

206627

ANNUAL REPORT
1985-'86



KERALA AGRICULTURAL UNIVERSITY

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General Report

The Executive Committee of the Kerala Agricultural University presents to the General Council, its 13th Annual Administration Report for the period from 1-4-1985 to 31-3-86.

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. Thomas C George, IAS, was the Registrar till December 1985. Sri. K Sethumadhavan, IAS., took charge of the post of Registrar on 4-12-1985.

Sri. K. T. Narayanan Nambiar continued as Comptroller in-charge during the period. Mr K. R Krishna Pillai continued as the Director of Physical Plant.

Dr. P.C. Sivaraman Nair continued as the Director of Research till 10th March 1986. Dr. M. Aravindakshan was the Director of Research in-charge from 11th March 1986.

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

Dr. N. Sadanandan continued as Dean, Faculty of Agriculture until 30-9-85 and later took over charge as Director (P G Studies). Dr M M Koshy, Director, Centre for Excellence for Tropical Soils took over as Dean in-charge on 1-10-1985.

Dr. M. Krishnan Nair continued as Dean, Faculty of Veterinary & Animal Sciences until 1-10-85. Dr. K Radhakrishnan, Professor (RC) took over as Dean in-charge on 1-10-85.

Dr. M. Krishnan Nair later took over charge as Director of Veterinary Research and Education.

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

Dr. P. Basak took over as Dean in-charge of Faculty of Agricultural Engineering on 2-11-1985.

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. CA Jose, Professor held full additional charge of the post of Associate Dean during the period under report.

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

The 37th meeting of the Academic Council was held at Vellanikkara on 4-7-85. The curriculum for the B. Tech Course in Agricultural Engineering was approved in this meeting. It was also decided to start PG Programme in Forestry.

The Board of Studies of the Faculty of Agriculture met at Vellayani (19th meeting) on 8-5-1985. The syllabi for M.Sc course in Food Science & Nutrition and the PG Courses in Agronomy were approved in this meeting.

The Board of studies of the Faculty of Veterinary and Animal Sciences (12th meeting) met at Mannuthy on 20-7-1985.

The PG Committee met on 26 10-1985 (28th meeting). Ninety PG programmes were approved in this meeting.

EDUCATION

The Teaching institutions under the University are the College of Agriculture, Vellayani, Trivandrum, The 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, and College of Co-operation & Banking, Mannuthy. 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. Masters' and Doctorate degrees in Agriculture, Horticulture and Veterinary & Animal Sciences were offered in the College of Agriculture, Vellayani, College of Horticulture at Vellanikkara and College of Veterinary & Animal Sciences at Mannuthy respectively. 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 six institutions was 542 at the end of the year. The details are given in page iii.

	Agri.	Horti.	Vety.	Fish	Co-op.	KCAET	Total
Dean	1	—	1	1	—	—	3
Assoc Dean	—	1	—	—	1	—	2
Director	1	1	2	—	—	—	4
Advisor & Dean i/c	—	—	—	—	—	1	1
Professor	23	24	53	4	3	3	110
Assoc Professor	16	20	29	10	7	2	84
Asst Professor	36	56	59	20	18	7	196
Jr. Asst. Professor	31	43	37	14	3	14	142
Total	108	145	181	49	32	27	542

The vacancies existed in different educational institutions at the end of the year is as follows:-

Colleges							
	Agri	Horti.	Vety.	Fish	Co op.	KCAET	Total
Dean	1	—	1	—	—	—	2
Assoc Dean	—	—	—	—	1	—	1
Director	—	—	—	—	—	—	—
Advisor & Dean i/c	—	—	—	—	—	—	—
Professor	2	2	9	2	2	—	17
Assoc Professor	5	10	12	3	3	—	33
Asst. Professor	6	19	28	11	4	—	68
Jr. Asst. Professor	13	29	34	7	—	—	83
Total	27	60	84	23	10	—	204

Admissions

During the period under report 551 students were admitted for various courses. The details of which are given below. The number of students who have passed out from different colleges are also furnished.

Courses	No. admitted	No. passed
1	2	3
B. Sc (Ag)	151	124
B. V. Sc & AH	115	60
B. F. Sc	19	28
B. Sc (C&B)	30	38
B. Tech	34	—
M. Sc (Ag)	67	25
M. Sc (Hort)	11	10
M. V. Sc	12	5
M. F. Sc.	2	—
M. Sc (C&B)	6	—
M. Sc (Ag. Engg)	8	—

1	2	3
M. Sc (Ag. Stat)	6	4
M. Sc (Forestry)	5	—
Ph. D (Ag)	6	—
Ph. D (Hort)	4	2
Ph. D (V&AS)	3	1
Diploma in Pathology	1	—
Diploma in Food Sciences & Nutrition	2	1
Diploma in Agri. Sciences	57	44
Diploma in Agriculture & Rural Engg.	12	22
Total	551	364

The number of students (1766) who are on roll at the end of the year is as follows:

No. of students on roll	Colleges						Total
	Agri.	Hort.	V&AS	Fish.	Co-op	KCAET	
<i>UG Courses</i>							
B.Sc (Ag)	254	331	—	—	—	—	585
B. Sc (C&B)	—	—	—	—	118	—	118
B. F. Sc	—	—	—	148	—	—	148
B. V. Sc & AH	—	—	523	—	—	—	523
B. Tech	—	—	—	—	—	34	34
Total	254	331	523	148	118	34	1408
<i>PG Courses</i>							
M. Sc (Ag)	89	63	—	—	—	—	152
M. Sc (Hort)	—	15	—	—	—	—	15
M. V. Sc	—	—	27	—	—	—	27
M. Sc (Ag. Statat)	—	—	10	—	—	—	10
M. Sc (Ag. Engg)	—	8	—	—	—	—	8
M. F. Sc	—	—	—	—	—	—	5
Ph. D (Ag)	17	13	—	—	—	—	30
Ph. D (Hort)	—	4	—	—	—	—	4
Ph. D (V&AS)	—	—	7	—	—	—	7
Total	106	103	44	5	—	—	258
<i>Other courses</i>							
DASc	—	—	—	—	—	74	74
DARE	—	—	—	—	—	26	26
Total						100	100
GRAND TOTAL							1766

The research programme of the University have been drawn out with emphasis 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 under KADP and MSCRP. 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 190 projects were cleared for implementation. The Faculty Research Committee of Veterinary Science met once and approved twenty four research projects for implementation. The Faculty Research Committee of the Fisheries met once and cleared two 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 amounting to Rs.59.98 crores were forwarded to the ICAR and State Planning Board for their consideration.

In the faculty of agriculture eighteen research stations and six units viz. Sugarcane Research Centre, Chittoor; KADP at Vellanikkara; MSCRP at Madakkathara; 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 Thiruvazhamkunnu and another at Thumburmuzhi are functioning. There were 53 ICAR 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	5	35
Faculty of Vety. & Animal Sciences	9	3	—	2	14
Agri. Engineering	2	1	—	1	4
Total	20	23	2	8	53

Scientific and popular articles published

During the period under report 168 scientific and popular articles were published by the staff members of various faculties as detailed below:

Faculty	Scientific articles	Popular articles	Total
Agriculture	49	16	65
Vety. & Animal Sciences	63	—	63
Fisheries	7	21	28
College of Co-operation & Banking	—	12	12
Total	119	49	168

The Staff strength in the Research Stations/Schemes/Projects was as on 31-3-86

Faculty of Agriculture

Stations	Dire-ctor	Assoc. Director	Prof.	Assoc. Prof.	Asst. Prof.	JAP	Total
1	2	3	4	5	6	7	8
Regional Agri. Res. Station, Pilicode							
NARP	—	1	2	16	5	—	
Non-plan	—	—	—	2	4	2	
AICC & AIP	—	—	—	—	1	2	35
RARS, Ambalavayal							
NARP	—	1	—	1	4	—	
Non-plan	—	—	—	—	3	—	
AICFIP (Citrus) scheme	—	—	—	1	1	2	13
RARS, Pattambi							
NARP, Pattambi	—	1	2	3	11	—	—
NARP Eruthiampathy	—	—	—	1	1	—	—
Non-plan	—	—	1	2	2	4	—
AICRIP	—	—	—	4	4	—	—

	1	2	3	4	5	6	7	8
Chemistry & Submerged soils	—	—	—	—	—	2	—	—
Pulses	—	—	—	—	—	2	4	44
RARS Kumarakom								
NARP	—	—	2	2	11	—	—	—
Root (w) scheme	—	—	3	—	4	2	—	—
RARS (A)	—	—	3	—	1	1	—	—
IRP-A	—	—	—	—	—	—	1	27
PRS Panniyur								
Non-plan	—	—	1	—	1	1	—	—
ICAR-Co-ordinated projects								
NARP	—	—	1	—	—	—	—	9
BRS Kannara	—	—	—	1	5	5	—	11
ARS Chalakudy	—	—	1	3	8	—	—	12
CRS Pampadumpara								
Non-plan	—	—	1	—	2	2	—	—
NARP	—	—	—	—	2	—	—	—
AICS & CIP	—	—	—	2	1	—	—	10
RRS Moncompu	—	—	5	1	13	11	—	30
SRS Thiruvalla KAU	—	—	1	—	1	2	—	—
AICRP	—	—	1	—	—	1	—	6
RRS Kayamkulam								
Non-plan	—	—	2	1	2	2	—	—
Root Wilt disease (State plan)	—	—	—	—	3	2	—	12
ARS Mannuthy								
Station	—	—	1	1	1	5	—	—
NARP	—	—	—	—	2	2	1	—
AICRP	—	—	—	—	—	1	—	—
Oilseed (ICAR)	—	—	—	—	—	1	—	15
LRS, Thiruvazhamkunnu	—	—	—	—	2	2	3	—
AICRP Agro-forestry	—	—	—	—	1	3	4	15
AMPRS Odakkali								
Station	—	—	1	—	—	1	2	—
ICAR	—	—	—	—	—	1	—	5
CSRC Karamana								
AICARP Scheme	—	—	1	—	—	3	2	—
PL-480	—	—	—	—	—	1	—	—
KAU Scheme	—	—	—	—	—	2	—	—
ECF Quilon	—	—	—	—	1	—	—	—
ECF Pattambi	—	—	—	—	1	—	—	11
CRS Balaramapuram	—	—	1	—	—	1	—	2
CRS Anakkayam	—	—	—	—	1	—	1	2
CRS Madakkathara								

1	2	3	4	5	6	7	8
AICCIP & MSCRP							
Madakkathara	--	--	2	1	2	1	6
RRS Vyttila	--	--	1	1	1	1	4
NARP Vellayani	--	1	--	3	6	--	10
Kottarakkara	--	--	--	2	5	--	7
Water Management, Eruthiampathy	--	--	--	1	--	--	1
AICRP on Agrl. Drainage, Karumady	--	--	--	1	2	--	3
Agricultural College Farm, Vellayani	--	--	--	--	2	5	7
Operational Research Project, Ozhalapathy	--	--	--	1	1	4	6
Directorate of Research	1	3	--	--	1	--	5
Total	1	7	30	60	136	73	307

Stations	Director	Assoc. Director	Prof.	Assoc. Prof.	Asst. Prof.	JAP	Total
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Faculty of Vety & Animal Sciences							
CBF, Thumburmuzhi	--	--	--	1	1	--	2
AICRP on Goats, Mannuthy	--	--	2	1	5	4	12
University Vety. Hospital, Kokkalai, Trichur	--	--	1	--	2	--	3
Pig Breeding Farm, Mannuthy	--	--	--	--	1	2	3
AICRP on Poultry for eggs	--	--	1	--	5	4	10
Poultry Farm & Duck Farm, Mannuthy	--	--	1	1	--	2	4
Centre for Advanced Studies in Poultry Science	1	--	1	1	--	--	3
ICAR Ad hoc scheme efficiency of white pekin Ducks, Desi Ducks & their crosses for production	--	--	--	--	1	--	1
ICAR Ad hoc Scheme Nutrient requirements of Caged layer	--	--	--	--	1	--	1
Centre for Advanced Studies in Animal Genetics and Breeding	1	--	--	1	1	--	3
University Livestock Farm Mannuthy	--	--	--	1	--	2	3
Livestock Res. Station, Thiruvazhamkunnu	--	--	--	2	2	3	7
AICRP on utilisation of Agro Industrial Bye-products	--	--	1	1	--	2	4
Director of Vety. Research	--	1	--	--	--	--	1
Total	2	1	6	9	20	19	57

1	2	3	4	5	6	7	8
Faculty of Fisheries							
Fisheries Station, Puduveyypu	—	—	—	1	2	1	4
Fisheries Station; Moncompu	—	—	—	—	—	1	1
IRP Kumarakom	—	—	—	—	—	1	1
Total				1	2	3	6
Directorate of Students Welfare	1	—	—	—	2	1	4
Grand Total	4	8	36	70	160	96	374

The following were the vacancies in the various Research Station/Schemes/Projects Directorate of Research/Directorate of Students Welfare during the year 1985-86.

Station	Director	Assoc. Director	Prof.	Assoc. Prof.	Asst. Prof.	JAP	Total
Faculty of Agriculture							
RARS, Pilicode	—	1	—	5	3	1	10
RARS, Ambalavayal	—	—	—	1	4	—	5
RARS, Pattambi	—	—	—	2	12	3	17
RARS, Kumarakom	—	—	—	1	5	1	7
RARS, Panniyur	—	—	—	—	2	1	3
BRS, Kannara	—	—	—	—	1	3	4
ARS, Chalakudy	—	—	—	1	6	—	7
CRS, Pampadumpara	—	—	—	1	5	2	8
RRS, Moncompu	—	—	—	—	9	6	15
SRS, Thiruvalla	—	—	—	—	1	2	3
RRS, Kayamkulam	—	—	—	—	2	1	3
ARS, Mannuhty	—	—	—	—	1	3	4
LRS, Thiruvazhamkunnu	—	—	—	1	2	6	9
AMPRS, Odakkali	—	—	—	—	1	1	2
CSRC, Karamana	—	—	—	—	1	1	2
RRS, Vyttila	—	—	—	1	1	—	2
NARP, Vellayani	—	—	—	—	1	3	4
NARP, Kottarakkara	—	—	—	—	1	—	1
Agri. College Farm, Vellayani	—	—	—	—	1	3	4
Operational Research							
Project. Ozhalapathy	—	—	—	1	—	4	5
Directorate of Research	—	1	—	—	—	—	1
Total	—	2	—	14	59	38	113

	1	2	3	4	5	6	7	8
Faculty of Veterinary & Animal Sciences								
Pig Breeding Farm, Mannuthy	—	—	—	—	—	—	2	2
Poultry & Duck Farm, Mannuthy	—	—	—	—	—	—	2	2
University Veterinary Hospital, Kokkalai	—	—	—	—	—	1	—	1
Livestock Research Station, Thiruvazhamkunnu	—	—	—	—	1	—	—	1
CBF, Thumburmuzhi	—	—	—	—	—	1	—	1
Centre for Advanced Studies in Poultry Sciences	—	—	—	—	—	1	—	1
Centre for Advanced Studies in Animal Genetics & Breeding	—	—	—	—	—	1	—	1
Total					1	4	4	9
Faculty of Fisheries								
Instructional Farm and Fisheries Station, Puduveyypu	—	—	—	—	—	—	1	1
Directorate of Students Welfare	1	2	—	—	—	—	—	3
Grand Total	1	2	—	—	15	65	43	126

The following additional teaching posts were created during the year 1985-86 in various Institutions Schemes

Stations	Dire-ctor/Advisor	Assoc Daan	Prof	Assoc. Prof	Asst. Prof/DPSW	JAP	Total
1	2	3	4	5	6	7	8
College of Agriculture, Vellayani	—	—	—	—	2	6	8
College of Horticulture, Vellanikkara	—	—	—	—	—	1	1
College of Vety. & AS, Mannuthy	2	—	—	4	—	—	6
College of Fisheries Panangad	—	—	—	—	—	1	1
KCAET, Tavanur	1	—	6	10	14	—	31
Progeny Testing of Cross Bred Bulls White Pekin Desi Ducks Scheme	—	—	—	—	3	—	3
AICRP Weed Control	—	—	—	—	1	—	1
	—	—	—	—	1	—	1

	1	2	3	4	5	6	7	8
Mycotoxis in domestic Animals	—	—	1	—	2	—	—	3
Goat Nematode Scheme	—	—	—	—	1	—	—	1
Onattukara Scheme	—	—	—	—	1	—	—	1
ICAR Scheme, Karamana	—	—	—	—	1	—	—	1
Directorate of Students Welfare	—	—	—	—	1	—	—	1
Director, PG Studies, HQRs.	1	—	—	—	—	—	—	1
Micorrhizal Association and Forest Eco-system of Kerala	—	—	—	—	—	—	2*	2*
Total	4	—	7	14	27	11	—	63

*Jr. Research Fellow

Students Welfare

Extra curricular activities of the students of all the 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 Director 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.

Students strength of KAU at the end of the year was 1766 (including 19 students from foreign countries).

Co-curricular and extra-curricular activities

Results of the extra curricular activities of Kerala Agricultural University are furnished below.

Events (Men Section)

Football	I College of Veterinary & Animal Sciences
	II College of Horticulture
Cricket	I College of Agriculture
	II College of Veterinary & Animal Sciences
Volley ball	I College of Veterinary & Animal Sciences
	II College of Horticulture
Basket ball	I College of Horticulture
	II College of Veterinary & Animal Sciences

Shuttle Badminton	I College of Veterinary & Animal Sciences
	II College of Agriculture
Hockey	I College of Veterinary & Animal Sciences
	II College of Fisheries
Table Tennis	I College of Horticulture
	II College of Agriculture
Ball Badminton	I College of Veterinary & Animal Sciences
	II College of Agriculture
Athletics	I College of Veterinary & Animal Sciences
	II College of Agriculture
<i>(Women Section)</i>	
Volley ball	I College of Horticulture
	II College of Fisheries
Basket ball	I College of Horticulture
	II College of Veterinary & Animal Sciences
Shuttle Badminton	I College of Horticulture
	II College of Fisheries
Table Tennis	I College of Horticulture
	II College of Veterinary & Animal Sciences
Ball Badminton	I College of Fisheries
	II College of Veterinary & Animal Sciences
Athletics	I College of Veterinary & Animal Sciences
	II College of Fisheries

Individual Champion (Men & Women)

Men	: ROY MATHEW (College of Fisheries)
Women	: GUNATEETA K. R. (College of Vety. & AS)

KAU Youth Festival

The 9th KAU Youth Festival was conducted on 21st, 22nd and 23rd May 1986 at the University Headquarters,

College of Veterinary & Animal Sciences secured the aggregate championship.

