nigrum* L). Presented in National Seminar of Agro-meteorology of Plantation Crops held at RARS, Pilicode on 12 & 13 March,
- V. Sukumara Pillai, S. Sasikumaran, and K. K. Ibrahim (1987). Effect of rain-fall pattern on the yield of pepper (*Piper nigrum*). Presented in National Seminar of Agro-meteorology of Plantation Crops held at RARS, Pilicode on 12 & 13 March.

RARS, Ambalavayal

- K., Kannan, V. S. Devadas, and C. George Thomas (1987) Effect of weather parameters on the productivity of coffee and pepper in Wynad. Paper presented at the National Seminar on Agrometeorology of Plantation Crops held at Regional Agrl. Research Station, Pilicode from 12-3-1987 to 13-3-1987.

RARS Pattambi

- K. Karunakaran, N. Rajappan Nair, and C. A. Rosamma (1986) Rice ratooning and ratoon based cropping systems in Kerala. Paper presented at the rice ratooning workshop. Bangalore April 21-25
- P. P. Joy, K. P. Rajaram and K. I. James (1986). A rice-grain legume cropping system. *Int. Rice. Res. News let.* 11 (6): 37-38.

V. P. Sukumara Dev, (1986). "A report of work done on seed borne diseases with special reference to rice in Kerala". Paper presented in the IV Workshop of all India Co-ordinated Rice Project on Seed borne Diseases held at TNAU from 25-27 November 1986

C. A. Mary, V. P. Sukumara Dev, K. Karunakaran and N Rajappan Nair (1986). Cowdung extract for controlling bacterial blight IRRN, 11 (2): April.

BRS, Kannara

A. K. Babylatha, K. Pushkaran, S. Prasannakumari Amma, and P. V. Nalini, (1986) Effect of certain growth regulators and nutrients on growth and yield of 'Nendran' banana. Sent for publication in the journal "*South Indian Horticulture*"

A. K. Babylatha, S. Prasannakumari Amma, K. Pushkaran, and P. V. Nalini, (1987) Sent for publication in the journal. "*Tropical Agriculture*"

E. V. Nybe, Luckin C. Babu, S. Prasannakumari Amma and K. Pushkaran (1986). Anatomical studies on Kokkan disease of banana. Paper sent for publication in the journal. "*South Indian Horticulture*".

E. V. Nybe, and P. C. S. Nair (1986). Nutrient deficiency in black pepper (*Piper nigrum* L.) I. Nitrogen, Phosphorus and Potassium. *Agric. Res. J. Kerala* 1987, 24 (2): 132-150.

ARS, Chalakudy

Kuruville Varughese, Jose Mathew and G. R. Pillai (1986). Response of blackgram to different levels of irrigation in summer rice fallows. *Agric. Res. J. Kerala* 24 (2) 175-178.

Kuruville Varughese, Jose Mathew and G. R. Pillai (1986). Response of cassava to irrigation under pure and mixed stands. *Agric. Res. J. Kerala* 24 (2) 179-184.

G. R. Pillai, Kuruville Varughese, Jose Mathew, and G. Santhakumari (1986). Intercropping food legumes with cassava in rice based farming system. Published in the international workshop "Food Legume Improvement for Asian Farming systems" held at Khon Kaen, Thailand, September

Kuruville Varughese, G. R. Pillai and Jose Mathew (1986). Economics of irrigation and mulching in Pineapple var. Kew. International symposium on Arid and Semi Arid Zones—Haryana Agril. University, Hissar November 27-29.

Kuruville Varughese, Jose Mathew, G. R. Pillai and G. Santhakumari. Effect of irrigation on sweet potato under graded doses of Nitrogen and Potassium (Accepted for publication in *Journal of Root Crops* Vol. 13 (1).

G. R. Pillai, Kuruvilla Varughese, Jose Mathew and G. Santhakumari. Response of Nendran banana to irrigation and mulching. (Communicated for publication in Agri. Res. J. Kerala)

RARS, Kumarakom

B. Balakrishnan and M. C. Nair (1986). സസ്യരോഗ നിയന്ത്രണം. Malayalam—technical bulletin published by KAU.

K. A. Inasi, U. Mohammed Kunju and Alice Antony (1986). Performance of short duration cultivars in Kuttanad. *J. Root Crop* 11 (1 & 2): 75-76.

G. Mathai, P. Santhakumari, L. Remadevi and P. R. Krishnakumari Amma (1986). Influence of weather on sheath blight and sheath rot diseases of rice. *Indian J. Plant Prot.* 14 (1): 7-9.

Sabina George Thekkayam (1987). Rock gardens—Popular article published in Silver Jubilee Souvenir of Kottayam Agri-Hort. Society.

Sabina George Thekkayam (1987). Flower, fruit and vegetable shows of Kerala. Published in Silver Jubilee Souvenir of Kottayam Agri. Hort. Society of Kerala.

K. M. Rajan and S. Alexander (1987). Soil amendment in relation to incidence and intensity of sheath blight of rice. Paper presented in the workshop on Biological Control of Plant Diseases held at Tamil Nadu Agricultural University, Coimbatore and abstract published as a special issue.

K. M. Rajan and M. G. Jayaprakash (1987). Integrated disease management of bacterial wilt of tomato (*Pseudomonas solanacearum*) Paper presented in the Workshop on Biological Control of Plant Diseases held at Tamil Nadu Agricultural University, Coimbatore and abstract published as a special issue.

K. I. Wilson, K. M. Rajan, M. C. Nair and S. Balakrishnan (1987). Ganoderma disease of coconut in Kerala. Paper presented in the Inter National Symposium on Ganoderma Wilt Diseases of Palms and other Perennial Crops held at Thanjavur and abstract published as special issue.

K. M. Rajan (1987). The role of *Ganoderma lucidum* in coconut pathology. Paper presented in the Inter National Symposium on Ganoderma Wilt Diseases of Palms and other Perennial Crops held at Thanjavur and abstract published in special issue.

K. M. Rajan (1987) Rhizome rot of ginger. Epidemiology and control In perspectives of Phytopathology Eds. Agnihotrie *et al.* Oxford. and IBH.

K. G. Padmakumar (1987). Intergrated fish farming system in Kuttanad Paper presented at the Seminar on Environmental Pollution and Protection of Natural Resources at the Mar Thoma College, Thiruvalla 4-5th March 1987.