College of Horticulture became second.

National Youth meet

A National Youth camp was conducted by KAU at Pettekkudi Village deep in the mountains of Idukki for a period of 10 days from 22nd December to 31st December 1985. Students of other Agriculture Universities also participated in this national camp.

Trekking

A batch of students with Director of Students Welfare undertook a trekking campaign through the hills for a distance of 30 km starting from Paravattani hills at Chirakkakode to Vazhani hills near Vadakkancheri.

A mounted squadron NCC Unit is started this year in Kerala Agricultural University headquarters. The unit is located at Mannuthy Campus with a strength of 100 cadets and 13 horses to give equitation training to the students of Kerala Agricultural University.

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 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 programme 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 1984-85 is also furnished below:-

The following are the staff position relating to the Directorate of Extension Education during 1985-86

Station	Dire-ctor	Assoc. Dire.	Prof/ Editor	Assoc Prof.	Asst. Prof.	JAP	Total
1	2	3	4	5	6	7	8
Director of Extension	1	1	1	—	—	—	3
Farm Advisory Service	—	—	2	5	1	—	8
<i>Communication Centre</i>							
i) Information Unit	—	—	—	1	4	2	7
ii) Publication Unit	—	—	—	1	3	—	4
iii) Exhibition & graphic service unit	—	—	—	—	1	1	2

1	2	3	4	5	6	7	8
Training Service Scheme							
i) Tavanur	—	—	—	—	1	2	3
ii) Mannuthy	—	—	—	—	1	—	1
iii) Vellayani	—	—	—	—	1	—	1
Krishi Vigyan Kendra							
i) Pattambi	—	—	1	4	5	—	10
ii) Ambalavayal	—	—	—	1	3	—	4
iii) Manjeswar	—	—	—	1	—	4	5
Scheduled Caste Area Research Centre, Nilambur	—	—	—	1	3	—	4
Tribal Area Research Centre, Amboori	—	—	1	1	6	5	13
National Demonstration Scheme, Sadanandapuram	—	—	—	1	3	—	4
UNICEF Training Cell, Vellayani	—	—	—	—	1	2	3
Lab-to-Land Programme & Village Adoption Programme	—	—	1	—	—	—	1
Total	1	1	7	19	36	16	80

The following are the vacancies in the various units attached to the Directorate of Extension Education during 1985-86

Station	Dire- ctor	Assoc Dire	Prof.	Assoc. Prof.	Asst. Prof.	JAP	Total
Farm Advisory Service	—	—	—	—	1	—	1
Communication Centre							
i) Information unit	—	—	—	1	2	—	3
ii) Publication unit	—	—	—	—	2	—	2
Training Service Scheme, Tavanur	—	—	—	—	—	2	2
Krishi Vigyan Kendra							
i) Pattambi	—	—	—	—	2	—	2
ii) Ambalavayal	—	—	—	3	4	—	7
iii) Manjeswar	—	—	—	1	—	3	4
Scheduled Caste Area Research Centre, Nilambur	—	—	—	—	2	—	2
Tribal Area Research Centre, National Demonstration Scheme, Sadanandapuram	—	—	—	—	—	4	4
	—	—	—	—	1	—	1
Total	—	—	—	5	14	9	28

Twenty five 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 15 technical bulletins & books were also published both in English and Malayalam.

The exhibition and graphic service units conducted major exhibitions at Trichur. In addition 21 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. K. R. Krishna Pillai continued as Director of Physical Plant during the period under report. The major items of civil works included various staff quarters under NARP, hostels, laboratory buildings under NARP and formation of roads Bachelors, hostel, trainees hostel, school building, glass house, net house, ladies hostel, canteen building were also completed during the period under report. Budget provision for the year was Rs. 350 lakhs under works (Plan) and Rs. 26.25 lakhs under maintenance and repairs. The expenditure was Rs. 241 lakhs.

ESTATE

Sri. K. T. Narayanan Nambiar continued as Estate Officer during the year up to 1-2-86. Sri. C. N. Muraleedharan Nair took charge of the post of Estate Officer on 3-2-86 and continued during the year. The total area of the Estate is 391,4368 ha.

A total quantity of 24.46 tonnes of rubber was produced during the year and the total receipt from Estate was Rs. 3,50,446.78. The total expenditure was Rs. 11,24,091.01. At the end of the year there was a stock of 24.828 tonnes of rubber for sale.

FINANCE

Sri. K. T. Narayanan Nambiar continued as Comptroller i/c till 9-2-86 and thereafter Sri. K. K. Pankajakshan, Deputy Secretary to Government was appointed as Comptroller.

For 1985-86 the University had approved a budget of Rs. 1904 lakhs. During 1985-86 Government has released Rs. 570 lakhs under non-plan and Rs. 230 lakhs under plan.

□

CHAPTER I

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, Multi State Cashew Research Project, and from the Department of Science and 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 budgetting, 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 31-1-85. Ordinarily, the council meets once in four months. During the year under report the council met 5 times on 27-7-1985; 8-11-1985 (special meeting); 23-11-1985; 25-1-1986 and on 25-26, March 1986. A special convocation to confer the Honorary Degree of Doctor of Science on Dr. Salim Ali, the eminent Ornithologist was held on 26-9-1985.

Important decisions taken by the General Council

i) In the General Council meeting held on 27-7-85, it has been resolved to award the Degree of Doctor of Science (*Honoris causa*) to Dr. Salim Ali, the World Renowned Ornithologist, considering his contribution in the field of Ornithological studies. In the same meeting the report of the Assurance Committee of the Kerala Agricultural University has been presented, and it has also been decided to convene a special meeting of the General Council to discuss the interim and final reports of the Accounts Committee on the annual accounts and audit report for 1977-78. Resolutions were also passed by the General Council held on 27-7-1985 for the creation of the following posts:

- 1 Director and certain other teaching posts for the establishment of a "Centre of Excellence for Tropical Soils" at the College of Agriculture, Vellayani.
- 2 Director, Veterinary Research & Education in the Faculty of Veterinary & Animal Sciences.
- 3 Director, PG studies in the KAU.
- 4 Director and certain other teaching posts for the establishment of a Centre of Advanced studies in Animal Genetics and Breeding under the Faculty of Veterinary & Animal Sciences.
- 5 Director and certain other teaching posts for the establishment of a Centre of Advanced studies in Poultry Science under the Faculty of Veterinary & Animal Sciences.

ii) The special meeting of the General Council held on 8-11-85 has discussed and approved of the following reports of the fifth Accounts Committee.

- 1 Interim report on the annual accounts and audit report for the year 1977-78.
- 2 Final report on the annual accounts and audit report for the year 1977-78.
- 3 Report on the annual accounts and audit report for the year 1978-79.

iii) Budget estimates for the year 1986-87 and annual report for 1984-85 were approved by the XXXVII General Council held on 25th, 26th of March, 1986. This meeting of the General Council has entrusted the Accounts Committee to review the Annual accounts and Audit report for 1980-81. The report of the Accounts Committee on the Annual accounts and Audit report for 1979-80 has been presented to the General Council, and at this meeting it has also been decided to convene a special meeting for considering the amendment proposal to statutes SRO No. 678/74 regarding the conduct of election to the various authorities of the University.

Details of statute amendments

Amendment proposals for the statutes mentioned below has been approved by the General Council for assent by the Chancellor.

- i) Statutes SRO No. 565/83 regarding the qualification method of appointment etc., for the post of Overseer Gr. II/Draftsman Gr. II
- ii) Statutes SRO No. 223/72-regarding service condition of Officers, Teachers and other employees of the University.
- iii) Statutes SRO No. 1210/76 regarding posts under the KAU Press.
- iv) Statutes SRO No. 81/76 - regarding the qualification, and method of appointment for the post of Jr. Asst Professor (Phy. Edn).

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 14 meetings (157th to 170th) were held.

Among the major decisions taken by the Executive Committee include the creation of teaching posts including Director under Centre of Excellence for tropical soils at the College of Agriculture, Vellayani; the establishment of a Centre of Excellence for Advanced Studies in Poultry Science under KAU; the establishment of a Centre of Excellence for Advanced Studies in Animal Genetics & Breeding; and to create the post of Advisor in Agricultural Engineering and to appoint Dr P. Basak to the post.

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 7th May 1985 and 27th January 1986. Important decisions were:

- 1 Recommended to award the degree of Doctor of Science (*Honoris Causa*) to Dr Salim Ali, the World famous Ornithologist.
- 2 The council agreed in principle to switch over to the semester system of studies in Kerala Agricultural University and directed to implement the same during the Academic year 1986-87.
- 3 Decided to recommend the appointment of a University Librarian in the cadre of Dean
- 4 Decided to start Doctorate Programme in the discipline of Animal Management (Livestock production management) from the academic year 1985-86
- 5 Recommended to establish a Centre for Advanced Studies in Animal Genetics and Breeding under Faculty of Veterinary and Animal Sciences
- 6 Recommended to establish a Centre of Biotechnology at the College of Horticulture, Vellanikkara, and
- 7 Recommended to establish a Centre of Advanced Studies in Poultry Science under Faculty of Veterinary and Animal Sciences.

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 21-8-1984. The Board of Studies of Agricultural Faculty met at the College of Agriculture, Vellayani on 8-5-85. The syllabi for M. Sc. course in Food and Nutrition and for the PG courses in Agronomy were approved in this meeting.

The Board of Studies of the Faculty of Veterinary and Animal Sciences (12 th meeting) met at Mannuthy on 20-7-85.

The Board of Studies in the Faculty of Agricultural Engineering and Technology was constituted from 10-3-1986.

Post-Graduate Committee:

The Post-graduate committee meeting were held on 26-10-85 (28 th meeting); Ninety PG programmes were approved in this meeting.

Important engagements of the Vice-Chancellor during the year

The Vice-Chancellor participated in the meeting of the Vice-Chancellors of Agricultural Universities held in New Delhi. He spoke on "Forest & Tribals-Law and Practice" at a seminar held in Trivandrum. Attended the seminar on All India Co-ordinated Project on Coconut & Arecanut held in Trivandrum; inaugurated the North Indian Crafts Festivals held at Trichur; presided over the workshop on Co-operation held at the College of Co-operation & Banking; participated at the workshops organised to discuss and finalise package of practices in respect of agricultural and Veterinary and Animal Sciences; presided over the technical session on Agricultural Production and Economic Systems at the Seminar held in Cochin; attended the follow up meetings relating to the recommendations of the Seminar on "KAU-2000 AD"; participated at the meeting in connection with the centenary celebrations of the Trichur Zoo; participated at

the meeting of the Regional Committee VIII of the I. C. A. R. held in Trivandrum. The Vice-Chancellor was a participant at the National Seminar on Agricultural Extension held in New Delhi.

The following are some of the important functions in which the Vice-Chancellor participated during the period.

The National Seminar on Piggery Production held at the College of Veterinary and Animal Sciences.

Exhibition of Medicinal Plants at the Ayurveda Hospital, Trichur.

Cultural Seminar of "Viswadarsana" organised at the Sahitya Academi Hall, Trichur.

Literary Seminar of Sahrudayavedi, Trichur.

Handing over ceremony of "Matsya-1", fishing vessel, to the College of Fisheries.

Youth Festival, Kerala Agricultural University.

Task Force on Agricultural Engineering held at Tavanur.

Meeting of the Board of Management of the Indian Agricultural Research Institute, New Delhi.

Meetings of the SB/ST Cell.

Workshop on Landslides in Western Ghats held in Calicut.

Meeting of the NARP Review Team.

Inauguration of the activities of the Forestry Board held at the Press Club, Trichur.

Presided over the function to release improved varieties of sesamum and groundnut at Vellayani.

Managing Council of the Students Union of the University.

Fruit Workshop

Meeting to lay the foundation stone for dairy plant at Marottichode, Mattoor—presided.

Spoke on Tribal Development and Management at the Training Programme for I. A. S. Officers at the Institute of Management in Government, Trivandrum.

National Workshop on Krishi Vigyan Kendras at Coonoor.

Inauguration of Krishi Vigyan Kendra of the University at Manjeshwar.

Seminar on elephants held at the College of Veterinary & Animal Sciences.

Seminar of coconut cultivators of Kerala held in Calicut.

Spoke on Ethnology and Tribal Welfare at the Seminar held at the Ayurveda College, Coimbatore.

Inauguration of the Vana Vigyan Kendra at Kuthiran.

Agricultural & Animal Husbandry Seminar held at Marakkal.

Farmers Day at Nemom.

Inaugurated the Flower Show sponsored by the Trichur Agri-Horticultural Society.

Ceremony in connection with laying the foundation stone for the College of Fisheries of the University.

Science Exhibition at the N. S. S. High school, Ottappalam.

Inaugurated the cultural conference at Peringottukara.

Annual Day celebrations of the University's Staff Club.

The Vice-Chancellor held discussion with the Chief Minister regarding job opportunities of the B. F. Sc. graduates. He had also discussed with Dr. Mahapatra, Chairman, KAU Commission, and members

of the Commission. The Vice-Chancellor delivered key note addresses at the workshop organised by the Cochin Chamber of Commerce and at the convention of the Kerala Management Association. He delivered the felicitation address at the National Conference of Indian Immunological Society at the Amala Cancer Institute.

Besides, the Vice-Chancellor participated in the meetings of the General Council, the Executive Committee, the Academic Council, Officers meeting, Campus Development Committee, Students Welfare Committee, Works Committee, N. S. S. Committee, Joint Training Committee, Inter-University Consultative Committee, State Committee on Science & Technology, Governing Body of Central Water Resources Development & Management and several committees for the selection of teaching staff as well as committees to assess the performance of teachers for their promotion to higher posts.

The Vice-Chancellor underwent the mandatory refresher training at the All India Management Association, New Delhi.

Assurance Committee

The Assurance Committee with Sri O. Lukose as Chairman met six times during the year under report.

Accounts Committee

The Accounts Committee under the Chairmanship of Prof. K. J. Kurian met 19 times during the year under report.

Statute Sub Committee

The Statute Sub Committee under the Chairmanship of Prof. Alexander Zachrias met four times during the year under report.

Officers' meeting

The University Officers met regularly under the Chairmanship of the Vice-Chancellor. During the period under report three meetings were held. The important decisions taken in the meetings were to adopt a new pricing policy of KAU Publications. Decided to enhance the rate of remuneration given to authors of various publication in Kerala Agricultural University. Decided to constitute a committee to examine the proposal for establishment of a farm complex at Vellanikkara. The necessity for increasing the income from Kerala Agricultural University properties was keenly felt and the following suggestions were made. Recommended to fix a ceiling for quarterly consumption of fuel for all the KAU vehicles other than those used for scheduled trips. The vehicles should be pooled and brought under the control of Heads of the stations. Recommended to initiate action for installing PABX system at Mannuthy and Vellanikkara campus.

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. Action has been initiated during the year under report to establish Faculties of Co-operation, Home Science and Forestry. A College of Rural Home Science was established during the year under report.

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 Coordination 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 Research Council met once during the period under report.

The Extension Advisory Committee renders advice in extension education activities which are organised through the Directorate of extension. The above committee also met once during the year under report.

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.

Student's 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 for B. Sc. (C&B) programme was given to students purely on merit, based on the marks obtained for the qualifying examination. However the principles of communal reservation was followed while giving admissions to the various courses as decided by the Government 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 Casual labourers are on daily rated wages. The basic wage is Rs. 5.75 for men and Rs. 5.25 for women labourers. In addition to this

they are eligible for variable DA @ 10 paise for every 10 points beyond 900 points in Travancore-Cochin areas. The same rates are applicable for the workers in Malabar area with the exception that the variable DA is calculated for points beyond 1000 only.

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.

In addition to the categories of labourers mentioned above, 10 casual labourers are being engaged in the KAU Press and about 40 workers are engaged on daily wages in the Engineering wing of the University.

The following are some of the service benefits sanctioned to labourers during the period under report. (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. Employment assistance under dying in harness scheme applicable to regular employees was also extended to the 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.

CHAPTER II

Education and Research

FACULTY OF AGRICULTURE

1.1 COLLEGE OF AGRICULTURE, VELLAYANI

The College of Agriculture 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 campus has an area of 243 ha.

Dr. N. Sadanandan was the Dean till 30-9-1985. Consequent on his transfer as Director (P. G. Studies), Dr. M. M. Koshy, Director, C. E. T. S. took full additional charge of Dean from 1-10-1985 and continued to be so during the period under report.

Dr. N. Mohanakumaran continued as Associate Director (NARP, S. R.) with the headquarters at Vellayani.

The following fifteen departments have been functioning in the College of Agriculture.

1. Agronomy, 2. Agrl. Botany, 3. Soil Science & Agrl. Chemistry, 4. Entomology, 5. Plant Pathology, 6. Plant Breeding, 7. Agrl. Extension, 8. Agrl. Statistics, 9. Horticulture, 10. Agrl. Economics, 11. Animal Husbandry, 12. Agrl. Engineering, 13. Plant Physiology, 14. Home Science, 15. Physical Education.

New Departments/Sections/Projects sanctioned during the year
The Projects/Schemes sanctioned during the year

(i) *Scheme on Cyst Nematode Heterodera oryzae infesting rice in Kerala*

The main objective of the scheme is to study the occurrence and damage by cyst nematode *Heterodera oryzae* on rice in Kerala and to evolve suitable control measures for the same.

The scheme is fully financed by ICAR with a total outlay of Rs. 2 12,000/- and the duration of the scheme is for a period of 3 years from May, 1985.

(ii) Survey of coreid bug incidence on coconut palms in Kerala

The main objective of this project is to assess the extent of damage by the pest coreid bug on coconut palms in all the districts of Kerala and also to identify the locations of severe intensity.

The project is operated by the existing staff of the Division of Entomology in collaboration with the Department of Agriculture, Kerala.

The project is financed by KAU with a total financial outlay of Rs. 3000/-

(iii) Mycorrhizal association and forest ecosystem of Kerala

The object of the project is to study the ecomycorrhizae of different forest trees of Kerala and to develop a suitable technique for mass production of the same.

The project is financed by the Department of Science and Technology, Government of India with a total outlay of Rs. 2,14,000/- for a period of 3 years from September, 1985.

(iv) Survey of the Mushroom flora of Kerala

The objectives of the project are

- (i) to study the natural mushroom flora of the state
- (ii) to identify the edible species of mushroom naturally occurring in the state

The project is financed by the Department of Science and Technology, Government of India with a total outlay of Rs. 1,90,000/- for a period of 3 years from April, 1985.