RRS, Moncompu

- K. P. Kuriakose and C. A. Joseph (1986). Variability and correlation studies in groundnut. *ARJK Dec. 86 Vol. 24*—Part II.
- K. P. Kuriakose and C. A. Joseph (1986.) Path analysis and selection index in groundnut. *ARJK Dec. 86 Vol. 24*—Part II.
- Dr L. Rema Devi, T. Sheela Paul and C. Gokulapalan (1987). Efficiency of different fungicides in the control of sheath blight of rice. *Indian J. Plant Prot.* 15: 69-70,

NARP (SR) Vellayani

- R. B. Asan. Information from Agricultural field experiments on data base for development plans.
Data base of Kerala Economy: pp. 85-86.
- J. Arthur Jacob, Effect of field population of *Hirschmanella oryzae*. National Conference on Plant Parasitic Nematodes held on 7th and 8th December, 1986.
- M. S. Sheela. and K. K. R. Nair (1986). Crop loss estimation in vegetables (Bhindi, Brinjal and bittergourd) due to root-knot nematode. National conference on Plant Parasitic nematodes of India-Problems and progress held on 17th-20th December at IARI, New Delhi.

College of Co-operation & Banking

- Sri A. M. Jose Peoples participation IRDP Kurukshetra, August-September, 1986.
Book Review in State and Society on Administering Development
Smt Molly Joseph (1987). Systems approach to Co-operative Management—*The Tamil Nadu Journal of Co-operation* Vol. 78

B. FACULTY OF VETERINARY AND ANIMAL SCIENCES

- N. M. Reddy and A. Rajan. (1986). Reproductive behaviour and semen characteristic in experimental hypothyroidism in goats (Theriogenology) 25:263
- Madan Singh Karki and A. Rajan (1986). "In vitro cultivation of the cells of carcinoma of the mucosa of the ethmoid". *Kerala J. Vet. Sci.* 17 (1) 67-73
- Madan Singh Karki and A. Rajan (1986). Transplantation studies on the carcinoma of ethmoturbinate mucosa of cattle *Kerala J. Vet. Sci.* 17 (1) 74-84
- A. Rajan, C. B. Manomohan, K. V. Valsala, T. Sreekumaran, C. R. Lalitha, K. M. Ramachandran and N. Divakaran Nair (1986). "Experimental studies on the toxicity of the plant *Mimosa invisa* mart var *inermis* adlb in calves". *Kerala J. Vet. Sci.* 17 (1) 91-98.
- M. Gopalakrishnan Nair, P. M. Jayakumar, T. V. Anilkumar, P. O. George, K. V. Valsala and A. Rajan (1986). "Follicular and parovarian cysts in a lioness (*Panthera leo*)". *Kerala J. Vet. Sci.* 17 (1) 143-145.

- M. Gopalakrishnan Nair, P. M. Jayakumar and K. V. Valsala (1986). Marek's disease in Japanese quail (*Coturnix coturnix Japonica*). *Kerala J. Vet. Sci.* 17 (1) 146-148.
- M. Gopalakrishnan Nair, P. M. Jayakumar, K. V. Valsala, K. V. Maryamma and A. Rajan (1986). Salmonellosis in Turkey's. *Indian J. Poult. Sci.* 21 (3) 238-239.
- K. V. Valsala, H. J. Hansen and B. Jarplid (1986). Distribution and ultrastructure of the Mast cell in Ducks. *Avian Diseases* 30 (4) 653-657
- Mamman J Abraham, K. V. Valsala and A. Rajan, (1987) Prevalence of hypothyroidism in cattle. *Kerala J. Vet. Sci.* 17 (2) 47-51
- T. V. Anilkumar and A. Rajan (1986). Immunomodulatory effect of Levamisole in goats. *Kerala J. Vet. Sci.* 17 (2) 71-72.
- T. V. Anilkumar and A. Rajan (1986). Immunopathological response of kids affected with Pneumonia *Kerala J. Vet. Sci.* 17 (2) 78-89.
- A. V. Purushothaman and A. Rajan (1986). Incidence and Pathology of hepatic trematodiasis in cattle and buffaloes. *Kerala J. Vet. Sci.* 17 (2) 25-30.
- J. A. Mamman, K. V. Valsala, and A. Rajan. (1986). Clinical features of experimental hypothyroidism in calves. *Kerala J. Vet. Sci.* 17 (2) 52-70.
- S. Sulochana, and D. Sudharma. (1986) Use of whole blood dried on filter paper strips in the assay of New castle disease virus antibodies. *Kerala J. Vet. Sci.* 17: 85-90.
- S. Sulochana. (1986) Isolation of Newcastle disease virus from an Indian House Swift (*Micropus affinis affinis*). *Kerala J. Vet. Sci.* 17: 134-136.
- K. T. Punnoose and P. R. Massillamony. (1986). Classification of R Plasmids of *Escherichia coli* of poultry based on Fertility (f) test. *Indian J. Comp. Microbiol. Immunol. Infect. Dis.*, 7: 117-120.
- M. R. Murugan and S. Sulochana. (1986). Comparative study on the pathogenicity and immunogenicity of Newcastle disease virus strain-M. and K. *Kerala J. Vet. Sci.*, 17 (2): 36-46.
- M. R. Murugan and S. Sulochana (1986). Buffalo Seminal Antibodies: Its detection and Titration by Gelatin Agglutination and Tube slide Agglutination Tests. *Indian Journal of Anim. Reproduction* 7(2):9-13.
- C. S. James, C. R. Ananthasubramonian and T. V. Viswanathan (1986). Effect of supplementation of tallow on digestibility of nutrients in rations containing agricultural byproducts. *Kerala J. Vet. Sci.* 17 (2) 96-104.
- K. T. Sampath and E. Sivaraman. (1986). Effect of feeding rations with different levels of rumen degradable protein on growth and digestibility of nutrients in crossbred calves. *Kerala J. Vet. Sci.* 17 (2)