(v) Follow up studies of innovation development programme among Tribal Communities

The object of the project is to conduct a follow up study of certain innovation development programmes among a few selected Tribal Communities in Western ghat area with special reference to Ecology and Forestry Development for Tribal developments.

The scheme is financed by the Ministry of Home Affairs, Govt. of India with a total financial outlay of Rs. 98,000/- for a period of 8 months.

New posts sanctioned during the year

Discipline	Prof.	Assoc. Professor	Asst. Professor	JAP	Name of the Scheme
Entomology	—	—	1	2	ICAR Adhoc Scheme on Cyst Nematode
Home Science	—	—	—	3	Home Science
Plant Pathology	—	—	—	2	Mycorrhizal Association and Forest eco system
Total	—	—	1	7	

Changes in personnel by new appointment transfer etc.

Dr. M. M. Koshy, Professor, assumed charge of the post of Special Officer (Director designate) in the Centre of Excellence for Tropical Soils with effect from 1-6-1985.

Dr. N. Sadanandan, Dean was appointed as Director (P.G. Studies) with effect from 1-10-1985.

Dr. M. M. Koshy, Director of CETS assumed full additional charge of Dean from 1-10-1985.

Sri. S. Sivaramakrishnan, Junior Assistant Professor of "Co-ordinated Research Project for Western Ghats" resigned from KAU service in the afternoon of 30-4-1985.

Sri. Arthur Jacob, transferred from the College of Horticulture Vellanikkara was posted as Assistant Professor (Nematology) in the ICAR adhoc scheme on Cyst nematodes in the Department of Entomology on 25-5-1985.

Sri. V. Ganesan, Assistant Professor joined duty in the Department of Agrl. Engineering on 28-6-1985 from NARP Mannuthy.

Smt. P. S. Geethakutty, Junior Asst. Professor (Agrl. Extension) Communication Centre, Mannuthy has been transferred and posted to this college with effect from 2-7-1985.

Sri. R. Vijayan, selected and appointed as Junior Assistant Professor in the Faculty of Veterinary and Animal Sciences, joined duty on the F. N. of 27-7-1985.

Smt. S. Regeena, Junior Assistant Professor (Agrl. Economics) has been transferred to the College of Horticulture on 16-9-1985.

Sri. C. E. Ajith Kumar, appointed as Junior Programmer in the Department of Statistics joined duty in the F. N. of 12-11-1985.

Sri. P. A. Korah, Assistant Professor reposted in the Centre for Excellence for Tropical Soils, joined duty on 15-11-1985.

Sri. K. Babukutty, Associate Professor was transferred to the College from RARS Pilicode and he joined duty on 19-12-1985.

Sri. P. Chandrasekharan, Professor of Agronomy was transferred and posted to the KVIC scheme at RARS, Ambalavayal. He was relieved on 31-12-1985.

Sri. Reji John, Research Fellow in the Project of Fisheries was relieved on 31-1-1986 and Smt. Sheena Stephen joined in his place on the same date.

Sri. Thomas Biju Mathew, selected and appointed as junior Assistant Professor joined duty on the F. N. of 1-1-1986.

Smt. V. L. Sheela, Junior Assistant Professor was transferred from the AICRP (Forage) under the Department of Plant Breeding to the Department of Horticulture of this College on 31-3-1986.

Sri. S. Motilal Nehru, Assistant Professor, transferred and posted to this college from RARS, Pattambi, joined duty on the F. N. of 4-3-1986.

Faculty Improvement programme

Dr. V. S. Balakrishnan, Associate Professor, Animal Husbandry was deputed for Ph. D studies at Thirupathi.

Smt. T. Nalinakumari and Smt. M. S. Sheela, Assistant Professors of Agri. Entomology continued to be on study leave for undergoing Ph. D Programme.

Dr. D. Dale, Associate Professor of Entomology continued on deputation for post doctoral training at IRRI, Manila.

Sri. E. K. Thomas, Assistant Professor of Agri. Economics was deputed for Ph. D. studies at Jawaharlal Nehru Krishi Viswa Vidyalaya, Jabalpur from 12-11-1985 onwards.

Sri. O. A. Abdul Rehiman, Associate Professor (Agri. Extension) joined duty after study leave on 16-9-1985.

Sri. B. K. Jayachandran, Assistant Professor of Horticulture was granted study leave for undergoing Ph. D programme at this college.

Sri. P. Jacob John, Associate Professor was granted extension of leave without allowance for a further period of 5 years with effect from 21-7-1985.

Details of seminars/symposia/extension lectures/training programme/correspondence course etc. conducted

The 7th and 8th Regional Workshops of NARP (SR) and Zonal workshop of T&V were conducted in this college.

One Kisan Mela was conducted by the department of Agri. Extension and fifty farmers participated in the Mela.

Two campaigns were organised at Kayamkulam and Sherthalai on better infant feeding practices by the department of Home Science.

A function for the release of two sesamum varieties and three groundnut varieties was conducted at this campus during September, 1985. An Agri. Seminar on the production technology of sesamum and groundnut was conducted in connection with the variety release function.

Training Programme

The following training programmes were conducted during the year in this campus.

Training on survey and control of coreid bug for the resource personnel of Quilon, Trivandrum, Alleppey and Malappuram districts.

Short term training on plant protection for the agricultural demonstrators.

Training on Mushroom cultivation for the members of the staff of Tribal development unit, Nilambur.

Training on Plant protection for the Junior Agrl. Officers of the Agrl. Department.

Pre-service training for Anganwadi teachers.

Practical training to the students of vocational Higher Secondary course.

Training on extension methods for the Junior Agrl. Officers in the Department of Agriculture, from 15-7-1985 to 20-7-1985.

A six month training programme for Agrl. Demonstrators of the Department of Agriculture under T&V system from 5-8-1985 onwards.

Off campus training programmes

Nutrition education programme under All India Co-ordinated project at Nilambur.

Training on Infant Feeding practices (5 batches) for the benefit of 138 women at Trivandrum.

Training on first aid and home nursing for the benefit of 60 women at Kayamkulam.

Preservice training for Balwadi teachers at Extension Training Centre, Kottarakkara.

Preservice training of Village Extension Officers of the State Development Department at Extension training Centre, Kottarakkara.

Training for women on Public Co-operation for the benefit of women leaders at Social Welfare Centre, Venniyoor.

One day camp on control of Diarrhoea at Social inputs and Area Development of the State Development Department.

Training programme on Growth Monitoring for the benefit of 505 women at Alleppey.

Training on Prevention of seed adulteration and creating consumer consciousness (two batches) at Trivandrum.

Extension lectures

Dr. Patresia Materson, F. A. O Expert on Integrated pest control gave a talk on the "Integrated control of Rice pests".

Dr. G. Bhaskaran, Endocrinologist, A&M University, Texas gave a talk on 'Juvenile Hormones'.

Dr. G. K. Veeresh, Professor of Entomology, U. A. S Bangalore delivered a lecture on "Soil grubs of India".

Dr. N. N. Prasad, Professor and Head of Plant Pathology, Annamalai University delivered a talk on 'Recent strategies in bacterial leaf blight in rice' on 12-8-1985

Dr. Balasubramonian, Professor and Head, Plant Pathology, T. N. A. U., Madurai gave a talk on 'biofertilizers' on 14-8-1985.

Dr. V. Mariappan, Professor of Plant Pathology, T. N. A. U gave a lecture on 'Viral diseases of rice' on 23-11-1985.

A guest lecture on 'Yoga' for physical and mental health by Sri. P. K. B Menon was organised by the Extension Club on 11-6-1985 under the International Yoga Year programme.

Prof. M. P. Manmadan gave a lecture on 25-5-1985.

Dr. Sivasubramonian, Professor, School of Genetics, T. N. A. U gave a talk on 'Hybrid Rice in China' on 10-5-1986.

Dr. N. S. Ramaswamy, Management Specialist addressed the Faculty members on 4-1-1986.

Dr. V. Muraleedharan Nair, Associate Professor, Agronomy recorded a talk on 'Manuring of pepper' at A. I. R. Trivandrum.

Academic programme

Strength of students under each course.

i) U. G. Course

	Men	Women	Total
1 year (B. Sc. Ag) (1985 admission)	40	38	78
2nd year .. (1984 admission)	38	36	74
3rd year .. (1983 admission)	25	23	48
4th year .. (1982 admission)	37	22	59
Total	140	119	259

No. of outside students with details of State/Country/programme etc.

Lakshadweep	4	—	4
Tripura	1	1	2
Andra Pradesh	1	—	1
Shillong	1	1	2
New Delhi	1	—	1
Bhuttan	3	—	3
Tamilnadu	1	—	1
	12	2	14

No. of students who obtained their degrees during the year:71

P. G. Courses

1st year	16	26	42
2nd year	22	25	47
Total	38	51	89

	Men	Women	Total
<i>Ph. D. Course</i>			
1st year	2	1	3
2nd year	5	2	7
3rd year	4	3	7
Total	11	6	17

No. of students from outside: Nil

No. of students who obtained degrees during the year:

Degree (M. Sc. Ag.) — 14

Diploma — 1

Practical training programme

With a view to impart practical knowledge in Agriculture and ability in tackling field problems in the farm front, the work experience programme was instituted for the undergraduate students. The work experience programme included cultivation of tapioca, banana, pulses, vegetables, fodder maize and homestead farming. The final B. Sc. (Ag) students cultivated paddy during pancha season in Kayal lands. In addition to the above annual crops, all the students were allotted perennial trees during the first year. They took the necessary records and maintained the trees properly till the end of the B. Sc. (Ag) programme.

Under the farm training programme, the final B. Sc. (Ag) students were assigned to various research stations of KAU in the Southern region to acquaint themselves with 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 agril. development projects. This programme which was arranged and monitored by the Department of Agril. Extension was planned and conducted in collaboration with the State Department of Agriculture.

Study Tour

The final year B. Sc. (Ag) students were taken for an All Kerala study tour to various research stations of the Kerala Agril. University from 19-12-1985 to 28-12-1985.

The third year B. Sc. (Ag) students were taken for an All India study tour to different places and institutions of agricultural importance in the country for a period of 23 days from 14-10-1985 to 6-11-1985.

Scholarships, awards and aids to students

1 National merit scholarship	16
2 National loan scholarship	Nil
3 Education concession under KPCR	35
4 ICAR Merit cum means scholarship	1
5 ICAR Junior fellowship	17

	Men	Women	Total
<i>Ph. D. Course</i>			
1st year	2	1	3
2nd year	5	2	7
3rd year	4	3	7
Total	11	6	17

No. of students from outside: Nil

No. of students who obtained degrees during the year:

Degree (M. Sc. Ag.) — 14

Diploma — 1

Practical training programme

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3 Education concession under KPCR	35
4 ICAR Merit cum means scholarship	1
5 ICAR Junior fellowship	17

	9
6 ICAR Senior fellowship	9
7 KAU Merit scholarship	20
8 KAU Fellowship	
9 Educational concession to Backward classes welfare department of Andhra Pradesh	Nil
10 Merit scholarship to the children to school teachers	Nil
11 USAID (New Delhi) for Nepal students	2
12 Educational concession to Tripura students	Nil
13 Educational concession to Lakshadweep students	4
14 Gandhi Centenary merit scholarship to the children of Bhilai Steel Plant employees	1
15 Scheduled caste students scholarship	40
16 Scheduled tribe students scholarship	3
17 OBC Christian converts	1
18 Stipend to Bhutan students	Nil
19 Stipend to Meghalaya students	2
20 Post Metric Scholarships (HRD)	Nil
21 Stipend to village level workers admitted for B. Sc. (Ag.) course	7
Total	169 Nos.

Extra curricular/co-curricular activities

Sri. R. Prakash, Ph. D. scholar continued to be the President of the College Union for the period. The students of the College participated in the activities connected with arts club, speakers club, social services league, camera club, planning forums etc. organised by the students union.

N. S. S. Activities

Dr. Skariah Oommen, Associate Professor, Animal Husbandry division and Sri. P. A. Rajan Asari, Assistant Professor (Entomology) continued to be the Programme officers of the NSS Units of the College during the year under report.

The student strength allotted to the College for 1984-'86 was 260. The volunteers have taken active participation in the various activities.

The two community centres of the N. S. S. units of Kakkamoola and Palapoor continued to function with facilities for reading news paper and weeklies.

Facilities were also provided for indoor games. Thirty five volunteers of the unit donated blood during this year.

An interclass quiz competition was conducted by the NSS Unit during May, 1985. The unit celebrated the environment day on June 5th, 1985. Vanamahotsava was celebrated and 400 seedlings were planted.

Dr. Skariah Oommen, Programme Officer attended the Regional Workshop of NSS functionaries at Madhura Kamaraj University from 20th to 22nd July, 1985.

A vaccination campaign was conducted on 7th December, 1985 at Kakkamoola and 250 birds were vaccinated against Ranikhet disease in poultry.

The unit celebrated the International Human Rights day on 10th December, 1985, and the national Youth week from 12th to 19th January 1986. The unit conducted Inter collegiate debate and quiz competition.

The unit started an adult education programme at Kakkamoola.

Tournaments/Championships

The interclass competitions were conducted in all games. The annual athletic meet was conducted as 'campest 85'. The college teams participated in all the inter collegiate tournaments conducted by the University.

The Department of Physical Education conducted coaching camps in various games and athletics and also practice matches were held in Basket Ball, Cricket, Shuttle, Badminton, Volley ball and Table tennis.

The college stadium was selected for the practice of inter national teams in connection with the Nehru Cup Foot Ball tournament.

The construction work of the indoor stadium is in progress. The drainage and the step around the stadium are almost completed.

Hostel

1. P. G. Hostel

Sri P. Chandrasekharan continued as the Assistant Warden till 31-12-1985 and Dr. K. P. Vasudevan Nair took charge as Assistant Warden from 1-1-1986.

Sri. S. Sathiadevan was the steward during the period.

Total number of students residing in the hostel is 35.

2. U. G. Hostel

Sri. S. Pazhania Pillai continued as Assistant Warden and Sri. K. Gopakumaran Nair continued as steward of the U. G. Hostel.

No. of students residing in the hostel was 107.

3. Ladies Hostel

Smt. K. Saradamma continued as Asst. Warden and Smt. L. Kamalakshy was the Matron of the hostel. The total strength of inmates in the hostel was 133.

College Library

269 books were purchased during the year making the total books in the library as 20654. There were 95 subscribed journals.

Livestock farm (Dairy and Poultry unit)

There were 22 milch animals and 36 dry animals including calves and working bullocks. 4 cows and one cow calf were procured. Quantity of milk produced during the year was 37,545.5 lit and the per day yield was 103 lit. Lactation average of the herd is 1,632.4 lit. 26,136 nos were produced and Egg production per day was 72 nos.

No. of cases treated in the Veterinary hospital

975 cows and buffaloes, 315 Poultry and 439 other animals were treated. No. of pregnancy diagnosis conducted was 203. Quantity of fodder produced was 140 MT.

The total expenditure of the livestock unit was Rs. 2,47,164.20 and the receipt was 2,47,058.70.

Lab to Land programme

Fifty farmers were selected from Muttakkad and Kalliyoor Villages located near the college. A basic survey was conducted to identify the critical inputs which are to be supplied to the farmers. One kisan mela and four training programmes were conducted for the benefit of the selected persons under the programmes. The "Farmers day", conducted in connection with the lab to land programme of Muttakkad village was inaugurated by the Vice-Chancellor, Kerala Agricultural University on 22nd February 1986. An agricultural seminar was also organized as part of the farmers day.

Village adoption programme.

Two Frontline Demonstrations on cowpea (C-152) and vegetables were conducted in the adopted village of Kalliyoor during the period. One Knapsack sprayer of 9 lit. capacity was distributed as community input.

Two seminars were organised under village adoption programme on fodder cultivation and intercropping in coconut garden.

Museum-cum-information centre.

Dr. G. Rangaswamy, former Vice-Chancellor of TNAU and Chairman, KAU Commission opened a Museum-cum-Information Centre at the Department of Agricultural Extension, College of Agriculture, Vellayani on 22-2-1986.

Publication

Several scientific papers and popular articles have been published. Based on the research results, several recommendations were also made for inclusion in the package of practices published by the Directorate of Extension, Kerala Agricultural University.

Visitors

Important visitors were:-

A world bank team headed by Dr. Rabia and accompanied by Dr. S. K. Sharma from the Ministry of Agriculture, Additional Director Sri. Jayasankar and Director of Extension, KAU on 25-9-1985.

Dr. M. V. Reddi, Professor and Head, Department of Genetics and Plant Breeding, S. V. Agricultural College, Thirupathy on 13-5-1985.

Dr. M. Aravindan, Senior Scientist, ICAR on 7-2-1986

Dr. Carengal, IRRI and Dr. Kulkarni, ICAR on 25-3-1986.

Dr. G. Sivasankar, Professor of Agricultural Botany, UAS, Bangalore.

Dr. (Mrs). Patresia Materson, FAO expert on IPC in rice on 20-1-1986.

Dr. G. Bhaskar, Endocrinologist, A and M University, Texas on 18-6-1986.

Dr. J. S. Gill, Project Co-ordinator (Nematology), IARI, New Delhi

Dr. S. Berger, Professor and Head of Nutrition and Food Economics, Poland Agricultural University.

Mr. Das Gupta and Smt. Honar Nachia, UNICEF, Madras.

56 Indian and Canadian students under Indo Canadian Youth Exchange Programme.

Instructional farm, Vellayani

The total area of the farm comprises of 75 ha. of garden land and 165 ha. of kayal lands.

The main crops being cultivated in the garden lands of the farm are Coconut 20 ha., Rubber 2 ha., Banana 10 ha., Paddy 5 ha., Mango 10 ha., Guava 1 ha., Sapota 0.50 ha., Bread fruit 0.50 ha., Jack 0.50 ha., Nutmeg 1.50 ha., Cloves 0.50 ha. etc. The rest of the area is occupied by roads and buildings. The important activities of the farm are centred around production and distribution of quality Coconut seedlings, grafts, layers and other seedlings of fruit and other ornamental plants, vegetable seeds, ornamental plants, maintenance of varietal collection of banana.

In the kayal lands attached to this farm a single crop of paddy is raised during the pancha season ie. from December to May by dewatering the kayal lands.

During the year 16,146 Tons of Banana were produced and sold and 688 Banana suckers were distributed among farmers.

3.529 Tons of paddy seeds were produced and sold to cultivators 7.767 Tons of bulk paddy and 2.969 tons of paddy straw were produced and sold.

1643 komadan coconut seedlings and 18,128 WLT seedlings were distributed from the farm. 1.865 tons of rubber sheets, 240 Kg rubber wash were sold.

19749 nos of vegetable seed packets were distributed from the farm. 249 775 Kg. of vegetable seeds were sold from the farm. 5549 ornamental plants and rooted cuttings were produced and sold.

18,692 grafts, layers and seedlings of fruit plants were also produced and distributed.

1.1.1 Centre of Excellence for Tropical Soils –

Main objectives in brief are:-

- i) Documentation of the research work on Kerala soils.
- ii) Development and execution of specific research programs on Kerala soils.
- iii) Detailed investigations on degraded and problematic soils.
- iv) Co-ordination of the work on soils carried out by different agencies.
- v) Function as a centre for advanced training in the investigation of soil problems.
- vi) Collaboration with other sister Institutions/ Universities to foster inter-disciplinary approach to agricultural research and teaching.

The Centre started functioning on 1-6-85. Dr. M. M. Koshy is in charge of this centre.

Details of work carried out

a) *Documentation*

With a view to documenting the work carried out on the soils of Kerala during the last sixty years, the published papers available on Kerala soils have been reviewed and draft summary and bibliography prepared.

b) *Research projects.*

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

The 30 soil samples collected include 12 from Kari, 12 from Karapadom and 6 from Kayal lands. These soils were immediately analysed to minimise deviation from field conditions. Physical, physico-chemical and chemical properties were determined.

Six representative soil samples, two each from Karapadom, Kari and Kayal were used to study the effect of drying and wetting on the physico-chemical properties of these submerged soils.

2 A comparative study of the nature of acidity in the upland and lowland soils of South Kerala.

Seventy two soil samples collected from 12 locations each from three taluks, viz. Neyyattinkara, Nedumangadu and Pathanamthitta were used for the study.

Distribution of organic carbon, nitrogen, C/N ratio, available P_2O_5 , K_2O , C. E. C., $exch. H$, Al, Fe, Ca and Mg sand, silt and clay and soil reaction of moist and dry soil in water and in KCl at different locations, depths and physiographic positions were determined.

3 The occurrence and distribution of the micronutrient elements in the rice soils of South Kerala.

Samples of surface and sub surface soils, typical of the paddy soil types of Kerala, viz. Kari, Karapadam, Kayal, coastal sandy alluvium and lateritic alluvium were collected and processed for the study. The analytical work is in progress.

4 Micronutrient status of Kerala soils.

Samples representing the ten types of Kerala soils from different locations were collected and analysed for physical, physico-chemical and chemical properties. Fe, Mn and Zn status of these soils is determined. Determination of Cu, Mo and B is in progress.

5 Fertility investigations in Kole soils with special reference to micronutrients.

Samples of surface and sub surface soils from 15 locations representing Kole soils were collected and analysed for their physical, physico-chemical and chemical properties. Fe, Mn and Zn status of these soils was determined. Determination of Cu, Mo and B is in progress.

1.2. COLLEGE OF HORTICULTURE, VELLANIKKARA

Location

The College of Horticulture is situated in the Main Campus of the Kerala Agricultural University at Vellanikkara, 10 K. M. 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 hectares comprising of Instructional Farm, Vellanikkara and is utilised for imparting practical training to students and for undertaking research by the staff and students.

Dr. P. K. Gopalakrishnan continued as Associate Dean of the College.

Fifteen Departments viz. Pomology and Floriculture, and Landscaping, Plantation Crops and Spices, Olericulture, Processing Technology, Agronomy, Soil Science and Agril. Chemistry, Agricultural Botany, Agricultural Entomology, Plant Pathology, Agril. Economics, Agril. Engineering, Agril. Statistics, Agril. Extension, Agro Meteorology, Physical Education continued to function in the college. Besides the following schemes are also functioning in the college.

1. A centre of excellence/Advanced Studies for Humid Tropical tree crops and Environmental Horticulture
2. Manpower development Scheme.
3. The Scheme on Root wilt Disease of Coconut in Kerala
4. All India Co-ordinated Vegetable Improvement project.
5. All India Co-ordinated Spices and Cashew Improvement Project—Research on Ginger.
6. Restoration of degraded environment in Chambakkad Tribal Colony area.
7. Establishment of Central Nursery for hybrid Pepper.
8. Adhoc Scheme for marketing of Coconut and Cocoa in Kerala.
9. Mechanical control and utilisation of floating type aquatic weeds, Vellanikkara.
10. Kerala Agricultural Development Project.

Changes in personnel by new appointments/transfer etc.

Dr. M. Aravindakshan, Director, Centre of Advanced Studies on Tropical Tree Crops and Environmental Horticulture took over the charge of Director of Research from 10-3-1986 onwards.

Dr. K. M. N. Namboodiri—appointed as Professor, Department of Plantation Crops with effect from 1-4-1985, consequent on the termination of the Sugarcane Research Scheme.

Sri. K. Gopakumar, Professor Agricultural Botany transferred and posted from the College of Agriculture, Vellayani assumed charge on 9-12-1985.

Sri. C. K. Ramakrishnan, posted as Professor, Department of Plant Pathology assumed charge on 1-2-1986.

Sri. John Thomas, Professor, Department of Agricultural Engineering was transferred and posted as Liaison Officer, Kelappaji College of Agricultural Engineering. He was relieved on the afternoon of 31-12-1985.

Faculty Improvement Programme

Smt. V. L. Geethakumari, Assistant Professor, Agronomy and Smt. Pathummal Beevi, Assistant Professor (Entomology) were granted study leave for undergoing Ph. D. Course.

Sri. P. K. Asokan, Assistant Professor (Agronomy) joined duty on 30-11-85 after the expiry of the study leave granted to him.

Sri. Luckin C. Babu, Associate Professor (Botany) joined duty in the Centre of Advanced Studies for Humid Tropical Tree Crops and Environmental Horticulture after the completion of the Ph. D. Programme

Details of Seminars/Symposia Extension Lectures/Training Programmes conducted

A training programme on nematological techniques for 3 days duration was arranged by the department of entomology for the benefit of Research Assistants from the Cardamom Research Station, Miyadumpara.

A seminar on Biological Control of *Salvinia melanta* was conducted at Arpukkara, Kottayam District for the farmers of that area on 20th May 1985 and supplied 450 packet of the weevils for releasing.

Department of extension conducted agricultural seminars under Village Adoption programme and Lab to Land programme.

Academic Programme

Strength of students under each course

i) U. G. Course

B. Sc. (Ag.) Degree Programme

Year of admission	Men	Women	Total
Ist Year (1985 admission)	46	27	73
IInd Year (1984 admission)	32	36	68
IIIrd Year (1983 admission)	30	24	54
IVth Year (1982 admission)	32	24	56
Final Year (1981 admission)	52	28	80
Total	192	139	331

No. of outside students with details of State/Country/Programme etc.

State/Country	Total		
	M	W	Total
Bhutan	4	—	4
Meghalaya	1	1	2
Mizoram	0	1	1
Arunachal Pradesh	1	—	1
Manipal	1	1	2
Nepal	0	2	2
Tripura	10	—	10
Andaman Nicobar	1	3	4
Lakshadweep	1	1	2
Pondichery	5	—	5
Tamil Nadu	1	—	1
Sudan	6	—	6
Total	31	9	40

No. of students who obtained their degrees

B. Sc. (Ag.) Degree Programme

Year of admission	M	W	Total
1979	—	1	1
1980	7	—	7
1981	21	24	45
Total	28	25	53

i) P. G. Courses

Strength of students in each course

M. Sc. (Hort.) Degree Programme

Year of admission	M	W	Total
Ist Year (1985 admission)	1	6	7
IIst Year (1984 admission)	2	6	8
Total	3	12	15

M. Sc. (Ag.) Degree Programme

Year of admission	M	W	Total
Ist Year (1985 admission)	11	18	29
IIInd Year (1984 admission)	15	19	34
Total	26	37	63

Ph. D.

Year of admission	M	W	Total
Ist Year (1985 admission)	2	5	7
IIInd Year (1984 admission)	1	7	8
IIIInd Year (1983 admission)	2	0	2
Total	5	12	17

No. of Students from other states/country

M. Sc. (Hort.)	1
M. Sc. (Agri.)	1
Ph. D.	1
Total	3

No. of students who secured degree during the period

Course	M	W	Total
M. Sc. (Ag.)	3	8	11
M. Sc. (Hort.)	4	6	10
Ph. D.	2	—	2
Total	9	14	23

Practical training programmes

Besides regular practical classes in the laboratories and in the field, the undergraduate students are given training in the cultivation of various

annual crops, maintenance of perennial crops and processing of agricultural and horticultural produces through various work experience courses.

Study tour

The second and third Year B. Sc. (Ag.) students visited places of agricultural importance all over the state and all over the country respectively.

Scholarships, awards and aids to students:

1	National Merit Scholarship	30
2	District Merit Scholarship	7
3	Stipend to Andaman Nicobar Island Students	3
4	Stipend to Tripura Students	8
5	.. Lakshadweep Students	1
6	.. Nepal Students	2
7	Nominees of Meghalaya	2
8	Need cum Merit Scholarship	13
9	University Merit Scholarship	21
10	Post Metric Scholarship under H. R. D. programme	4
11	Educational Concessions to SC/ST	29
12	Educational Concession under KPCR to SEBC and F. C. Students	40
13	KAU Fellowship	15
14	ICAR Junior Fellowship	26
15	ICAR Senior Fellowship	3
	Total	204

Extra curricular/Co-curricular activities

Students of the college participated in activities connected with sports and game, arts club, quiz club, social service league and planning forum. These activities were undertaken by students union. In addition they participated in the National Service Scheme, Village Adoption Programme, Lab to Land programme and other extension programmes organized by the University.

Hostel

1. Mens Hostel

Dr. P. Varadarajan Nair, Associate Professor, Department of Plant Pathology was the Assistant Warden till 30-10-85.

Dr. S. Rajan, Assistant Professor, Department of Olericulture, took charge as Assistant Warden from 1-11-85.

N. P. Chandran, was the Steward.

2. Ladies Hostel

Dr. Sosamma Jacob was the Assistant Warden of the ladies hostel.

Hostel Strength

	Men	Women	Total
B. Sc. (Ag.)	144	100	244
B. Sc. (C & B)	35	25	60
P. G.	11	30	41
Total	190	155	345

1053 Books were purchased during the year making the total no. of books in the library as 21900. The college is subscribing for 231 journals both Indian & Foreign.

Book bank scheme

Under the scheme 276 books were issued to the students during the year collecting 50% of the cost from them.

Visitors to the institution

Ronald H. Pallock, USAID New Delhi; Dr. K. V. A. Bavappa Director, C. P. C. R. I., (KAU Commission); Dr. Santa Ram, Professor of Horticulture, G. B. Pant Agricultural University, Pant Nagar; Dr. H. Hanumantha Rao, Chief Co-ordinator, Coffee Board, Karnataka and Dr. S. P. Varma, ICAR Project Co-ordinator were visited the college during the report period.

1.3 COLLEGE OF CO-OPERATION & BANKING

As provided in section 5 of the Kerala Agricultural University Act, 1971 and according to the decisions of the 22nd meeting of the Academic Council held on 7-11-1980 and the 21st meeting of the General Council held on 20 & 21st November, 1980, a four year degree programme in Co-operation and Banking was started on 16th November 1981 in the College of Horticulture, Vellanikkara.

Dr. C. A. Jos, Professor and Head of Office of the Co-operation and Banking programme held full additional charge of the post of Associate Dean. The sanctioned strength of the scientists of college during the year was 30 (Thirty).

Besides academic programmes the following two research projects were in operation in the college during the period.

1. 'Impact of Development Projects in the Western Ghat Region on the Forest Dependent Population'—A case study of Wynad District funded by the Department of Environment Government of India under the leadership of Sri. M. Mohandas, Associate Professor.
2. 'Evaluation of Peoples' Dairy Development Project Kalady' funded by the Peoples' Dairy Development Project, Kalady under the leadership of Dr. C. A. Jos, Associate Dean i/c and Mrs. Molly Joseph, Junior Assistant Professor.

New Projects started during the year

The Indian Council of Social Science Research, New Delhi has accorded sanction for a research project titled 'Spatial Micro-level Planning for Integrated Rural development—An exploration into the potentialities of an Alternative Data—base' for a period of 16 months of a cost of Rs. 44730—.

Changes in personnel due to new appointments, transfers, etc.

Sri. P. C. Mathew, selected and appointed as Assistant Professor (Management). Miss. V. Leelavathy appointed as Junior Assistant Professor (Commerce) on provisional basis. Sri. A. T. Philipose, Sri. E. Vinaiakumar and Sri. Jose Degaul Pius were appointed as Junior Assistant Professors (Co-operation). Mrs. Jaya S. Anand and Miss. E. M. Sahda appointed provisionally as Junior Assistant Professors (Banking).

Mrs. K. S. Sujatha, selected and appointed as Assistant Professor (Statistics). Miss. P. Sheena, appointed as Junior Assistant Professor (Economics).

Dr. Tharian George, Assistant Professor (Economics) and Sri. James Manalel, Assistant Professor (Banking) resigned their posts on 31-8-1985 and 30-9-1985 respectively. Miss. E. M. Sahda, Junior Assistant Professor (Banking) resigned the post on 29-3-1986. Dr. Sreekumar Sreedharan, Associate Professor (Commerce) resigned from the service.

Faculty Improvement Programme

Sri. T. Paranjothi, Assistant Professor (Co-operation) was granted leave for study purpose for one year from 3-9-1985 to do M. Phil. in applied Economics.

Details of Seminars/Symposia/Extension Lectures/Training Programmes/Correspondence Course etc. conducted

A two day workshop on 'Development of Managerial Personnel in the Co-operative Sector in Kerala' was organised by the College at the Directorate of Extension, Mannuthy on 26th and 27th April, 1985.

Details of Seminars/Symposia/Workshop/Training Programmes etc attended

Dr. C. A. Jos, Associate Dean i/c attended the National Seminar on 'Linking of Agricultural System with Commercial Banks' organised by the National Institute of Bank Management from 9th to 12th July 1985 at Pune. Seminar on 'Research in Social Sciences' conducted by the Asian Institute of Development and Entrepreneurship, Cochin from 15th to 16th September 1985 at the University of Cochin and the

Seminar on Economic Development of Western Ghats organised by the Department of Science and Technology, Tamil Nadu on 21st and 22nd September 1985 at Uthakamandalam.

Sri. M. Mohandas, Associate Professor attended the National Seminar on Agrarian Structure and Strategies for Agricultural Development for the 21st Century conducted by the University of Agricultural Sciences, Bangalore from 2nd to 5th December 1985 at Bangalore and the National Workshop on Alternative strategy for Poverty Alleviation through the Application of Science and Technology in Rural auspices of Inter-Cultural Foundation for Development Management, New Delhi.

Publications of the Faculty

Dr. C. A. Jos (1985) Review of the present supply position and the rationale for the supply of required personnel in the Co-operative Sector.

M. Mohandas (1985) An Integrated Approach to Co-operative Education, Research and Personnel Development for Kerala.

Philip Sabu (1985) Challenges facing the Co-operative Sector in Kerala.

T. Paranjothi (1985) Professionalisation of the Co-operative Sector in Kerala.

Dr. C. A. Jos, (1985) Linkage of Kerala Agricultural University with Commerical Banks.

Dr. N. Rajan Nair (1985) Regulated Markets in Tamil Nadu—A Retrospect.

Dr. C. A. Jos (1985), Research in Co-operation.

Philip Sabu and T. Paranjothi, (1985) Restrictive provisions in the Kerala Co-operative Societies Act, 1969. The Co-operator, No. 22, Vol. XXII May 15, 1985.

Dr. C. A. Jos (1985), Economics and Environment of the Western Ghat Region.

M. Mohandas (1985) A model Institutional frame for Rural Development.

M. Mohandas (1986) Co-operatives and Rural Development, Tamil Nadu Journal of Co-operation, No. 9, Vol. 77, March 1986.

Dr. C. A. Jos (1986) Approach to Co-operation as Integrated System of Education, Research and Extension in Indian Agricultural Universities. The Co-operator No. 16, Vol. XXIII, February 15, 1986.

Academic Programmes

B. Sc. (C&B) Degree Programme

Strength of Students

Sl. No.	Year of Admission	No. of Students		
		Men	Women	Total
1	1985 Admission (I year)	16	14	30
2	1984 Admission (II year)	16	6	22
3	1983 Admission (III year)	14	13	27
4	1982 Admission (IV year)	12	14	26
5	1981 Admission (IV year)	10	3	13
Total		68	50	118

Number of Outside Students

Sl. no.	Name of the State	Men	Women	Total
1	Lakshadweep	2	—	2
Total		2	—	2

Number of Students who obtained B.Sc (C&B) Degree

Sl. no.	Year of Admission	Men	Women	Total
1	1981 Admission	21	17	38
Total		21	17	38

Practical Training Programme

The training and project work were given during the final trimester of the B. Sc (C&B) programme to give the students a first hand knowledge of functional management problems of the co-operative institutions.

Study tour

The all Kerala study tour of the 1984 admission students were conducted from 21-11-85 to 29-11-85 Co-operative and other institutions of academic interest were included in the itinerary. The 1982 admission students had their all India study tour from 5-2-86 to 27-2-86. The touring party called on co-operative as well as other institutions of national importance and repute.

Scholarships, Awards and Aids to Students

Sl. No.	Name of Scholarship Award/Aid	No. of recipients
1	National Merit Scholarship	1
2	Merit Scholarship (District-wise)	1
3	ICAR Post-metric Scholarship (HRO Programme)	1
4	KAU Merit Scholarship	14
5	Educational Concession to SC/ST students	17
6	Educational Concession to students of Lakshadweep	2
Total		36

Extra-Curricular/Co-curricular Activities

Students' Union Activities

The College Union 1984-85 was inaugurated by Sri. Suresh Kurup, M. P. on 20th June 1985.

The Arts Club was inaugurated by Prof. Vayala Vasudevan Pillai, Assistant Director School of Drama, University of Calicut. The Quiz Club conducted an interclass quiz competition on 13th December 1985. Prof. K. V. Ramakrishnan the renowned poet inaugurated the Readers and Writers Forum.

A magazine committee was set up with Dr. N. Rajan Nair as the staff adviser. A wall magazine called "Sarani" was released by the committee.