- E. Sivaraman and A. D. Mercy. (1986). Effect of varying levels of protein and energy on growth and carcass characteristics of pigs. *Kerala J. Vet. Sci.* 17 (1)
- Amritha Viswanath, Maggie Menachery and A. D. Mercy. (1986) Trace elements in Poultry feeds Manganese *Kerala J. Vet. Sci.* 17 (1). 1-6.
- K. T. Sampath and E. Sivaraman. (1986). *In sit* dry matter disappearance and protein degradability of yellow maize, wheat, bran and guinea grass in the rumen of cattle. *Indian J. Animal Sci.* 56: 12.
- K. T. Sampath, and E. Sivaraman. (1986). Effect of feeding rations with different levels of rumen degradable protein on pH, NH₃ N and TVFA concentrations in the rumen of cattle. *Assoc. J. Dairy Science*
- A. M. Jalaluddin, C. K. Sobti, B. Prasa; S. K. Nag Pal and P. G. Gupta (1986). Histopathological changes following bilateral Urethral ligation and total nephrectomy in calves. *Indian Vet Journal*, 63 (5) 362-64.
- A. M. Jalaluddin, B. Prasa; V. K. Sobti, and Ramakumar, (1986). Some cardiovascular changes following experimental urinary dystorlexis in calves. *Indian Journal of experimental Biology*, 24 326-327
- P. O. George, Jacob V. Cheeran, Muraleedharan Nayar, K. M. Ravindran Nair, T. Sarada Amma and K. Rajankutty. "Amputation of tail in a lion under xylazine anaesthesia". *Kerala Journal of Vet. Sci.* 17 (1), 152-53.
- M. Gopalakrishnan Nair, P. M. Jayakumar, T. V. Anilkumar, P. O. George, K. V. Valśala and A. Rajan. (1986). Follicular and Parovarian cysts in a lioness (*Panthera leo*). *Kerala Journal of Vet. Science* 17 (1) 143-45.
- V. K. Sobti and A. K. Jalaluddin (1986). Changes in electro cardiogram and cardiac vectres following experimental bilateral urethral legation in calves. *Ind. Journal of Animal Sciences* 56 (5) 517-520.
- P. O. George, Jacob V. Cheeran, A. M. Jalaluddin, K. Rajankutty and C. Abraham Varkey (1986). Treatment of wounds on the forelimb of a lion under general anaesthesia. *Indian Vety. Journal* (11) 952-953.
- P. G. George, C. Abraham Varkey (1986). Role of tracheoctomy in the treatment of uterine eversion in bovine. *Indian Journal of Veterinary Surgery* 7 (1) 56-58.
- V. K. Sobti, A. M. Jalaluddin, G. A. Chandrasaki (1986). Effect of total nephrectomy on the electro vectro cardiogram in calves. *Indian Journal of Animal Sciences*, 56 (9): 907-915.
- V. K. Sobti, A. M. Jalaluddin, P. Ramkumar and R. N. Kohli (1986). Electrocardiographic changes following experimental rupture of urinary bladder in calves. *Indian Journal of Veterinary Surgery* 7 (9) 36-40.

- G. Mukundan and S. Balakrishnan (1986). Integration of small ruminant and tree cropping in South India. Paper presented in the seminar on 'Impact of Agriculture on environment in Kerala' held on 20th and 21st December, 1986 at College of Veterinary and Animal Sciences, Mannuthy.
- P. Nandakumar, and C. A. Rajagopala Raja. Dynamics of serum immunoglobulin levels in kids from birth to eight weeks of age. *Kerala Journal Veterinary Science* 17 (2) 113-117.
- C. A. Rajagopala Raja, K. V. Reghunandan, P. Nandakumar, and B. Nandakumar Inheritance of immunoglobulin level in Sannel-Malabari goats. *Kerala J. Vet. Sci.* 17 (2) 111-112.
- Sosamma Iype, C. R. Girija and G. Mukundan. First lactation milk yield and length in Jersey crossbreds. *Kerala J. Vet. Sci.* 17 (2) 128-131.
- M. Stephen, G. Mukundan and Sosamma Iype. Age at first calving in Brown Swiss x Local crosses in Kerala. *Kerala J. Vet. Sci.* 16 (1).
- E. Nanu, M. Soman and P. Prabhakaran Carcass characteristics of male goats and predictability of carcass weight. *Indian Journal of Animal Science* 57 (2), 150-152.
- P. Kuttinarayanan and M. Soman Effect of chlorine water spraying for reducing bacterial load on carcass. *Kerala J. Vet. Sci.* 16 (2) 126-129.
- Dr K. Venugopal (1986). Prevalence of Leptospiral antibodies in aborting and repeat breeding cattle. Cheiron.
- Dr K. Venugopal. Incidence of leptospiral antibodies in referred human samples. *Indian J. Medical Research.*
- M. R. Saseendranath Incidence of canine dirofilariasis in Trichur, Kerala *Indian J. Vet. Med.*

FACULTY OF FISHERIES

- V. Malika and P. U. Surendran "Proper Balanced terrary Designs with unequal replications"—*Journal of Indian Society of Agricultural Statistics* (in Press)
- Mathew T. M. Sebastian, Sankaran, and S. Krishnan "A Time Series Approach in to the Analysis of the Marine Products Export Figures of India and an attempt at Prediction". *Indian Journal of Marketing* (in press)
- M. V. Mohan and T. M. Rankoran "Statistical Interpretation of the hatching percentage of carp eggs" *Current Science* (in press)
- M. V. Mohan and T. M. Sankaran "Two new indices for studying the stomache contents of fishes"—*Aquaculture* (in press)
- K. K. Varma, and N. N. Raman "Short term variation in surface energy exchange at fixed location in southern Bay of Bengal during

different phases of MONEX-79. *Proc. Sym Short-term variability of Physical oceanographic features of Indian Waters. Cochin Feb. 1987* pp 11-14

- K. K. Varma, N. N. Raman "Turbulent fluxes in the central east Arabian Sea during HONEX' Accepted by *Proc. Indian Acad. Sci (Earth & Planet Sci)*
- N. N. Raman, and K. K. Varma "Study of sea surface energy exchange at polygon positions during MONEX-79 (Under preparation).
- P. M. Mathew (1986) Selective culture of prawn in pokkali fields Paper presented in the seminar on "Brackishwater prawn Farming" organised by Marine Products Development Authority, Cochin and Indian Bank, at Cannanore on 23rd October, 1986.
- P. M. Mathew, (1986). Impact of agriculture on aquatic biosystem. Paper presented in the seminar on "Agriculture and Environment" Kerala Agricultural University & State Committee on Science, Technology & Environment, December 20 & 21, 1986.

Fisheries Research Station—Puduveypu

- K. S. Purushan (1986) Recent advance in paddy cum fish culture and its scope in Kerala. *Sea food Export Journal* 1986 18 (5)
- K. S. Purushan (1986) Economics of traditional prawn farming in Kerala. *Paper presented at the Seminar on Brackishwater Prawn Culture at Cannanore* under the auspices of MPDDA, Cochin.