The Planning Forum was inaugurated by Dr. AGG Menon, Director of Extension. A guest lecture on "How to face an interview" by Professor P. C. Thomas, St. Thomas College, Trichur was arranged on 17th December 1985.

The Students' Union collected an amount of Rs. 2500/- from the students and credited to the Ethiopia Relief Fund.

NSS Activities

Dr. U. Ramachandran continued to be the programme officer of the NSS unit of the College. The unit had a volunteer strength of 110 students. A Community Centre was started at Mattampuram in Kuruchikkara village-the adopted village of the unit-with the help of the Local Youth Association.

The volunteers of the unit planted seedlings in the campus of the Directorate of Extension and on both sides of the National Highway. The volunteers under took a cleaning and maintenance campaign at the Primary Health Centre, Vellanikkara on the Independence Day.

The state level and university level camps and seminars were attended by the volunteers of the unit during the year.

Sri. A.G. James an NSS volunteer of the College, participated in the 107 days long 'KNIT INDIA' Cycle March which commenced on 24th December 1985 from Kayakumari and ended on 9th April 1986 at Kashmir under the leadership of Dr. Baba Amte.

The NSS unit observed the National Youth week from 12-1-1986 to 19-1-1986 competitions in debate, elocution, music having nationally and socially relevant content and a seminar on youth were conducted in this connection.

Lab-to-Land Programme

Dr. U. Ramachandran was the implementing officer. The programme was implemented in the Madakkathara Village.

The 25 selected beneficiaries of the Madakkathara Village continued to receive the benefits during this year also.

In order to develop agriculture and allied activities of the beneficiaries, 30 farmers were selected and recommended for availing loans from the Agricultural Development Branch of the State Bank of Travancore, Trichur.

Two 'Kisan Melas' were conducted. A cattle show was also organised as part of the 'Kisan Mela'.

Village Adoption Programme

Madakkathara was the adopted village of the college.

Service of the scientists in the Directorate of Extension and Communication Centre was made use to take classes for the farmers.

Athletic Activities

Sri. P.C. Mathew, Assistant Professor was the officer in charge of sports and games.

Elections to the athletic association were held along with the Students' Union election on 25th May 1985.

The athletes of the college participated in all the events of the Kerala Agricultural University Tournaments 1984-85 held on 11th, 12th and 13th October, 1985.

The inter class tournaments in Foot Ball, Basket Ball, Volley Ball, Shuttle Badminton and Ball Badminton were held from 10th January to 19th January 1986.

Self Improvement Programme

Dr. N. Rajan Nair was officer in charge of the programme.

The main objective of the programme is to impart education in specific areas to the students of the B. Sc (C&B) and to equip them to appear for various competitive examinations and twelve students of the 1982 admission were selected and training given.

As part of the training, regular classes were arranged by experts on subjects like Mathematics, English, Physics etc.

Fourteen journals catering to diversified interests were being subscribed for the programme. Besides journals and house magazine of various institutions – national and international – were being received on a reciprocal basis.

Hostel

The boys and girls who required hostel accommodation were boarded in the men's and women's hostels of the College of Horticulture Vellanikkara, 35 boys and 22 girls stayed in the hostels during the year.

College Library

During the year an amount of Rs. 45000 – was spent for purchasing books and subscribing for journals.

Book Bank Scheme

Under the scheme 117 books valued Rs. 5020.55 were purchased and issued to the students, collecting 50% of the cost from them.

Visitors to the Institution

Prof. N. S. Ramaswami, Indian Institute of Management, Bangalore, Sri. E. Chandrasekharan Nair, Ex-Minister, Kerala, Dr. M. A. Ommen, Professor of Economics, University of Calicut, Dr. P. K. Gopalakrishnan, Member, State Planning Board, Professor Vayala Vasudevan Pillai, Assistant Director, School of Drama, University of Calicut, Professor K. V. Ramakrishnan, Poet, Professor P. C. Thomas, St. Thomas College, Trichur, Professor Govindankutty Menon, Sree Kerala Varma College, Trichur, Swami Sankarananda, President, Sree Ramakrishna Ashram, Trichur, Dr. A. Abdul Lathief, M. D., Medical College, Trichur and Professor Raja Raja Varma, Sree Kerala Varma College, Trichur were the important dignitaries visited the college.

1.4 REGIONAL AGRICULTURAL RESEARCH STATION, PILICODE

The Agricultural Research Station, was established in the year 1916 by the then 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 re-organised under the NARP in 1980 to solve location specific problems in the northern zone of Kerala and was up graded as the regional agricultural research station.

The lead function of the station is coconut and coconut based farming systems.

Area of the station is 87.1661 ha, which includes 30.2661 ha. of garden lands acquired in 1985.

The important crops grown are, coconut (44.9 ha) rice (62. ha. in 2 season), cashew (1.0 ha), pepper (0.60 ha) and banana (1.50 ha).

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

Study leave was granted to Smt. A. Naseema, Assistant Professor, Sri. A. M. Ranjith, Assistant Professor and Smt. V. K. Mallika, Assistant Professor. Leave for study purpose was sanctioned to Sri. K. J. Loveson, Farm Assistant for B. Sc. (Agri) Course, Sri. P. Sasidharan Nair, Tractor Driver for LSA Training and Sri. T. Venu, Lab Assistant for LSA Training.

The 8th NARP KAEP Joint Regional workshops were held on 14-15 January 1986.

Sri. M. Govindan, Jr. Asst. Professor attended the XXVI Annual Conference of the Association of Microbiologists held at Madras on 10-12 October, 1985.

Sri. M. Govindan, Jr. Asst. Professor, participated in the National Seminar on Microbial Ecology held at TNAU, Coimbatore, on 21 -23 January, 1986.

Dr. G. S. L. H. V. Prasad Rao, Associate Professor attended the Second Agrometeorological Congress held at the G. A. U., Anand, on 10-12 March, 1986.

Sri. M. Govindan, Jr. Asst. Professor, attended in the National Symposium on current status of Biological Nitrogen fixation Research held at the HAU on 6-8, February 1986.

Dr. R. R. Nair, Professor i/c. Associate Director, Sri. P. C. Balakrishnan, Asst. Professor and Sri. A. Rajagopalan, Junior Assistant Professor attended the annual meeting of the AICC & AIP at Trivandrum in November, 1985.

RESEARCH

No. of research projects as on March 31, 1986 was 51.

Ongoing projects

i) Crop improvement (coconut)

Utilisation of existing germplasm and description of varieties

The germplasm collection at Pilicode consists of 31 exotic and 36 indigenous cultivars.

An evaluation of the cultivars which have attained the stage of stabilised bearing indicate that Spicata, Philippines Ordinary, New Guinea and Laccadive Ordinary are highly suited for cultivation in Kerala. Spicata produced a mean nut yield of 116 per palm per annum with a copra outturn of 20.32 kg. per palm and topped the list of 12 most promising cultivars. The cultivars showing high yield potential include New Guinea (18.59 kg copra per palm), Philippines Ordinary (18.76 kg copra) and Laccadive Ordinary (18.04 kg copra).

Based on nut yield and other agronomic traits, the All India Co-ordinated Coconut & Arecanut Improvement Project has recommended the release of Laccadive Ordinary.

Evaluation of Tall x Dwarf 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 data on nut yield for the last 7 years indicated the superiority of T x D hybrids over D x T. The best yielders are T x CDG (399.7 nuts/palm in 7 years) and T x MDY (398.60 nuts/palm in 7 years). The D x T hybrids, CDO x WCT and CDO x LO have recorded, 38.1 and 32.1 nuts per palm during this period respectively. The poorest performer is WCT with a cumulative nut yield of 28.69.

The palms in this experiment have not reached the age of steady bearing. Their performance has to be watched closely for a few more years.

Trial of promising seed materials

The palms are in the pre-bearing stage. In biometric characters like the number of functional leaves, T x CDO and T x GB have been observed to be superior to CDO x T and LO x GB.

Production of new cross combinations

The project aims to isolate the most compatible and productive hybrids through field trials. The hybrids include Philippines x Cochin China x Philippines, Laccadive Ordinary x Philippines and Ayiramkachi x T.

The palms are in the pre-flowering stage. In leaf production, Cochin China x Philippines has ranked first (9.1 leaves per palm/year) followed by Philippines x Cochin China.

Study of cross progenies of Exotic Tall x Indigenous varieties

The project aims to exploit genetic diversity by intervarietal and inter racial crosses in coconut in order to spot out promising combinations. The hybrids and the cultivars are yet to attain the steady bearing stage.

In the production of leaf, female flowers and nuts, the hybrid Jaya x Tall ranked first and was superior to the rest. The next best yielder was L. O. x Tall.

The study has to be continued for at least 10 years more.

Study of pre-potency in WCT

The best yielders among the 15 progenies of the pre-potent palms were Nos. 36 (43.6 nuts/palm/annum) and 14 (41.0 nuts/palm).

However, these progenies cannot be considered as good yielders since the productivity is less than 50 nuts/palm/annum.

Evaluation of Tall x Different Dwarfs

This trial was taken up in the year 1972 to find out promising hybrids of coconut. The treatments include WCT x GB, WCT x LD, WCT x GD, WCT x OD, WCT x MD, WCT x AD, NCD YD x WCT and the popular tall cultivar, WCT.

The palms have not so far reached the steady bearing stage. Flowering has been delayed due to moisture stress in the summer months especially in 1983.

The data on vegetative growth gathered during 1985 indicated that SCT x GD and WCT x MD were faster in growths as compared to the rest.

Studies on second generation selfs and sibmated progenies

Selfing was done in certain WCT palms of coconut at Kasaragod during 1924-26 and the selfed progenies were planted at Pilicode. During 1959-60, selfing and sibmating were done on these progenies and the second generation selfs and sibmated progenies planted during 1961. The grand parents were 1/109, 1/109 (orange colour), 1/174, VI/4, 1/129 and VII/127.

The yield data gathered during the last 10 years (1976-85) showed that the sibmated palms produced significantly more number of nuts than the selfs, the percentage increase being 30.4 (13.3 nuts/palm). The selfs produced, on an average, 43.7 nuts/palm. Among the family groups, 1/174 registered the maximum yield of 65.5 nuts per palm and it was significantly superior to the other groups.

ii) Crop management

Influence of partial dehusking of coconut seednuts on the vigour of seedlings

Seednuts were sown in conventional seed beds and in polybags filled with soil with the husk intact and with the husk partially removed (stalk end portion only) in order to study the effect of partial husking on germination and vigour of seedlings.

The growth measurements recorded during the year indicated that partial removal of husk prior to sowing resulted in larger girth at collar while it reduced the plant height.

The study has to be continued to gather information on the effect of husk removal on the establishment of seedlings, when transplanted.

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

The maximum number of ripe nuts was (111.4 nut/palm/annum) registered by the treatment receiving Na_2O and K_2O in the proportion 0:1000 during the year 1985. The data gathered so far (1977-85) however, indicate that the maximum per cent increase (60.3) in nut yield

is obtained when Na_2O and K_2O are applied in the ratio 750:250 per palm per annum. Replacement of potassium to the extent of 50 per cent or even 75% by Na_2O has not reduced the yield of nuts.

Response of D x T hybrids to common salt application

The experimental palms have not so far reached the stage of bearing. The data on growth measurements recorded so far (1977-85) show that application of 250 g Na_2O and 750 g K_2O per palm per annum is the best combination to produce the maximum growth characters and precocity in D x T palms under rainfed conditions.

NPK experiment on major soil types - WCT in laterite soils

Three levels each of N (0.5, 1.0, 1.5 kg/palm), P (0.25, 0.50, 0.75 kg/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 work out the optimum fertilizer dose.

The palms are in the pre flowering stage.

The data on annual leaf production recorded during the period 1977-1985) indicate that palms receiving NPK @ 0.5, 0.5, 1.25 kg/palm produce the highest number of leaves 84.5 per palm in a period of 10 years per palm.

Fertilizer cum irrigation trial on T x G hybrids

The data gathered on growth characters indicate that application of NPK fertilizer @ 0.5, 0.5, 1.5 kg, respectively, per palm and irrigation water (376.4 l/palm) at IW/CPE 1.00 is ideal for fast growth of T x G seedlings.

Investigation on growth and productivity of coconut cv. WCT as influenced by irrigation and fertilizer application

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

From the mean values for plant height, girth at collar and the number of leaves produced, it could be seen that drip irrigation at IW/CPE 0.5 (274 litre per palm, as an average) with a fertiliser dose of NPK @ 0.5, 0.32, 1.8 Kg, respectively, per palm year is the ideal practice for WCT seedlings.

iii) Crop protection

Investigations on stem bleeding disease

Two new fungi, *Philaphora* sp. and *Paecilomyces variottii* have been isolated from the disease affected tissues. The pathogenicity of the latter has been proved by inoculation on healthy palms.

The cultivars Siam, Philippines, Jamaica, Navasi, MDY, MDO, MDG and Kulithalai have been observed to be tolerant to the disease.

Investigations on button shedding in coconut

The isolates from the shed buttons of the cultivars New Guinea and WCT have yielded continuously a *spp.* of *Pestotia*. The spread of the fungus is rather slow.

Plant parasitic nematodes occurring in coconut gardens under different cropping systems

Root knot nematodes have been observed in the coconut gardens inter cropped with fodder and pepper.

RICE

i) Crop Improvement

Varietal trial on rice

Five varieties of rice Jaya, Karthika, Pavizham, Swarnaprabha and the culture 23332-2 were tested for their yield potential and adaptability. The varieties were found to be on par with grain and straw yields. None of them showed any special reaction to the common pests and diseases.

Evaluation of rice germplasm collection for the northern region

Twenty two rice varieties (Dwarf indicas) were tested for yield during the first crop season. The maximum grain yield (2080 kg/ha) was registered by IR 32 closely followed by AU 1 with an yield of 2030 kg/ha. Jaya and Jyothi, the local checks, yielded, 1510 kg each/ha.

A metroglyph analysis carried out on the agronomic traits of 17 popular tall *indicas* in the germplasm collection indicated that the gone-types studied did not have great genetic variability probably due to long years of selection pressure employed by the farmers for eliminating the less suitable types. The cultivars Kothambarikayama, Kozhivalan and Thottamkayama appeared to be superior to the cultivars with respect to potentiality for higher grain yield.

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

Five mutant lines of Odacheera in the M 10 generation (OD 15, 16, 24, 42, 72) were grown in a saline area and studied their performance. The lines 15 and 72 recorded the highest yield of 3860 kg/ha each. These entries will be tested again in typical salinity areas to study their salt tolerance.

Evolving high yielding varieties of rice

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

From a population of 11,000 single plants (250 for Allikannan and 210 from Thowan) were selected based on synchrony and uniformity in flowering as well as laid out in 1985-87 with the seeds collected from the single plants selected.

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 second crop season. The varieties differed significantly with respect to yield. The check variety Jyothi ranked first with an yield of 4830 kg/ha. The pre-release culture 204 ranked second (4530 kg/ha). The latter also recorded the maximum straw yield (3690 kg/ha) while Jyothi only 2670 kg/ha. The Culture 204 can be rated as a good yielder.

Multilocational trial with Culture 1727

The pre-release culture (received from RRS Pattambi) was compared with Bharathi, Pavizham, Jaya and Thowan to study its yield potential and adaptability. The culture was found to be significantly superior to the other with a grain yield of 4070 kg/ha. It was also on par with the tall variety Thowan in straw yield.

The Culture 1727 will be proposed for release after studying its performance during one more season.

ii) Crop management

Fertilizer management and economics of Koottumundakan practice in paddy

A economic fertilizer practice for Koottumundakan system was investigated in this project.

The maximum net income of Rs. 6142/ha was obtained when the crop was given a fertilizer schedule of 40:20:20 kg NPK/ha in the first and second crop seasons the cost benefit ratio working out to 1.86. The next best treatment i. e. 40:20:20 NPK in Virippu and 20:10:10 NPK in the Mundakan yielded a net income of Rs. 5830 per ha with a C/B ratio of 1.85. This treatment has resulted in a saving of 20 kg plant nutrients per ha. This fertilizer schedule can be popularised after one more seasons trial.

Testing the efficacy of flood tolerant cultures of paddy

The relative efficacy of 7 pre-release rice cultures were tested for their field tolerance to intermittent floods during the virippu season. The cultures were, CR 1009, CR 1018, CR 1030, CR 260-171, CR 292-5259, BR 51-315-4, and B2 52-96-3.

At Pilicode, CR 1018 (160 days) recorded a grain yield of 3540 kg/ha and showed its significant superiority over the rest of the cultures.

At Vellur in a cultivator's field, CR 1018 was the best yielder (4950 kg/ha), while in the state seed farm, Pullur, it was CR 260-171 with an yield of 3998 kg ha. The former was completely damaged by the flood water.

The flood tolerance of these cultures will be tested again in 1986-87.

Weed control in dry-sown rice

The treatments which showed the minimum weed weight (dry matter) at flowering of the crop included handweeding (0.306 t/ha), Penoxalin+2, 4-D (0.388 t/ha) and benthocarb+hand weeding (1.40 t/ha). The untreated control recorded a weed weight of 6.07 t/ha. The data also indicated that penoxalin or benthocarb, should be followed by a hand weeding or 2,4-D application in order to obtain adequate weed control. Both penoxalin and benthocarb gave adequate control of monocot weeds.

The best treatment giving the maximum grain yield was penoxalin +hand weeding (2.62 t/ha). The next best was penoxalin+2,4-D (2.56 t/ha).

iii) Crop protection

Screening rice varieties for disease resistance.

Altogether 94 entries were screened during the year for disease resistance: 44 in the viruppu season and 50 in the mundakan. The only variety to show resistance to sheath blight was 'Kayama' during the viruppu season. M22-65-2-3-1, Adakkan, Mala and IR 34 showed tolerance to the disease. Brown spot was seen on all the entries except Jaganth, Kayama, IR 34 and Cultura 23178.

During the second crop season, PTB 33 was found highly tolerant to sheath blight. Neck blast disease was noticed on Jamuna, Cultura 7944, IR 22, Supriya, Suma, Arikrazhi, Triveni and Jyothi. All the entries showed susceptibility to the disease, brown spot.

Survey of rice crop to identify major disease affecting rice.

After a survey of the rice fields to identify the major diseases affecting the crop, a trial was laid out to study the effectiveness of Dithane M45 and Hinosan for the control of the diseases Blast and Sheath blight.

The results indicated that Dithane M 45 was as effective as Hinosan for the control of the disease. It is also cheaper than Hinosan.

Screening rice varieties against major pests

Eight entries were screened for their reaction to stem borer, gall midge and leaf roller.