2. POPULAR ARTICLES

A. FACULTY OF AGRICULTURE

RARS, Pilicode

- M. Govindan (1986). മികച്ച വിളവിനും ഓണ്ടൽ മുരിങ്ങ Mathrubhumi, 26-5-1986, Deshabhimani, 2-6-1986.
- M. Govindan (1986). അസോള. Deshabhimani, 18-9-1986.
- M. Govindan (1987). തെങ്ങിന്റെ ശത്രുനിര നീളുന്നു. Mathrubhumi, 5-1-1987.
- C. Latha Bastine (1986) കേരകൃഷിയുടെ പ്രശ്നങ്ങൾ ഒരു വിചിന്തനം. Indian Naliker Journal, June 1986
- K. P. Mammooty, A. Rajagopalan (1986) മഹാളിക്കെതിരെ മരുന്നുതളി. Deshabhimani 14-7-1986
- R. R. Nair (1986) തെങ്ങുകൃഷിയ്ക്ക് ഒരു കലണ്ടർ. Malayala Manorama, 13-6-1986, Janayugam, 16-6-1986, Deshabhimani, 23-6-1986.
- R. R. Nair (1986). പി. എച്ച്. സി. 1. പുതിയ തെങ്ങിനം. Mathrubhumi, 15-12-1986.
- N. N. Ramankutty (1986). ഒന്നാംവിളയ്ക്ക് നൂരിയിട്ടുമ്പോൾ ശ്രദ്ധിക്കുക. Mathrubhumi. 21-4-1986.

N. N. Ramankutty and C. Latha Bastine (1986). കുട്ടുകുണ്ടകൻ സമ്പ്രദായം ശ്രദ്ധിക്കുക. Deshabhimani, 16-6-1986.

N. N. Ramankutty and N. K. Vijayakumar (1986). ഒന്നാം വിളയ്ക്ക് അടി വളവും നിലമൊരുക്കലും. Deshabhimani, 17-4-1986.

N. N. Ramankutty (1987). എളുപ്പ് നനച്ചാൽ ഇരട്ടി വിളവ്. Mathrubhumi, 19-1-1987.

P. K. Sathiarajan, and M. Govindan. (1986). ഇലതണ്ടു ചീയൽ വാഴക്കുഷി യ്ക്ക് ഒരു മാതൃക ശത്രു Deshabhimani, 7-4-1986.

P. K. Sathiarajan and M. Govindan (1986). ഇലകരിച്ചിൽ—ഇഞ്ചിയ്ക്ക് പുതിയ ഭീഷണി. Deshabhimani 17-3-1986, Mathrubhumi, 24-3-86.

P. K. Sathiarajan and M. Govindan (1986). കായ് അഴുകൽ—നേന്ത്രവാഴ യ്ക്ക് പുതിയ ഭീഷണി Mathrubhumi, 15-12-1985

P. K. Sathiarajan and M. Govindan (1986). നേന്ത്രൻ വാഴയ്ക്ക് പൊട്ടൻ രോഗം. Deshabhimani, 6-6-1986.

Thomas Varghese (1986) സസ്യങ്ങളിൽ നിന്ന് പെട്രോൾ. Mathrubhumi' 14-9-1986

Thomas Varghese (1986). മലിനമാകുന്ന മണ്ണ്, മരിക്കുന്ന പ്രകൃതി. Eenadu, 15-10-1986.

Pepper Research Station, Panniyur

P. K. Unnikrishnan Nair, and V. Sukumara Pillai, കുരുമുളക് പെടിച്ചട്ടികളിലും. Mathrubhumi, 9-6-1986.

P. K. Unnikrishnan Nair, and V. Sukumara Pillai, Pepper in pots. The Hindu, 1-10-1986—Science and Technology pages.

V. Sukumara Pillai, S. Sasikumar and K. K. Ebrahim കുരുമുളക് കൃഷി കേരളത്തിൽ—ഒരു വിമർശനാത്മക പഠനം. കേരള കർഷകൻ, കുരുമുളക് സ്പെഷ്യൽ, 1987 ഫെബ്രുവരി 16.

P. K. Unnikrishnan Nair. കുരുമുളകിന്റെ പൊള്ളു രോഗനിയന്ത്രണം.

P. K. Unnikrishnan Nair. കുരുമുളക് ഉത്പാദനവും വിപണനവും.

P. K. Unnikrishnan Nair. കുരുമുളക് നേഴ്സറിയിൽ രോഗബാധ ഒഴിവാക്കുക. കേരള കർഷകൻ, കുരുമുളക് സ്പെഷ്യൽ 1987, ഫെബ്രുവരി 16.

RARS, Ambalavayal

Smt Susamma P. George, (1986) ജാതികൃഷി ആദായകരം, കല്പയേനു 14 (2): 8

K. Kannan (1986). നമ്മുടെ മണ്ണിനും ചേരും ഈ സർവസുഗന്ധി. Mathrubhumi Daily, September 29.

RARS, Pattambi

B. Mohan Kumar & K. Karunakaran 1986. A traditional system of rice culture receiving renewed interest in Kerala. Farmer and Parliament Nove. 17, 18 & 28.

Live Stock Research Station, Thiruvazhamkunnu

N. K. Sasidharan (1986). Indiyude Eanthappazham. Karshikarangam, Malayala Manorama daily

ARS, Chalakudy

Kuruvilla Varghese & Jose Mathew. Irrigation practices of Pineapple. Malayalam daily—Deepika, Mathrubhumi.

Kuruvilla Varghese & Jose Mathew. Suitable cropping sequence. Malayalam daily—Malayala Manorama. Kerala Times.

Jose Mathew. Irrigate coconut for better yield—Kalpadhenu Vol. 14 (1) Aug. 86.

Kuruvilla Varghese and Jose Mathew: Irrigate Pineapple for better yield. Kalpadhenu Vol. 14 (1) Aug. 86.

RRS, Moncompu

എൽ. രമാദേവി 1987. കൂട്ടനാട്ടിൽ നെല്ലിന്റെ കുലവാട്ടത്തിന് സാദ്ധ്യത കൃത്യതൽ കേരള ടൈംസ്—മാർച്ച്—24.