Bhadra was found to be fairly tolerant to leaf roller and gall midge.

PEPPER

i) Crop improvement

Screening pepper varieties for shade tolerance

Eight popular cultivars of pepper (Karimunda, Panniyur-1, Kottanadan, Balankotta, Kuthiravally, Arakulam munda, Poonjarmunda and Narayakodi) were screened for their yield performance under the partial shade of coconut. The standards used were Moringa and Subabul.

The vines trained on moringa produced significantly more number of spikes (295.2) than those trained on subabul (100.9).

With respect to green pepper yield Narayakodi recorded the maximum of 1608.6 g/vine followed by Kuthiravally (864.6 g/vine) under the partial shade of coconut. Both these cultivars gave higher yields when trained on moringa.

ii) Crop management

Studies on diazotrophic rhizocoenosis in pepper

The population dynamics of *Azospirillum*, *Azotobacter* and *Beijerinckia* in the rhizoplane and rhizosphere of pepper were studied. *Azospirillum* occurred in remarkably large numbers than *Azotobacter* and *Beijerinckia* in the root environment. Rhizoplane harboured more *Azospirillum* than the rhizosphere.

Inoculation of *Azospirillum* increased the root formation, root development and germination of pepper cuttings. The uninoculated plants developed no roots even after 30 days of planting while treatment with *Azospirillum* resulted in the production of 6 roots per cutting. Treatment with *Azospirillum* was as good as IBA for inducing rooting in pepper.

PULSES

Screening different crop varieties as floor crops in coconut garden

Groundnut

The accession 3122 with a pod yield of 1931 kg/ha was found to be promising for cultivation in the partial shade of coconut.

Cowpea

CG 11 topped the list of varieties screened with a grain yield of 927 kg/ha.

Blackgram

The check variety T9 and Co 2 were found to be the best yielders (004 kg grain/ha).

Greengram

All the 4 varieties screened (Pusa 106, Co 4 Pusa 113 and Pusa 105) were on par, their yield ranging from 627 to 680 kg/ha.

The accessions of these crops were also evaluated in the summer rice fallows.

Groundnut

The varietal difference was not significant. However, the accession 1268 ranked first with a pod yield of 4792 kg/ha.

Cowpea

The varietal differences were not statistically significant. The top ranking entries were, V 38 (1461 kg/ha) and RC 25 (1338 kg/ha). The lowest yielder was P 118 (978 kg/ha).

Blackgram

KMU 3 was the highest yielder (865 kg grain/ha) but it was on par with M3 (948 kg/ha) and Co 2 (936 kg/ha). T9 recorded the lowest yield of 701 kg/ha.

FODDER

i) Crop improvement

Screening fodder grasses and legumes for the northern part of Kerala

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

Panicum maximum cv. Makueni, *P. maximum* cv. Hamil, *P. maximum* cv. Riversdale and *P. maximum* guinea grass produced reasonably good yields, their dry matter yield ranging from 1.03 t/ha to 1.6 t/ha, in the first cutting. In the subsequent cuttings also *P. maximum* cv. Makueni showed its superiority over the others by producing dry matter yields over 2 t/ha.

Screening fodder legumes for the northern region of Kerala

Ten fodder legumes were screened for their adaptability and yield performance under the partial shade of coconut.

Among the test varieties, *Stylosanthes quianensis* cv. Schofield was found to be the best, producing a dry matter yield of 1.7 t/ha in 3 cuttings. The other legumes to indicate promise included *Centrosema pascuorum* cv. Cavalcade, *C. pubescens*, *S. quianensis* cv. Cook and *S. scaba* cv. Seca.

VEGETABLES

i) Crop improvement

Screening varieties of cucurbitaceous summer vegetables suitable for the northern region of Kerala

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

Ridgegourd

The yield of the varieties tested ranged from 0 to 1.90 kg/plant. The best yielder was 2/3 (1.9 kg/plant). The accessions of promise were, 11/2 (1.5 kg/plant), 11/3 (1.5 kg), 25/2 (1.52 kg), 26.2 (1.52 kg) and 17/2 (1.64 kg/plant).

Cucumber

The accession 41/3 ranked first with a fruit yield of 8.08 kg per plant. 75/1 ranked second (7.17 kg per plant).

Bittergourd

The accession Nos. 66/3 and 37/4 topped the list of test varieties with an yield of 1.95 kg/plant. The other promising accessions were, 57/1, (1.87 kg per plant), 13/2 (1.88 kg), 76/4 (1.77 kg) and 66/1 (1.42 kg/plant).

Snakegourd

The accession No. 26/4 recorded the highest yield (6.29 kg/plant) followed by 18/4 (4.72 kg) and 15/2 (4.25 kg).

The promising accessions, based on the indices fixed for selection, have been advanced for a replicated trial during the year 1986-87.

CROPPING SYSTEMS

i) Crop management

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

The population dynamics of different micro-organisms viz., heterotrophs, fungi, actinomyces, diazotrophs, beijerinckia and azotobacter were studied in the rhizosphere samples of three cropping systems: Coconut alone, Coconut+Cocoa in single hedge, Coconut+Cocoa in double hedge.

The study revealed that growing cocoa as an intercrop in the coconut garden favoured the population build up of beneficial micro-organisms in the root environment of coconut as well as in the interspaces of coconut.

Survey and identification of soil and air borne diseases of crops in coconut based farming systems

A new disease, locally called as 'Pottan' was identified and control measures tested. The treatments included application of fungicides and nematicides alone and in combinations. Application of Calixin and Carbofuran to the suckers immediately after the manifestation of disease symptoms controlled the disease.

PLANT PROTECTION

i) Crop protection

Studies on black shank and frog-eye-leaf spot diseases of tobacco

The maximum incidence of frog-eye-leaf spot disease was noticed during January (62%) and the minimum during February (10%).

Spraying with Bordeaux mixture (1%) gave the maximum control of the disease. Calixin (0.2%) was also equally effective.

Evaluation of repellency of some plant products against the major pests of cowpea

The plant products tested included lemongrass leaf infusion (2%), neem leaf infusion (2%), Karinochi leaf infusion (2%) and tobacco leaf infusion (2%). Ekalux spray (0.05%) was adopted as the standard for comparison.

Neem leaf infusion controlled the incidence of aphids effectively; for the control of pod borer, Karinochi leaf infusion was the best, the percentage infection being 8.3 as against 10.4 recorded by Ekalux.

SOILS & AGRONOMY

i) Crop management

Scheduling irrigation for vegetable crops

i) Cucumber

Cucumber (local) was grown under different irrigation practices during the summer season in rice fallows. Basin irrigation at frequent intervals (cultivators practice) resulted in the maximum yield of 39.2 t/ha. The next best treatment was pitcher irrigation giving an yield of 38.2 t/ha. The latter resulted in considerably savings in irrigation water. Stubble mulching had no significant effect on yield.

ii) Watermelon

In order to fix an optimum irrigation schedule for watermelon (cv. Mangalore) grown in the summer rice fallows, the following irrigation treatments were imposed: pitcher irrigation, daily pot watering, basin irrigation at IW/CPE 0.50, 0.70 and 0.90 (depth : 30 mm).

The maximum fruit yield of 25.8 t/ha was recorded by pitcher irrigation as in the previous 2 seasons. The next best treatment was cultivators' practice of daily pot irrigation which yielded 23.28 t/ha. Basin irrigation at IW/CPE 0.70 registered an yield of 21.97 t/ha. The other treatments produced yields lower than 21.97 t/ha.

Mulching exhibited no significant influence.

Developing methods for the rapid multiplication of Azolla spores

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

Isolates of Azolla from different parts of Kerala have been collected. All the types generally perform well during July-October. Cooler temperature with high relative humidity and cloudy atmosphere are highly suited for the growth of Azolla.

A potential sporulating type of *Azolla pinnata* (PIL 1) was identified. It can be used in rice cultivation successfully.

ECONOMICS & STATISTICS

Extent of adoption and constraints in the adoption of improved agricultural technologies

A survey was conducted in 13 Panchayats to study the extent of adoption of improved agricultural technologies by farmers.

The results of the survey indicated that the adoption rate of improved agricultural technologies was comparatively high in rice and banana. The rate of adoption was very poor in cashew.

METEOROLOGY

Effect of drought on coconut yield

Effect of the unprecedented drought during 1982-83 on coconut yield was studied in Pilicode Station. The study indicated that yield decline due to drought will be seen only in the following year.

Seasonal influence on nut size and its characteristics in coconut

The husked nut weight and copra content are high during summer (March-May) and winter (December-February) as compared to those obtained during south west monsoon (June-Sept.) and post monsoon (Oct.-Nov.) seasons.

The total heat units received during the second phase of nut development influenced on nut size.

Estimation of irrigation requirement of crops in the Kasargod district of Kerala by climatic water balance approach

The weekly irrigation requirements of coconut, arecanut, banana and pepper have been computed based on climatic water balance approach. The maximum irrigation requirement per plant (palm in the case of coconut and arecanut) in a week is 453L in coconut, 138L in arecanut, 78L in banana and 75L in pepper. The irrigation requirements of these crops work out to, respectively, 8111L, 2537L, 1426L and 1185L per plant respectively during the span of weeks from November 5 to June 3.

Research Highlights

COCONUT

- 1) The 7th workshop of the All India Co-ordinated and Arecanut Improvement Project recommended the release of the high yielding coconut hybrid (LOxGB) evolved at Pilicode. It has a production potential of 127 nuts per palm as against 97 of Laccadive Ordinary and 51 of Gangabondam. The weight of copra is 194.5 g/nut. It comes to flowering in the 5th year and is adaptable to all types of soils.

- 2) TxD hybrids have been found to be superior to DxT and WCT under rainfed conditions. In cumulative nut yield over a period of 7 years (1979-85), WCT x CDG ranked first producing 399.75 nuts/palm. WCT x MDY (398.6 nuts/palm) ranked second.
- 3) Partial removal of husk (from the stalk end portion) prior to sowing resulted in faster germination and growth. Such seed nuts produced seedlings with good girth, as compared to seed nuts sown in tact.
- 4) Replacement of potassium (K) to the extent of 50 per cent by Na₂O (NaCl) is possible with no yield decline in coconut. The best yields are obtained when coconut is given Na₂O and K₂O in the proportion 750g:250g. per palm.
- 5) The optimum requirement of fertiliser and irrigation for TxG hybrids in the pre-flowering stage is NPK @ 0.5, 0.5, 1.5kg. per seedlings/year and irrigation (30 mm) at IW/CPE 1.00.
- 6) Coconut seedlings (cv. West Coast Tall) could successfully be grown in the sandy loam soils with drip irrigation given at 50% of the average pan evaporation.

RICE

- 7) The Culture 1727 (4070 kg/ha) is consistent in yield. It has been found to be superior to Jaya (3392 kg/ha), Bharathi (3094 kg/ha) and Pavizham (2605 kg/ha).
- 8) Under "Koottumundakan" system of rice cultivation, it is more economical to fertilise the second crop (Mundakan) with half the present recommended dose of NPK (40:20:20), the cost/benefit ratio working out to 1.85 as against 1.86 by fertilizing the crop with 40:20:20 (NPK kg/ha) in each season (Virippu and Mundakan).
- 9) CR 1018 has been identified as a high yielding, flood tolerant rice culture (yield range 3.5 t/4.95 t/ha). Its duration is about 150 days. It can be recommended for areas susceptible to intermittent floods during the Virippu season.
- 10) Dithane M 45 is as good as Hinosan in the control of sheath blight of rice.

PEPPER

- 11) Narayakodi is ideally suited for cultivation in the partial shade of coconut.
- 12) Dipping pepper cuttings in the broth culture of *Azospirillum* induces rooting. It is a good substitute for IBA as a root growth promoter.

FODDER

- 13) *Panicum maximum* cv. Makueni is an ideal variety of fodder grass for cultivation in the partial shade in coconut gardens.

CROPPING SYSTEMS

- 14) Growing cocoa as an intercrop in coconut garden favours the population build up of beneficial micro-organisms like diazotrophs, beijerinckia and azotobactor in the root environment of coconut as well as in the inter space of the crop.
- 15) Application of carbofuran and calyxin (drenching) results in the control of "pottan," disease of banana, which resembles "Kokkan".

SOILS & AGRONOMY

- 16) Pitcher irrigation is an economic practice for vegetables (cucumber and watermelon) grown in summer rice fallows.

METEOROLOGY

- 17) Nut size in coconut is a function of the total heat units available during the second phase of nut development. The husked nut weight is higher in summer (March—May) than in the other months.

Other matters

30.2661 ha of land have been acquired adjacent to the existing farm at Pilicode.

Exhibition

Participated in the Golden Jubilee Celebration of the Chidambaramath U. P. School, Ramanthali and won the first prize for exhibition.

Visitors to the station

Dr. G. Rangaswami, Chairman, KAU Commission visited this station on 7-5-1986.

1.5 PEPPER RESEARCH STATION, PANNIYUR

The Station was started in 1952-53 in Panniyur Village of Taliparamba Taluk in Cannanore District. With the acquisition of additional area in 1981, the total extent of the farm is 26.13 hectares. This is a sub station of the RARS Pilicode.

The main crop pepper, at present occupies an area of about 13 hectares.

The other subsidiary crops grown are rubber, coconut, arecanut, mango and other fruit plants.

Sri. V. Sukumara Pillai, Professor, continued to be incharge of the station.

Three scientists of the station attended the VIIth Workshop of All India Co-ordinated Spices and Cashewnut Improvement Projects held at Kanakakunnu Palace, Trivandrum from 6th to 9th November, 1985.

Three staff members of the Station attended the 8th NARP-KAEP Regional Workshop held at RARS, Pilicode in January, 1986. One staff member of the Station attended the 'writers' workshop on print media for

the KAU Scientists held at the Directorate of Extension, Mannuthy in February, 1985. One of the staff members of the station used to attend the T & V workshop of Cannanore and Kasaragod Districts during the year under report.

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

Research

The Number of research projects on 31-3-85 was 21.

Research Highlights

Crop improvement

In the evaluation of seedling progenies of black pepper, one culture i.e. No. 4180 which is an open pollinated seedling of Arakkulam munda showed promise. Planted in 1982, it has given a yield of 880g of green berries in the harvest 1986. This culture was put under rapid multiplication.

Analysis of six years' yield data (1979-80 to 1984-85) of five cultivars viz. Arakkulam munda, Balankotta, Kalluvally, Kuthiravaly and Panniyur 1 showed that Kuthiravaly has given the highest green yield (2.303 kg/vine) followed by Panniyur 1 (1.809 kg/vine), Balankotta (1.503 kg/vine) Arakulam munda ((1.327 kg/vine), and Kalluvally (0.580 kg/vine).

Morphology of variety Panniyur 1 was studied and compared with that of Malabar and Travancore groups of cultivars through multivariate analysis. It revealed that the variety Panniyur 1 showed more morphological affinity towards Malabar cultivars than Travancore cultivars.

Heritability of spike yield, number of spikes, berries per spike, berry weight and spike length were assessed. It was seen that berry weight showed maximum heritability (80.85%) whereas the traits, number of spikes and spike yield showed the least (27.68% and 30.02% respectively). Spike length (76.45%) and berries per spike (54.55) were intermediate with respect to heritability.

Nature of inheritance of the anthocyanin pigmentation on the stipules in pepper was examined. The character anthocyanin pigmentation was seen to be dominant over the absence of pigmentation. Most of the cultivated types are pigmented ones varying from light to deep purple of the stipules.

Description of the foliar traits of the cultivars in the germplasm which was initiated during the last year, was continued during this year. In all 59 cultivars were described with respect to traits viz. (i) petiole length (ii) leaf length (iii) leaf breadth ((iv) length to breadth ratio, and (v) leaf area.

Crop management

Studies on the influence of planting materials on the growth habit and yield of pepper vines revealed that planting middle one third portion of runner shoots had maximum growth rate, early flowering habit and production of spikes.

Studies on hormonal applications on pepper cuttings on root formation and development revealed that dipping the lower cut end of the cuttings in 1000 ppm IBA solution for 45 seconds was highly advantageous. However, for small nurseries, Seradix B₁ can be used as the material which is readily available and can be easily and conveniently handled by laymen.

Plant protection

Studies on the control of nursery disease of pepper cuttings has revealed that among the various shade intensities provided for raising the cuttings no significant difference was noticed in the incidence of disease during the year. Among the different fungicides tried at fortnightly spraying and drenching, 1% Bordeaux Mixture followed by 0.1% Difolitan was found to be effective in reducing the incidence of the disease.

Studies on the control of pink disease of mango revealed that removal of dried twigs and branches and scrapping off of the pink encrustation and application of wound dresser (Bordeaux paste) on the cut surface, and scrapped area in the last week of June and spraying of 1% Bordeaux Mixture in the last week of June and first week of December are found effective in containing the disease.

Concluded projects

Comparative Yield Trial of pepper varieties

Yield data on the five varieties viz. Arakkulam munda, Balankotta, Kalluvally, Kuthiravaly and Panniyur 1 were recorded from 1979-80 to 1984-85.

The variety Kuthiravaly gave maximum yield (2.303 kg green vine) followed by Panniyur 1 (1.809 kg green/vine). However, Panniyur 1 was seen to be most responsive to better climatic conditions and the variety gave very good yields when the agroclimatic factors were conducive. The variety Kuthiravaly was least sensitive to climatic conditions and hence gave comparatively steady yields throughout the period of experiment, resulting in net high mean yield.

Anatomical studies of the cultivars of Piper nigrum

The anatomy of plant parts of varieties Panniyur 1 and Kuthiravaly was studied and described.

The anatomy of the stem was seen to be adopted for climbing habit. Further, varietal variation with reference to anatomy was not observed.

Crop management

Studies on the influence of planting materials on the growth habit and yield of pepper

An experiment to investigate the influence of planting materials on the growth habit and yield of pepper vines was in progress since 1977.

The middle 1/3rd portion of the runner shoots were found to be the best planting material as indicated by vigorous planting material as indicated by vigorous plant growth, precocity and better yields in plants raised from this portion.

Ongoing projects

Crop management

Observational trial on different live standards for pepper

Seven species of pepper standards were planted in 1982. The pepper variety Karimunda was planted in 1986.

Crop improvement

Morphological studies on pepper varieties

Description of the foliar traits of the cultivars in the germplasm was continued during this year. In all 59 cultivars were described with respect to traits viz. (i) petiole length (ii) leaf length (iii) leaf breadth (iv) length to breadth ratio, and (v) leaf area.