2. FACULTY OF FISHERIES

T. M. Sankaran. 'Mathematical Magic' (in Malayalam) 'Eureka'—March 87.

K.K. Varma. "Upwelling—An oceanic phenomenon" *Science Reporter* October 1986. pp 640-643.

K. S. Purushan 1986 "Chemmeen Kooduthal Chemmeen" (Enhanced prawn production) Kalpadenu Book 13, No. 4, March, April, May, 1986.

K. S. Purushan 1986 "Chemmeen Valarthal" (Prawn farming booklet issued by MATSYAFED, Kuravankonam, Trivandrum.

K. S. Purushan 1986 "Nellinodoppam Matsyam Valarthal—Keralathile Sadhyathakal" (Rice cum fish culture—potentials in Kerala) *Kerala Karshakan*, Book 31 No. 1, October, 1986.

K. S. Purushan 1986 "Namukku Yojicha Matsyakrishi" (Aquaculture suitable to our conditions) *Booklet published by Kerala Agricultural University*. Ed. by R. T. Ravivarma.

K. S. Purushan 1987 "Nellinodoppam Matsyam Valarthalum" (Rice and fish grown together) *Mathrubhumi daily* 5th January, 1987.

K. S. Purushan 1987 "Chemmeen Krishij Cheyyumpol" (When prawn culture is done?) *Malayala Manorama daily* 14th February, 1987.

K. S. Purushan 1987 "Chemmeen Krishikku Chila Prayogika Nirdde-sangal" (Practical suggestions for prawn culture) *Kerala Karshakan* Book 31, No. 9, February, 1987.

Appendix VI

PROJECT CO-ORDINATION GROUPS

AGRICULTURE

Rice

Project Co-ordinator : Prof T. F. Kuriakose

Members : Prof P. N. Pisharody, Dr C. A. Joseph,
Mr N. Rajappan Nair, Dr K. Karunakaran,
Dr N. Vijayakumar, Mr P. J. Tomy, Mr P. K. G. Menon,
Mr N. N. Ramankutty, Dr C. C. Abraham,
Dr M. C. Nair.

Coconut, Arecanut and Oil palm

Project Co-ordinator : Prof K. Kannan

Members: Dr P. K. Sathyarajan, Dr C. Sreedharan, Dr A. I. Jose,
Dr K. M. Rajan, Dr M. J. Thomas, Officer in charge,
CRS Balaramapuram.

Spices

Project Co-ordinator : Dr Abi Cheeran

Members : Officer i/c. RARS, Ambalavayal, Officer i/c.
PRS, Panniyoor, Officer i/c. CRS Pampadumpara,
Mr V. Sukumara Pillai, Dr T. S. Venkitesan, Mr D. Joseph,
Dr A. Visalakshy, Dr M. Aravindakshan.

Cocoa and Other Beverage crops

Project Co-ordinator : Dr R. Vikraman Nair

Members : Dr K. Kumaran, Mr D. Joseph, Dr J. Ravi, Professor & Head,
Department of Plantation Crops.

Cashew

Project Co-ordinator : Prof K. K. Vidyadharan

Members : Officer in charge CRS, Madakkathara,
Mr P. G. Veeraraghavan, Dr Abi Cheeran,
Dr M. Aravindakshan, Officer in charge
CRS, Anakkayam, Dr Seetha Rama Rao

Fruit Crops and Floriculture

Project Co-ordinator : Prof S. Balakrishnan

Members : Mr P. C. Jose, Professor of Horticulture. (College of Agriculture, Vellayani), Officer i/c. BRS, Kannara, Officer i/c. RARS, Ambalavayal, Professor of Pomology, College of Horticulture, Dr A. Visalakshy and V. S. Devadas, P. K. Vaisalakumari, Dr G. Gopikumar.

Vegetables and Tuber Crops

Project Co-ordinator : Dr K. V. Peter

Members : Professor of Horticulture, College of Agriculture, Vellayani, Dr N. Mohanakumaran, Scientist i/c. AICVIP, College of Horticulture, Dr John Kurian, P. K. Asokan, Dr K. Sasidharan Pillai, C. R. Manikantan Nair, Prof V. Sukumaravarma, Dr T. R. Gopalakrishnan.

Pulses and Oil Seeds

Project Co-ordinator : Dr V. Gopinathan Nair

Members : Dr N. Krishnan Nair, Smt S Santhakumari, Assistant Professor, AICRP on Pulses Research, RARS Pattambi, Mr M. R. C. Pillai, Dr V. K. Sasidhar, Dr K. Sivan Pillai, Mr K. I. James, Mr K. P. Vasudevan Nair, Dr K. Pushkaran, Dr S. K. Nair, Dr S. Balakrishnan, Dr C. C. Abraham.

Essential Oils and Medicinal Plants

Project Co-ordinator : Mr E. V. G. Nair

Members : Dr M. K. Rajagopalan, Officer i/c. Odakkali, Dr G. Sreekantan Nair, Dr V. G. Nair, Smt K. Saradamma, Dr N. P. Chinnamma.

Post Harvest Technology and Nutrition

Project Co-ordinator : Dr G. Sreekantan Nair

Members : Mr Jacob John, Mr V. P. Sukumara Dev, Dr L. Prema, Associate Professor, AICRP on Agri. By-products, College of Veterinary and Animal Sciences, Mannuthy. Dr P. V. Nair, Professor of Horticulture, Processing Technology, Mr A. Augustin, T. Nalinakumari.

Sugarcane and Miscellaneous Crops

Project Co-ordinator : Dr K. M. N. Namboodiri

Members : Dr R. Vikraman Nair, Mr S. Sukumaran Nair, K. Chandrasekharan Nair, Dr M. C. Nair, Dr N. N. Potti, Mr D. Joseph

Fodder Crops

Project Co-ordinator : Mr G. Raghavan Pillai

Members: Mr K. P. Madhavan Nair, Dr. R. Gopimany,
Dr K. I. Wilson, Officer i/c Fodder Research Scheme, Mannuthy,
Dr C. Sreedharan

Plant Protection

Project Co-ordinator: Dr M. C. Nair

Members: Mr K. P. Vasudevan Nair, Dr C. C. Abraham,
Dr T. S. Venkitesan, Dr Abi cheeran
Dr K. M. Rajan, Mr K. K. Ravindran Nair,
Dr James Mathew, Dr C. T. Abraham,
M. Govindan, Dr A. Visalakshi, Dr P. Karunakaran,
Dr N. Mohandas.

Soils & Agronomy

Project Co-ordinator: Dr. P. Padmaja

Members: Dr C. Sreedharan, Dr R. Vikraman Nair,
Mr P. J. Tomy, Dr R. S. Aiyer, Dr K. P. Rajaram,
Dr A. I. Jose, Mr P. K. Gangadhara Menon,
Mr N. N. Ramankutty, Dr P. Balakrishna Pillai,
Dr Thomas Varghese, Dr. J. Thomas.

Farm Economics, Extension & Statistics

Project Co-ordinator: Dr G. T. Nair

Members: Dr O. M. Thampi, Prof. of Agrl. Extension,
College of Agriculture, Vellayani,
Mr E. R. Narayanan Nayar, Dr K. Mukundan,
Dr T. Prabhakaran, Dr C. A. Jose,
Dr N. Rajan Nair, Mr M. Mohandas, Mr Abdu Razak,
M. FMH Khaleef, Dr V. Radhakrishnan, Dr K. C. George,
Prof P. V. Prabhakaran

Cropping Pattern & Farming System

Project Co-ordinator: Dr V. K. Sasidhar

Members: Prof P. N. Pisharody, Dr K. P. Rajaram,
Dr N. Mohanakumaran, Dr V. G. Nair,
Mr K. P. Madhavan Nair, Mr. K. C. Iype
Dr C. R. Ananthasubramaniam, Mr E. R. Narayanan Nair
Dr K. Wilson, Dr N. Mohandas

Agro Meteorology

Project Co-ordinator: Dr P. Balakrishna Pillai

Members: Dr P. C. Jose, Dr G. S. L. H. V. Prasad Rao,
Mr.K. V., Mammen, Mr Abdu Razak, Dr G. R. Pillai

VETERINARY & ANIMAL SCIENCES

Project Co-ordination Group

1 Cattle & Buffaloes

Project Co-ordinator: Dr C. R. Ananthasubramaniam,
Professor, Project Co-ordinator (C & B)

Members: Dr T. G. Rajagopalan, Professor & Head, Animal Management; Dr E. Sivaraman, Professor & Head, Nutrition; Dr C. P. Neelakantan, Professor & Head, Animal Reproduction; Dr K. Pavithran, Professor & Head, Dairy Science; Dr P. A. Ommar, Professor & Head Anatomy; Dr G. Mukundan, Professor & Head, Ani. Breeding & Genetics; Dr T. Prabhakaran, Professor, Animal Production Economics; Dr Abraham C. Varkey, Associate Professor, Surgery; Dr P. P. Balakrishnan, Associate Professor, L. R.S. Thiruvazhamkunnu; Dr V. Jayaprakasan, Assistant Professor, Microbiology.

2. Goat & Rabbit

Project Co-ordinator: Dr G. Mukundan, Professor & Head, Animal Breeding & Genetics

Members: Dr K. M. Ramachandran, Professor, Pathology
Dr E. Mathai, Special Officer (Acad. Programme);
Dr V. Sathianesan, Professor, Parasitology;
Dr N. Kunjukutty, Professor, Nutrition;
Dr N. M. Aleyas, Professor, Clinical Medicine;
Dr C. S. James, Associate Professor, Nutrition;
Dr P. C. James, Associate Professor, Microbiology;
Dr A. D. Joy, Assistant Professor, Small Animals
Dr N. Gopakumar, Assistant Professor, Pharmacology.

3. Poultry

Project Co-ordinator: Dr A. Ramakrishnan, Sr Scientist & Head, Poultry Science.

Members: Dr A. Rajan, Professor & Head, Pathology,
Dr A. K. Kochu Govindan Unny, Professor, Poultry Science
Dr R. Sabarinathan Nair, Professor, Poultry Science,
Dr Maggie Menachery, Professor, Nutrition,
Dr M. G. Ramakrishnan Pillai, Professor, Physiology
Dr C. George Varghese, Professor, Parasitology,
Dr Sosamma Iype, Associate Professor, Breeding & Genetics,
Dr A. M. Jalaludin, Associate Professor, Breeding & Genetics,
Dr K. P. Surendranathan, Associate Professor, Physiology,
Sri K. L. Sunny, Asst Professor, Statistics.

4 Swine, Elephant & Other Species

Project Co-ordinator: Dr G. Nirmalan Professor & Head, Physiology.

Members: Dr. C. R. Ananthasubramaniam, Professor, Project Co-ordinator (C & B) Dr K. Chandrasekharan, Professor, Parasitology, Dr Jacob V. Cheeran, Sr. Scientist, Pharmacology; Dr C. K. Thomas, Professor (Farms), Dr. Kurien Thomas, Professor, (Pig Breeding Farm), Animal Management, Dr P. Ramachandran. Professor, AICRP on Ag. By Products, Dr K. N. Muraleedharan Nair, Assoc. Professor, Surgery, Dr. K. Baby, Assoc. Professor, Preventive Medicine, Dr C.A. Rajagopala Raja, Assoc. Professor, Breeding & Genetics, Dr C. Pythal, Asst. Professor, Animal Management.

5 Animal Reproduction

Project Co-ordinator: Dr C. P. Neelakantan, Professor & Head, Animal Reproduction.

Members: Dr G. Nirmalan, Professor & Head, Physiology; Dr. M. K. Rajagopalan, Professor & Head, Pharmacology, Dr. K. Prabhakaran Nair, Professor, Animal Reproduction; Dr K. Ramadas, Professor, Veterinary Hospital; Dr M. Sthanumalayan Nair, Professor, Animal Reproduction; Dr P. A. Devassia, Special Officer (Farm) Reproduction) Dr K. T. Punnoose, Assoc. Professor, Microbiology. Dr K. P. Sadanandan, Assoc. Professor, Physiology. Dr T. Sreekumaran, Assoc. Professor, Pathology. Dr. T. Saradamma, Assistant Professor, Surgery

6 Animal Diseases

Project Co-ordinator: Dr A. Rajan, Professor & Head, Pathology.

Members: Dr P. O. George, Professor & Head, Surgery, Dr E. P. Paily, Professor & Head, Preventive Medicine. Dr K. M. Alikutty, Professor & Head, Clinical Medicine. Dr K. Rajamohan, Professor & Head, Parasitology, Dr S. Sulochana, Professor & Head, Microbiology, Dr M. Soman, Professor, Vet. Public Health, Dr V. Sudarsanan, Professor, Animal Reproduction, Dr P. Marykutty, Associate Professor Pharmacology. Dr C. T. Thomas, Professor, Nutrition, Dr M. Mukundan Assistant Professor, Cattle Breeding Farm, Thumburmuzhi.