Evaluation of shade tolerant high yielding pepper varieties

Fortyeight genotypes of pepper were planted in an area of natural high shade. The yield data is being recorded.

Breeding – intervarietal hybridization in pepper

Hybridization involving eight parental combinations were done during the year 1985-86. 51 cultures planted in the field in 1982-1983 were harvested in 1986.

A good number of seedling vines planted in 1983 has produced spikes in 1986.

Among the seedling vines evaluated, culture No. 4180, an open pollinated seedling of Arakkulam munda showed promise. Planted in 1982, it has given a yield of 880 g of green berries in the harvest of 1986.

Evaluation of black pepper genotypes in arecanut garden for yield

Ten genotypes were planted in 1984.

Standardisation of nursery techniques for raising bush pepper

The laterals of variety of Panniyur 1 were treated with hormones before planting and plantings were done in December, 1985, January, February, March, April and May, 1986.

Planting in January and December was found to be not suitable for raising bush pepper.

Germplasm collected and screening of pepper varieties

The yield data were recorded for the cultivars in germplasm. Since the various cultivars are not of uniform age, the yield performance could not be properly compared.

Multilocation trial of cultivars of black pepper

Nine cultivars viz. Arakkulam munda, Aimperian, Karimunda, Kalluvally, Kuthiravally, Narayakodi, Neelamundi, Kottanadan and Panniyur-1 were planted in 1984.

Multilocal trial of promising cultures of black pepper

7 cultures viz. Culture Nos. 54, 211, 239, 331, 406, 1171 & 1199 along with Panniyur-1 and Karimunda were planted in 1984.

Crop management

Irrigation experiment on pepper

An irrigation experiment on pepper was started and is in progress since 1981 to find out the effect of summer irrigation on the growth, flowering pattern, berry setting and yield of pepper (Variety Panniyur-1).

The data so far obtained indicate that irrigating pepper vines of Panniyur-1 variety at IW/CPE ratio of 0.25 upto March and is economically advantageous.

Plant protection

Ecological studies on quick wilt disease of pepper

The weather parameters such as rainfall, number of rainy days, maximum and minimum temperatures, and relative humidity are being recorded daily along with the number of pepper vines affected by quick wilt disease in the plot selected for the purpose was in progress at the station since May, 1976.

Results of the studies on the ecology of quick wilt (Foot rot) disease indicate that significant correlation exists between disease infection and rainfall, number of rainy days, relative humidity and minimum temperature.

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

In vitro studies using newer fungicides, some of them having systemic and semisystemic action have been in progress since 1981. *In vivo* studies using different fungicides has been in progress. As per the recommendation of the VI workshop of All India Co-ordinated Spices and Cashewnut Improvement Project held at Calicut the experiment has been modified.

Minimum disease incidence is seen in the treatment receiving Bordeaux mixture spraying and pasting and drenching with Emisan.

Field Experiment for the control of slow wilt

An experiment has been laid out in a cultivator's field during 1982-83 and due to severe drought experienced during 1982-83 all the vines were dead. As per the recommendation of the VI Workshop of All India Co-ordinated Spices and Cashewnut Improvement Project held at Calicut during 1983 it was decided to start a new experiment with nematicides and fungicides. The experiment was laid out during 1985-86.

No clear indication of the superiority of the treatment is seen in the observations collected during the year.

Studies on the control of nursery disease of pepper

An experiment to control the nursery disease of pepper cuttings was in progress since 1981.

Results of the studies on the control of nursery disease of pepper cuttings indicate no significant difference in the incidence of the disease in various intensities of shade provided for raising the cuttings. From among the different fungicides tried as fortnightly spraying and drenching, 1% Bordeaux mixture was found to be effective in reducing the incidence of the disease followed by 0.1% Difolatan.

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

An experiment was laid out for evolution of shade tolerant high yielding pepper varieties during 1982. As a sub project of this project the incidence and intensities of quick wilt (Foot rot) fungal pollu and spike shedding are being recorded to find out disease tolerant types if any.

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

An experiment was laid out for evolution of shade tolerant high yielding pepper varieties during 1982. As a sub project of this project the incidence of pests like Pollu, top shoot borer, marginal gall forming thrips and scale insects are being recorded to find out pest tolerant types if any.

Survey on the quick wilt disease of pepper in Cannanore District

Quick wilt (foot rot) is the most serious and deadly disease affecting pepper. No reliable estimates are available on the extent of damage caused by the disease in the district. Therefore, with a view to find out the extent of damage caused by the disease in the major pepper growing tracts of Cannanore, the survey was started during 1983 and continued during September-November, 1985. The Survey covered an area of 320.84 ha out of the total area of 26413 ha under pepper which works out as 1.21% of the total area under pepper. The survey was undertaken in seven SADU units.

The maximum leaf infection was 21.44%, and the maximum branch infection was 16.79%. The maximum stem infection was 6.78%. The maximum mortality of the vines was noticed in Karimunda variety (19.14%) and the minimum is Poonjar munda (16.07%). Leaf and branch infection was also minimum in Poonjar munda. In the survey it was also seen that all the varieties grown in the District were susceptible to the disease.

MANGO

Studies on the control of Pink disease of mango

An observational trial for the control of pink disease of mango with 26 treatments was started during June, 1981. Based on the results of the observational trial a full fledged replicated trial with five treatments was started during June, 1983 and is being continued.

Minimum infection was noticed in treatment No. 1 i.e. removal of dried twigs and branches and scrapping of the pink encrustation of live branches and cutting off of the infected part, if it is a small twig and application of wound dresser (Bordeaux paste) at the cut surface, scrapped area and to the fork region in the last week of June and spraying of 1% Bordeaux mixture in the last week of June and first week of December.

Visitors to the Station

N. Chanda, Agricultural Development Officer, Tarakeswar Block, Hooghli District, West Bengal, T.W.F. de Waard, Royal Tropical Institute, Amsterdam and Executive Council Members of the Konkani Krishi Vidyapeeth were the important visitors to the station.

1.6 REGIONAL AGRICULTURAL RESEARCH STATION, AMBALAVAYAL

The Research Station was established in the year 1946 as part of Wynad Colonisation Scheme to carryout research on various aspects of improvement of agriculture in Wynad in general and in the Colony area in particular. In 1966, the station was upgraded as Central Horticultural Research Station to undertake intensive research on major horticultural crops like fruits, spices, essential oils etc. In 1972, it was taken over by the Kerala Agricultural University. The station was brought under National Agricultural Research Project in November, 1983 and was 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 and paddy based farming system and verification function for pepper, essential oils and medicinal plants. The Cardamom Research Station, Pampadumpara is a sub-station with lead function for cardamom and verification function for pepper and high altitude rice.

The Krishi Vigyan Kendra, started as a small scheme with the objective of imparting training on scientific technology in agriculture

and animal husbandry to the farmers of Wynad especially to the tribal communities was strengthened with the sanctioning of a full-fledged Krishi Vignana Kendra in 1983 with full financial assistance from I.C.A.R. A poultry unit has been attached to the Kendra. Lab to Land Programme and Village Adoption Scheme are other extension schemes working in the Station.

The station is situated in Sultan's Battery Taluk of Wynad district at an elevation of 914 m above MSL and has an area of 87.03 ha. The geographic location is 11° 37' N latitude and 76° 12' E longitude. The soil is loam rich in humus.

The gross cultivated area is 98.00 ha, which is mixed with coffee, pepper and other annual crops.

Professor K. Kannan, Associate Director continued to be in charge of the Station during the period under report.

The third N.A.R.P. Zonal workshop for High Range Region was conducted at the Regional Agricultural Research Station, Ambalavayal on 17th and 18th January 1986. A total number of 62 scientists and Extension workers from Kerala Agricultural University, C.P.C.R.I., Rubber Board, Cardamom Board, Coffee Board, Agricultural Department BARBAD and farmers participated in the workshop.

A kisan mela and farmers' seminar was conducted on 10-10-1985 under the joint auspices of Lab to Land Programme, Village adoption Programme and Krishi Vigyan Kendra. About 75 tribal farmers attended the Mela.

The staff of the station conducted a number of Agricultural classes to the farmers especially to the Tribal farmers in various tribal colonies.

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

Sri. K. Kannan, Associate Director attended National workshop on Krishi Vigyan Kendra conducted at Coonoor on 6-8 October, 1985. He also attended the workshop on Management of N.A.R.P. at the Mahatma Phule Agricultural University, Rahuri from 20th to 22nd November, 1985.

Sri. K. Kannan, Associate Director, Sri. P. J. Joseph, Assistant Professor, Sri. V. S. Devadas and Smt. Jessy M. Kuriakose, Junior Assistant Professors attended the All India Fruit Improvement Project Workshop held at the University Campus, Vellanikkara from 11-9-85 to 13-9-1985.

Sri. K. Kannan, Associate Director, Sri. C. M. George and Sri. K. C. Aipe, Assistant Professors and Sri. T. P. Manomohandas, Jr. Asst. Professor attended the workshop on Advanced Workshop on T & V

Workshop conducted at the Regional Agricultural Research Station, Pilicode on 29th and 30th July, 1985.

Sri. V. S. Devadas, Junior Assistant Professor attended the training on Plant propagation and Nursery Management conducted at Indian Institute of Horticultural Research, Bangalore from 14-7-1985 to 27-7-1985.

The station participated in the Flower Show of Wynad District held at Kalpetta on 27th and 28th April, 1985 and bagged two first prizes and one second prize for rose, fruits & vegetables.

The station also participated in the Wynad District Science Fair held at Panamaram in November, 1985 by putting up an Agricultural Exhibition.

The station took part in the Calicut Flower Show, 1986 conducted from 20th to 25th February, 1986 and bagged three first prizes, one third prize and one rolling shield for best collection of fruits and vegetables.

Research

No. of Research Projects as on 31-3-1986 was 45.

Research Highlights:

RICE

Agro-technique for rice in the High Range Region, Expt. 1—Response of rice to different levels and application of lime in the acid soils of Wynad

The results indicate that there is no response to lime application even upto 1000 kg/ha in the rice fields of Wynad.

Ongoing Projects

Crop Improvement

Evaluation and screening of rice varieties suitable for high altitudes

Performance of rice cultivars and varieties for the first, second and third crop seasons.

From a study of 12 cultures and varieties during the first crop season Cul. 796 recorded the highest grain yield of 4812 kg/ha. However it was on par with Mo 4 (4698 kg), WND-2 (4642 kg), Edavaka (4472 kg), MDU-2 (4279 kg), Cul. 1-5-4 (4279 kg) and IR-20 (4053 kg). Considering the straw yield Edavaka ranked first (6793 kg/ha) followed by WND-2 (4868 kg) and Cul. 796 (3950 kg). Considering grain and straw yield Cul. 796 and the local selection Edavaka seem to be promising for growing during the first crop season in the High Ranges.

During the second crop season also 12 varieties and cultures were tried for second time. The local section Edavaka gave maximum grain

yield of 3397 kg and straw yield of 3111 kg ha. Mo 4 ranked second with a grain yield of 3261 kg. During the previous year Cul. 796 gave maximum grain yield and Edavaka maximum straw yield.

Agro-techniques for rice in the High Range region-Expt. II—Evaluation of herbicides for weed control in the rice fields of Wynad

The experiment was conducted during the first crop seasons with different weedicides for weed control in the rice fields of Wynad. Least weed growth was in treatment Basalin + 2, 4-DEE at the rate of 1.5 kg/ha 12 DAP followed by Basalin + 2, 4-DEE at the rate of 1.25 kg/ha 12 DAP. However, these two treatments and the treatments Benthocarb at the rate of 1 kg ai/ha + 2, 4-D sodium salt at the rate of 1 kg ai/ha 16 DAP, hand weeding 30 and 60 DAP, Benthocarb 1 kg ai/ha + 2, 4-D ethyl ester 0.630 kg/ha 16 DAP and hand weeding 20 and 40 DAP were on par and significantly superior to other treatments. Yield difference was not statistically significant. The same trend was noticed during the previous season also. The trial will be continued.

Standardisation of application of fertilizer for rice in the High Ranges

The study to fix up optimum time of fertilizer application under Wynad condition was conducted during the first crop season with long duration WND-2 and medium duration IR-20 varieties of paddy. The control plots in both the varieties recorded low yield. There was no significant difference between other treatments. However, the treatment full P as basal + $\frac{1}{2}$ N and $\frac{1}{2}$ K at tillering + $\frac{1}{2}$ N and $\frac{1}{2}$ K at panicle initiation recorded maximum grain and straw yield in WND-2 and $\frac{1}{2}$ N, full P, $\frac{1}{2}$ K as basal + $\frac{1}{2}$ N at tillering + $\frac{1}{2}$ N, $\frac{1}{2}$ K at panicle initiation in IR-20. The trial will be continued.

Trial on fertilizer requirement of pepper-var. Panniyur-1 under the agroclimatic conditions of Wynad

Maximum yield of dry berry/vine (5.65kg) was obtained from treatment 75 g N + 20 g P + 150 g K per plant/year. This treatment tops the list in respect of other yield parameters also. Treatments receiving high dose of nitrogen has given maximum yield during 1983 and 84 also. Indications are that higher dose of nitrogen is comparatively better for high yield from Panniyur-1 under the agro-climatic conditions of Wynad.

Multilocational comparative yield trial with pepper varieties

Nine varieties i.e., Panniyur-1, Karimunda, Kuthiravaly, Kottanadan, Aimperian, Naalamundi, Arakulam munda, Narayakody and Kalluvally were tested to select the best pepper variety for commercial cultivation under the agro-climatic conditions of Wynad. Planting was done in 1984 and the vines are coming up satisfactorily.

Investigations on major diseases of ginger

Study of epidemiology and control of bacterial wilt of ginger.

Bacterial wilt caused by *Pseudomonas solanacearum* (Smith) is a serious menace to ginger in Wynad causing heavy crop loss. During the year none of the treatments could control the disease. This is in conformity with the previous year's result. The treatments have therefore, been modified.

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

a) Effect of seed treatment on rhizome rot of ginger

A trial involving five treatments was conducted to find out the effect of rhizome treatments on the incidence of soft rot disease of ginger. Minimum incidence of pre-emergence soft rot was observed in treatment Captan 0.2% (5.93) as against 50.15% in the control. Captafol 0.2% and Dithane M-45 0.3% treatments also recorded low incidence of 8.59 and 8.91 percentage. In respect of rhizome yield all treatments were significantly superior to control. Indications are that seed rhizome treatment with Captan, Captafol and Dithane M-45 are effective in the control of rhizome rot of ginger.

b) Field control trial on the rhizome rot of ginger

The trial had two main plot treatments i.e., 1) application of organic and inorganic manures in 50:50 proportion and (2) application of organic manures alone and 5 sub-plot treatments i.e., soil application of (1) Captan (2) Captafol (3) Dithane M-45 (4) Cheshnut compound, and (5) control. The percentage incidence of pre and post emergence rhizome rot was low in all treatments including control. However, due to heavy incidence of bacterial wilt rhizome yield was comparatively low in all treatments.

FRUITS AND FLORICULTURE

Varietal-cum-rootstock trial in mandarin orange

The trial involving all combinations of four root-stocks and five scions showed that Rough lemon imparted more vigour to all scions. The scionic combination Coorg mandarin on Rough lemon recorded maximum height (4.53 m), scion girth (32.40 cm) and stock girth (41.33 cm) and spread. Trifoliate orange and Troyer citrange stocks imparted dwarfness to the scions. The maximum weight (29.05 kg) and number of fruits (461) were obtained from Kinnow on Troyer Citrange followed by Coorg on Rough lemon (20.12 kg and 196 Nos.). Bigger sized fruits were produced by Nagpur mandarin and Coorg mandarin while Kinnow and Satsuma produced smaller sized fruits.

First five years of study showed that Coorg mandarin budded on Rough lemon root-stock is the most vigorous combination in respect of

all the biometric characters recorded. Though it is too premature to assess the yield potential, data recorded in 1985 showed that it is comparatively higher in yield than most other combinations. With regard to quality also it is on par with other combinations.

Rootstock trial in Coorg mandarin orange

Coorg mandarin budded on six root stocks i.e., Rough lemon, Rangpur lime, Trifoliolate orange, Cleopatra mandarin, Troyer citrange and Carrizo citrange are evaluated in this trial. As in the previous years no significant difference was noticed in respect of biometric and yield attributes between treatments. However, maximum yield in respect of weight and number were recorded by Coorg mandarin on Rangpur lime followed by Coorg mandarin on Carrizo citrange. This is in conformity with previous years result.

Manurial trial in Coorg mandarin orange

Five levels of N (0, 200, 400, 600 and 800 g/plant/year) and five levels of K (0, 200, 400, 600, 800 g/plant/year) with a uniform dose of P are tried on Coorg mandarin orange. Planting was done in 1980 and fertilizer application as per schedule of treatments was started in 1984. It was observed that application of 600 g N/plant/year without K induced more vigorous growth of plants with respect to height, girth and spread. Maximum fruit weight (12.19 kg) was recorded by plants applied with 400 g N + 600 g K.

Micronutrient trial on Coorg mandarin orange

The trial was conducted as per the recommendations of National Fruit Research workshop held at Kerala Agril. University in 1985. Spraying of micronutrients as per schedule of treatments was started in September, 1985. Percentage reduction in chlorosis as compared to pre-treatment incidence 30 days after spraying was maximum in the treatment Zn 0.5% + Mg 0.5% + Mn 0.5% + B 0.1% spraying twice.

Standardisation of agro-techniques—cultural trial in Mandarin orange

There was no significant difference between treatments in respect of biometric data. However, paddy straw mulching has imparted slightly more vigorous growth to plants compared to other treatments.

Control of weeds with herbicides in citrus orchards

Diuron and gramaxon are tried as pre-emergent and post-emergent weedicides in the citrus orchards. Statistical analysis do not show any significant difference in weed growth between treatments in pre-emergent trial. However, minimum weed growth was noticed in the treatment applied with diuron @ 4 kg/ha. In the post-emergent trial significantly low weed growth was noticed in all weedicide applied plots upto 90th day compared to control plots.

Evaluation of lemons (Citrus limon) and limes suited for High Range Region of Kerala

The study is aimed at collection of all available lime and lemon types and to study their performance with a view to select the best types on the basis of fruit yield and quality.

The collection will be enriched with further addition from available sources. After initial evaluation replicated trials will be laid out with selected types.

Introduction and trial on mango in High Ranges—Screening mango varieties for growing in the High Ranges of Kerala

Twenty eight mango varieties available in the farm are being studied for yield, fruit quality, season of bearing, disease and pest infestation etc. On the basis of preliminary studies these have been grouped as early season, mid season and late season bearers and also high yielders, medium yielders and poor yielders. The studies will be continued.