7 Animal Products Technology

Project Co-ordinator: Dr R. Padmanabha Iyer, Professor & Head, Vety. Public Health.

Members: Dr K. I. Maryamma, Professor, Pathology, Dr Zacharias Cherian, Professor, Pharmacology, Dr M. V. Sukumaran, Professor, Dairy Science, Dr P. Prabhakaran, Professor, Vety. Public Health. Dr C. K. Venugopalan, Professor, Poultry Science, Dr E. Madhavan Professor, Animal Reproduction, Dr S. Ravindran Nair, Associate Professor, Surgery, Dr K. Madhavan Pillai, Associate Professor, Parasitology, Dr M. T. Jose, Asst. Professor, Vety. Public Health Dr Francis Xavier, Asst Professor, Animal Management.

8 Economics, Statistics & Extension

Project Co-ordinator: Dr T. Prabhakaran, Professor, Animal Reproduction Economics.

Members. Dr K. C. George, Professor & Head, Statistics, Dr P. S. Pushkaran, Professor & Head, Extension Dr A. Ramakrishnan Professor & Head, Poultry Science.

Dr R. Padmanabha Iyer, Professor & Head, Vety. Public Health.

Dr P. T. Georgekutty, Professor, Prev. Medicine,

Dr G. Venugopal, Professor, Physiology,

Dr Lucy Paily, Professor, Anatomy,

Dr K. V. Valsala, Assoc. Professor, Pathology'

Dr V. Raju, Superintendent, Extension,

Sri N. Ravindranathan, Asst. Professor, Statistics.

Appendix VII

LIST OF PROJECTS FINANCED BY OUTSIDE AGENCIES DURING VII FIVE YEAR PLAN

A. RESEARCH PROJECTS

i) All India Co-ordinated Projects

Project Details	Project Centre
<i>a) Faculty of Agriculture</i>	
1 AICRP on Agroforestry	Livestock Research Station, Thiruvazhamkunnu
2 AICRP on Nematode Pests of crops	College of Agriculture, Vellayani
3 AICRP on Agricultural Drainage	Karumady
4 AICRP on Cashew	Madakkathara
5 AICRP on Spices	
i) Research on Spices	Pepper Research Station, Panniyur
ii) Research on Cardamom	Cardamom Research Station, Pampadumpara
iii) Research on Ginger	College of Horticulture, Vellanikkara
6 AICRP on Floriculture	-do-
7 AICRP on BCCP	-do-
8 AICRP on Tropical Fruits (Banana)	Banana Research Station, Kannara
9 AICRIP Main Centre	Regional Agri. Research Station, Pattambi
AICRIP Sub-Centre	Agricultural Research Station, Mannuthy
AICRIP Centre	Rice Research Station, Moncompu
10 AICARP—Cropping Systems & One ECF unit	Cropping Systems Research Centre, Karamana and Quilon
11 AICRP on Sugarcane	Sugarcane Research Station, Tiruvalla

12	AICRP on Pulses	Regional Agricultural Research Station, Pattambi
13	AICRP on Vegetables	College of Horticulture, Vellanikkara
14	AICRP on Forage crops	College of Agriculture, Vellayani
15	AICRP on Water management	Agronomic Research Station, Chalakudy
16	AICRP on Weed Control in Plantation Crops (PL 480)	College of Horticulture, Vellanikkara
17	Operational Research Project on Integrated Control of Rice Pests, Kuttanad	Rice Research Station, Moncompu
18	ORP on Watershed basis	Ozhalappathy, Palghat
19	NSP—Breeder Seed Production Unit	Regional Agricultural Research Station, Pattambi
20	PL 480 scheme—Fate and Efficiency of Urea based fertiliser	Cropping Systems Research Centre, Karamana
21	AICRP on Pesticide Residue	College of Agriculture, Vellayani
22	Promotion of Agri. Electronics—Pilot Centre (Financed by Dept. of Electronics, Government of India through ICAR)	Vellanikkara

b) Faculty of Veterinary & Animal Sciences

1	AICRP on Goat	Mannuthy
2	AICRP on Poultry	-do-
3	AICRP on Agricultural Byproducts	-do-

c) Faculty of Agricultural Engineering & Technology

1	AICRP on Farm Implements and Machinery	Kelappaji College of Agricultural Engineering & Technology, Tavanur
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ii) AP Cess fund projects

	Title of scheme	Location
a)	<i>Agriculture</i>	
1	Studies on the strains of Rhizobia of Pulses, the effect on them and standardisation of a mass culturing technique	College of Agriculture, Vellayani
2	Cyst nematode <i>Heterodera oryzicola</i> infesting rice in Kerala	-do-
3	Tapioca consumption and goitre incidence in Kerala	-do-

4	Research on <i>Cymbopogon flexuosus</i> and other cybopogon spp.	Aromatic & Medicinal Plants Research Station, Odakkali
5	Survey, appraisal and control of major diseases of sugarcane	Sugarcane Research Station, Tiruvalla
6	Marketing of coconut and cocoa in Kerala	College of Horticulture, Vellanikkara
7	Breeding for resistance to bacterial wilt in chilli and brinjal	-do-
8	Development of improved varieties of sesamum and ground nut suited to the rice fallows in the Onattukara region, Kerala	Rice Research Station, Kayamkulam
b) Veterinary & Animal Sciences		
1	Karyological studies of cattle of Kerala with special reference to infertility and sterility	College of Veterinary and Animal Sciences, Mannuthy
2	Mycotoxicosis in domestic animals and poultry	-do-
3	Studies on blood groups and biochemical polymorphism in cattle	-do-
4	Efficiency of White Pekin ducks, Desi ducks and their crosses for meat production	-do-
5	Progeny testing of crossbred bulls in rural areas	-do-
c) Agricultural Engineering & Technology		
1	Design and development of wind turbines and its feasibility studies in Kerala	Kelappaji College of Agricultural Engineering & Technology, Tavanur

iii) Schemes sanctioned by other External Agencies

Project title	Project centre
a) Department of Science & Technology, GOI	
1 Mushroom flora of Kerala	College of Agriculture, Vellayani
2 Mycorrhizal association and forest ecosystem of Kerala	-do-

3	Incidence and nature of Hypo-thyroidism in domestic animals	College of Veterinary & Animal Sciences, Mannuthy
4	Micro-organisms associated with eggs and larvae of <i>Macro-brachium rosenbergii</i> in hatchery	College of Fisheries, Ernakulam
b)	<i>State Department of Science & Technology, GOK, Trivandrum</i>	
1	Hazards of food adulteration in Trivandrum district	College Agriculture, Vellayani
2	Trials on large scale cultivation of edible species of mushroom <i>Pleurotus</i>	-do-
3	Investigations on the diseases of bamboo and reeds in Kerala	Regional Agricultural Research Station, Kumarakom
4	Investigations into the role of free flying birds in transmission of parasitic nematodes	College of Veterinary and Animal Sciences, Mannuthy
c)	<i>SIDA</i>	
	SIDA assisted project on ground water studies	College of Horticulture, Vellanikkara
d)	<i>ICSSR Project</i>	
	"Spatial Micro-level planning for integrated rural development"	College of Co-operation and Banking, Mannuthy
e)	<i>Hindustan Cocoa Products</i>	
	Cadbury's Cocoa Research Project	College of Horticulture, Vellanikkara

B. EXTENSION PROJECTS

Project Details	Project Centre
i) All India Co-ordinated Projects	(ICAR Financed)
1 All India Co-ordinated Project for the rapid improvement of Agrl. Technology directed at the Socio economic upliftment of SC & OBC.	Scheduled Caste Area Research Centre, Nilambur, Malappuram Dt.
2 All India Co-ordinated Project for strengthening Agricultural and Research programmes for the Socio-economic uplift of Tribals	Tribal area Research Centre, Amboori, Trivandrum Dt.
3 All India Co-ordinated Project on National Demonstration on Major Food crops	Sadanandapuram, Quilon Dt.



- Other ICAR financed Projects
 ICAR Gold Jubilee Celebration
 Lab-to-Land Programme
 Krishi Vigyan Kendras
- 3 All India Adhoc Research Project for studying the impact of modernization in Agriculture on women with sp. reference to rice farming systems in the country
- Directorate of Extension, KAU, Maunuthy
- a) Regional Agri. Research Station, Pattambi, Palghat
 b) Regional Agri. Research Station, Ambalavayal, Wynad Dt.
- Directorate of Extension, KAU, Mannuthy
- iii) Govt of India assisted Projects/State Govt. assisted Projects
- a) *Govt. of India assisted Projects*
- 1 Ministry of Home Affairs
 Integrated development of Kanikkar tribals dispersed in hamlets situated in the slopes of Agasthyamudi Peak.
- College of Agriculture, Vellayani, Trivandrum Dt.
- 2 Ministry of Welfare
 Follow up studies of certain innovative development Programmes among a few selected tribal communities in the western ghat area with special reference to ecology and forestry development for Tribal development
- College of Agriculture, Vellayani, Trivandrum Dt.
- 2 Department of Environment, Socio-cultural Exploratory Pilot survey on customs/traditions with positive as well as negative influence on sustainable use of natural/living resources of Eco-system in Kerala.
- Directorate of Extension, Kerala Agricultural University, Mannuthy, Trichur.
- b) *State Government Assisted Projects*
- Department of Planning & Economic affairs.
- 1 Simple methods of water harvesting for drinking and irrigation purposes along the western ghats.
- College of Agri. Vellayani, Trivandrum

- 2 Establishment of Agro-met observatory at Amboori in Trivandrum
- .iv) **Govt. of India and State Govt. Assisted Project**
National Agrl. Extension Project (NARP)
 - a. Central Training Institute Mannuty Dt., Trichur
 - b. Training Service Scheme College of Agriculture, Vellayani Trivandrum Dt.
- v) **Other Externally Aided Projects**
 - 1. UNICEF
Training Cell College of Rural Home Science, Vellayani, Trivandrum Dt.
 - 2 Council for Advancement of Peoples Action and Rural Technology. (CAPART)
 - i) Design, Development and Evaluation of Sand dredging equipment College of Horticulture, Vellanikkaia, Trichur Dt.

Appendix VIII

STATUTE AND AMENDMENTS ISSUED DURING 1986-87

- 1 SRO No.826/86 dated 19-4-86, First Statutes prescribing the method of appointment, qualifications, salary and allowances and duties in respect of the post of Headmaster (KAU School)
- 2 Amendments to statute SRO No. T0/T2 issued under notification No. 61689/Ag/P4/71/AD dated 12-2-72 as assented to by the Chancellor with effect from 25-11-82 under section 49 (6) of the KAU act regarding qualifications for the post of Deans of Faculty Agriculture, Veterinary and Animal Sciences and Director of Research.
- 3 SRO No.1245/86 dated 3-7-1986. First statutes prescribing the qualifications, procedure for appointment, salary and allowances, period of appointment and powers and duties of the Dean, Professor, Associate Professor, Assistant Professor and Junior Assistant Professor in the Faculty of Agricultural Engineering and Technology.
- 4 Amendments to the statute SRO No. 565/83, as assented to by the Chancellor with effect from 26-6-86 under section 49 (6) of the KAU act adding a new sub clause (a) under clause 2 (b) educational qualifications Diploma in Agriculture and Rural Engineering from IAT, Tavanur.
- 5 Amendments to the statute SRO. No. 668/73 as assented to the Chancellor with effect from 26-6-86 regarding qualification for the post of Tracer.
- 5 Amendments to the Statutes SRO. No. 678/74 as assented to by the Chancellor with effect from 28-7-86 regarding procedure for election without Postal Ballot to the Election of members of the General Council.
- 7 SRO No. 1533/86 dated 3-9-86 first statutes prescribing the method of appointment, qualification, salary and allowances, age limit, and duties in respect of the post of Workshop Attender under KAU.
- 8 Act 27 of 1986 to amend the KAU act, 1971 regarding the normal retirement age, of the Deans of Faculties, Director of Research,

Director of Extension, the Director of Veterinary research & Education, Director of Post graduate studies, and Professors of the University.

- 9 Amendments to the statute SRO No. 447/72 as assented to by the Chancellor with effect from 30-12-86 renaming of the Animal management Departments, Livestock Production management.
- 10 Amendments to the statute SRO No. 81/76 as assented to by the Chancellor with effect from 11-2-1987 regarding qualification for the post of Deputy Director of Students Welfare (Sports and games).

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