Standardisation of technique of simpler methods of vegetative propagation of fruit crops

Observations made so far showed that maximum success of 61.54 per cent was obtained in stone grafting on mango in the month of August while none was successful in December. More detailed studies are in progress.

Comparative evaluation of banana cultivars under rainfed and irrigated conditions in the High Ranges

Ten banana varieties are tried both under irrigated and rainfed conditions. The varieties are Poovan, Karpooravally, Chenkadali, Njalipoovan, Nendran (Local), GrosMichel, Kunnan, Nendran (from Kannara), Bodles Altafort and Palayankodan. Harvest has not been completed.

VEGETABLES AND TUBERCROPS

Collection, evaluation and selection of different tuber crops including wild edible forms suitable for growing in the High Range Region

Ten *Dioscorea alata* accessions selected from previous year's trial were planted in replicated plots during April 1985. Significant difference in yield between treatments was noticed. Highest yield was obtained from Da-30 (51075 kg/ha) followed by Da-61 (48,832 kg), Da-20 (39,582 kg), Da-100 (38,707 kg) Da-62 (38207 kg) and Da-10 (37832 kg). The trial will be continued for confirmatory results.

Six *Colocasia esculanta* local types were also collected for further studies.

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Nutritional-cum-varietal trial on Cassava (Multilocal collaborative trial with C.T.C.R.I.)

The trial was conducted with two varieties i.e., M4 and H-1687 and six levels of manures. Statistical analysis of yield data showed that while difference in yield between treatments was significant in respect of H-1687 it was not significant in M4. However in both varieties the plants receiving farm yard manure over and above fertilizers have given higher yield. Maximum yield in both varieties have been received from treatment receiving NPK 100:100:150 kg/ha + FYM 1 kg/plant (M4-16.632 tons/ha and H-1687-15.038 tons/ha) closely followed by NPK 100:100:150 kg/ha + FYM 1 kg/plant (M4-16.495 tons/ha and H-1687-14.867 tons/ha)

Evaluation of Cole crops for High Ranges

Six varieties of cabbage and ten varieties of cauliflower were planted at bi-weekly intervals starting from the third week of August, 1985 to the second week of October. In both these crops early planting was found to be better for higher yield. Late American Monarch gave the highest yield in cabbage followed by special Eclipse Drum Head and Golden Acre whereas in cauliflower Snow Main Crop Patna recorded highest yield.

CASHEW

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

Six varieties and three types of planting materials are tried. Planting was done in 1983. As in the previous year mortality was maximum in air layers. Epicotyl grafts of the variety NDR-2-1 continued to be the most vigorous.

CROPPING PATTERNS AND FARMING SYSTEMS

Standardisation of rice based cropping system for Wynad

Groundnut, cowpea, horsegram, greengram, blackgram, sweet potato, ginger, vegetables and sesamum were planted in the rice fallows after harvest of first crop paddy in the month of January. Maximum receipt was obtained from ginger (Rs. 20,202/ha) followed by vegetables (Rs. 8,737/ha). Sesamum, greengram, blackgram and horsegram failed due to poor germination and subsequent growth.

The station maintained a rose collection consisting of about 400 varieties. Large scale production and sale of rose buddings are being done with a view to enhance farm receipts.

Visitors

Sri. A. P. Abdullah Kutty, Counsellor, Andaman and Nicobar Islands visited the station on 17-10-1985. Sri. Franset Foss, Pitlochry of Scotland,

U. K. paid a visit on 20-3-1986. Other visitors were Sri. M. A. Hiriyan; S. T. Raman and N. P. Raghavan. Deputy Directors of Horticulture, Ooty. Accounts Committee Members of Kerala Agricultural University visited the station on 6-5-1995.

A large number of farmers, officials and students have also visited the station during the year.

1.7 CASHEW RESEARCH STATION, ANAKKAYAM

This station was started in 1963 under a scheme included in the third Five year Plan. The Research Station is situated in Anakkayam village in Ernad Taluk in Malappuram Dist, the location of the station being on the northern side of the Malappuram Manjeri Road at a distance of about 9 km from Malappuram. The station occupies an area of 9.92 ha. 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 evaluation of suitable vegetative propagation methods and distribution of quality planting materials form the major activity 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.

Sri. K. I. James, Associate professor continued to be incharge of the Station till 2-12-85. Thereafter Smt. P. V. Nalini, Junior Asst. Professor was in charge of the Station.

Research Reports

1. *Collection and maintenance of types (CRS Anakkayam)*

47 clonal and 43 seedling types already collected and planted in the station are under observation for adaptation, growth habit, plant character, vigour, flowering character and fruit and nut character and yield potential were studied.

During the period 1985-86 maximum yield of 30.45 kg was obtained from K-10-2 followed by K-19-1 (25.80 kg) and NLR-2-1 (25.68 kg). In seedling types BLA-139-1 continued to be outstanding in yield. Apart from the above types K-4-1 also recorded an yield of 28.38 kg during the year.

2. *Breeding improved varieties of cashew by hybridization*

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

The progenies are being evaluated for the characters like vigour, earliness of bearing, flowering, sex ratio, yield potential and colour and size of apple.

On observing the yield potential of the old hybrid progenies (H1 to H6 series) for the last 10 years it was found that most of the hybrids were very poor in yielding. Only 6 hybrids yielded more than 10 kg/tree.

During 1985-86, H-3-13 recorded the highest yield of 18.69 kg followed by H-4-6 (17.50 kg) and H-1-12 (17.46 kg).

On observing the yield data of the new hybrids (H7 to H18 series) for the last 10 years it was found that they were very poor yielders.

3. *Comparative yield trial*

16 promising types of cashew are being evaluated. The yield data were statistically analysed from 1978 to 1984 and found that there was no significant difference in yield due to different types, except for in the year 1979. In the year 1979, BLA-139-1 was found to be superior in yield followed by BLA-39-4.

4. *Study of promising clonal progenies*

Progenies of 9 types were planted during 1968. Five plants each of 10 types were planted during 1975.

Observations on growth and yield characters are being studied. Out of the 12 types of clonal progenies planted during 1967 the type H-3-6 recorded the highest mean yield of 18.75 kg followed by H-3-9 (11.22 kg).

In the 1968 planting K-10-2 recorded the highest mean yield of 10.89 kg followed by H-4-10.

In the 1974 planting highest yield of 8.38 kg/tree was obtained from K-10-2 followed by UL-28-1.

5. *Cultural trial on cashew*

Objective is to study the effect of various cultural treatments on growth and yield of cashew.

On analysing the yield, 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 may be discontinued and the area can be utilised for planting promising types.

Highlights

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

These selections have recorded the nut yield/tree varying from 15 to 40 kg against 2 to 10 kgs obtained on an average from the cultivated varieties by the farmers. BLA-139-1 is released as Anakkayam-1.

1.8 REGIONAL AGRICULTURAL RESEARCH STATION, PATTAMBI

Rice Research Station, Pattambi was established as Paddy Breeding Station in 1927 to evolve high yielding rice varieties suited to the different agroclimatic conditions 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 centre at Mannuthy, Kayamkulam 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. With the implementation of NARP, the station was reorganised as Regional Agricultural Research Station of Central Zone. It undertakes intensive research on the production and protection technology on rice. The station has been allotted the lead function for research on rice, pulses and oilseeds and rice based farming systems. This station also functions as an advanced centre for studies on laterite soil management.

The station is located at 10°N latitude and 76°E longitude at an elevation of 25M above MSL. The total area is 63.64 ha. The soil is lateritic sandy loam and overlies unweathered soil. Ridges and slopes of low hills forms the bulk of the modan lands. Palliyals are high level terraced lands with extremely porous soil in double cropped wet land is moderately fertile and deep.

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

The ICAR Co-ordinated Research Projects in operation at Pattambi are AICRIP Double cropping main-centre, AICRIP on Chemistry of submerged soil, NARP rice based mixed farming system, AICRP on pulses and Krishi Vigyan Kendra besides the All India Co-ordinated Agronomic Research project being implemented in the Palghat District, with Regional Agricultural Research Station Pattambi as head quarters.

Dr. K. Karunakaran and Sri. N. Rajappan Nair participated in the advanced workshop for the T & V resources personnel conducted at Mannuthy on 9.4. 1985.

They also attended the annual All India Rice Workshop of the AICRIP at Hyderabad from 11-4-1985 to 15-4-1985, and also attended the Package of Practices Workshop held at Vellanikkara on 13th and 14th June, 1985.

Dr. K. Karunakaran, Professor (Ag. Bot.) attended the annual All India Kharif Pulses Workshop held at Coimbatore from 16-5-85 to 19-5-1985. He attended the annual All India Rabi Pulses Workshop

held at Srinagar from 31-8-1985 to 4-9-1985, also participated in the AICRIP Regional Monitoring tour of the Southern States from 9-10-1985 to 15-10-1985.

Dr. K. Karunakaran inspected the certified seed production plots of Jyothy in Tanjore District on 29-10-1985 as per the request of the National Seeds Corporation.

Sri. P. K. G. Menon, Professor, Soil Science, attended the annual workshop of the ICAR co-ordinated scheme for research on the chemistry of submerged soils under high rainfall areas on 5th and 6th September held at C. R. R. I., Cuttock.

Sri. P. J. Tomy, Associate Professor, attended the U. S.—Pakistan Biosaline Workshop—Karachi during 22-26 September 1985, the international monitoring and evaluation of IRSATION responsored by IRRI, Manila, Philippines, 20th September to 2nd October 1985 and T & V monthly workshop for Palghat District from July 1985 to March 1986.

Sri. V. P. Sukumara Dev, Professor (Plant Pathology), attended the Annual All India Rice Workshop of the AICRIP held at the Directorate of Rice Research, Rajendranagar, Hyderabad from 12-4-85 to 15-4-1985.

Research

Number of research projects as on 31-3-1985 was 83.

RICE

Concluded projects

Performance evaluation of the rice culture-1727.

The rice culture 1727 was yield tested in multilocational trials at centres using Jaya, Bharathy and Pavizhom as checks. This culture recorded the highest yields at Pilicode and Moncompu and was found to be marginally superior to Pavizhom on the basis of the mean of seven trials. The culture has been included in the Minikit trials and adaptive traits for 1986-87.

Performance testing of the new rice varieties Onam and Bhagya for Punja season.

The two new short duration red kernelled varieties released from Kayamkulam were compared with Triveni, Annapoorna and Rohini in an unreplicated yield trial. Both the new varieties were found to be well comparable in duration, plant height and grain yield to the three check varieties.

Response of short duration rice under different water management practices

In summer season, by giving 5 cm. irrigation two days after the disappearance of ponded water, there was a saving of 214 mm of water compared to the conventional method of 5 cm submergence throughout

the crop period for Triveni. The number of irrigation can be reduced considerably by adopting this water saving method as the total number of irrigations required for this treatment was only 19.5 compared to 57 for the recommended practice of 5cm submergence.

Fertilizer requirement of medium duration transplanted rice for Kharif season

The result showed that the levels of N (90, 70, 50), P_2O_5 (45, 35, 25) and K_2O (45, 35 and 25 kg/ha) did not influence the grain or straw yield of rice variety Jaya significantly. It was inferred that for a soil which is medium in N, P_2O_5 and K_2O , a fertilizer dose of 50, 25, 25 N, P_2O_5 and K_2O /ha respectively is sufficient to get a grain and straw yield of 4 t/ha for a few seasons.

Fertilizer requirement of medium duration dry sown rice (IR-8) for the Kharif season

The result of the fertilizer trial with three levels each of N (90, 70, 50 kg/ha) P_2O_5 (45, 35, 25 kg/ha) and K_2O (45, 35, 25 kg/ha) for the dry sown crop (IR-8) for three years revealed that only N levels affected the grain and straw yield significantly in 1984 and in other years different the levels were on par in yield. Levels of P_2O_5 or K_2O could not influence the yield in any of the three years of the trial probably due to the medium status of P and K in the experimental field.

Fertilizer management for rice variety Mashuri under transplanted condition during virippu season

The study revealed that during the first crop season under transplanted condition, Mashuri required a fertilizer dose of 50:25:25 kg NPK/ha. With regard to the time of application it was recommended to apply N in 3 splits-50% basal, 25% on 40 DAT and 25% on 60 DAT.

District trial with semi tall cultures of rice

Three semitall cultures from Moncompu were tested with Jaya, Jyothi and Mashuri during first crop season of 1984-85. It was found that all cultures gave yield more or less equal to that of Jyothi, but significantly higher than Jaya and Mashuri. Among the three cultures, culture 153-1 was found to be the best.

Identification of factors responsible for the low level of production of high yielding varieties of rice during the second crop season in Kerala

The performance of four popular high yielding rice varieties planted at seven dates of planting at fortnightly intervals starting from 22nd August were evaluated.

There was no perceptible variation with regard to the general growth and spikelet production *per se* but the final yield varied widely

because of the sterility of spikelet observed. Even though the phenomenon of yield decline was observed to be more predominant for the crop raised during the three middle dates of planting (18th September, 3rd October and 17th October). Analysis of the data clearly indicate that the yield reduction can occur under the influence of the adverse weather parameters occurring at the critical phases of the crop irrespective of the date of planting as such.

Screening for leaf blast resistance

In an attempt to identify the reaction of rice varieties to leaf blast 647 entries under National Screening Nursery were tested and 27 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 condition. Out of 653 entries tested, 84 were found resistant and 105 moderately resistant. Four KAU culture viz. KAU-93, KAU-129, KAU-204 and KAU-126 were included in the moderately resistant group.

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 62 entries tested none was found resistant while CR-331-1-1-3 was moderately resistant to sheath blight. This entry was found resistant to brown spot and BLB at other test locations also

Evaluation of seed dressing fungicides on blast disease incidence

The object of the experiment was to identify a good seed dressing fungicide against rice blast. Under wet sown conditions Bavistin 50 W.P. (2 g/kg of seed) Foltaf 80 W. P. (3g/kg of seed) and Fongoren 50 W. P. (2 g/kg of seed) significantly reduced the rate of development of the disease even up to 60 DAS where as in the case of dry sown conditions these fungicides were significantly effective only upto 30 DAS.

New fungicides evaluation trial for blast disease control (granular form)

The trial was to test the efficacy of new granular fungicidal formulation for the control of blast disease. Application of Coratop-5 g.@ 30 and 40 kg/ha respectively at tillering and flowering recorded the lowest leaf and neck blast with highest yield.

New fungicides evaluation trial for blast disease control (EC/WPO formulations)

The object of the trial was to test the efficiency of new fungicidal formulations for the control of blast disease. Fongoren 50 W. P. (1g/lit) Topsin-M (1g/lit) and Ediphenphos (1ml/lit) were promising and were comparable to Bavistin in the control of blast disease.

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. Among the different spray schedules Bavistin (1g/lit) followed by Kitazin (1 ml/lit) were found as the best treatments in checking both leaf and neck blast incidence.

Chemical control of sheath blight

To test the efficacy of different fungicidal formulations for the control of sheath blight disease of rice, 6 chemicals were tested and it was found that spraying of Validacin- 3L @ 2ml/lit. twice at 40 and 50 DAP was the most effective treatment in checking the disease spread.

Stem borer screening

Sixty entries were screened in field to assess their reaction against stem borer. Observations on the incidence of stem borer showed that none of varieties were free from stem borer attack.

Brown plant hopper screening and biotype studies

This trial was laid out to evaluate the resistance of hundred varieties to brown plant hopper. The observations recorded on the 30th and 50th DAP indicated a very low incidence of the pest and hence the reaction of the varieties could not be properly evaluated.

Multiple resistance screening trial

Out of the 62 varieties tested for multiple resistance in this trial, none of the varieties were found resistance to major pests like gall midge, stem borer, leaf folder, rice bug, etc.

National screening nursery

The object of this trial was to evaluate the elite cultures included in co-ordinated yield trials. Out of the 659 varieties cultures tried, only 46 entries showed a score value of zero (no damage) even though the gall midge incidence during the season was low.

Ongoing Projects

Uniform variety trials (Regional Agricultural Research Station)

The UVT-2 trials with 23 entries were conducted, one each in Kharif and Rabi seasons. The local check Swarnaprabha was no par with both the national checks Rasi and IR. 36 during Kharif season and was significantly superior to IR.36 and on par with Rasi during Rabi season.

This AICRIP trial is conducted every year with new entries decided at the annual workshop.

Preliminary variety Trials

Two PVT-2 trials with 81 entries were conducted one each in Kharif and Rabi seasons. Though the national check varieties Rasi and IR. 36 recorded higher grain yields than the local check KAU-23332-2 during Kharif season, both these varieties recorded lower yields than the very same local check during Rabi season.

This AICRIP trial is conducted every year with new entries decided at the annual workshop.

International Rice Yield Nurseries

During the year two trials viz. IRYN (E) and IRYN (M) were conducted during Kharif season. In the IRYN (E) with 27 entries the local check KAU-23332-2 was on par with the international check variety IR. 36. Among the 28 entries in the IRYN (M), the local check KAU-1-5-4 recorded slightly higher yield than the international check variety IR. 42, but the yield difference was not significant.

This trial is conducted every year with new sets of varieties under the International Rice Testing Programme.

Breeding high yielding tall photosensitive rice varieties with good straw yield specifically suited for the Mundakan season of Kerala

F4 populations of five crosses were studied during the year and 348 promising single plants selected for further detailed evaluation.

Two white kernelled and four red kernelled cultures were compared with check varieties like Co-25 and PTB-4. Based on the results one red riced culture, culture 871 from the cross Co-25 x (Triveni x Vellathil Kolappala) and one white riced culture, culture-841 from the cross PTB 15 x Co-25 were found to be promising for being advanced to adaptive trials in farmer's fields.

Evolution of an awnless and high yielding type of the rice variety Parambuvattan for the Virippu cultivation in Palliyal lands

Sixty nine M3 families were studied during the year, and a total number of 29 promising mutants showing either no awning or very much reduced awning (upto 0.8 cm only) as against the mean awn length of 5.6 cm in the original variety were selected. These mutants are to be further evaluated during 1986-87.

Breeding high yielding rice varieties with pigmentation at some plant parts

F2 populations of six cross combination involving IR. 1552 as the purple pigmentation donor were raised and studied. A total of 73 promising single plants were selected for further evaluation in 1986-87.

Improvement of rice varieties BR. 51 and IR. 36 for consumer acceptability

A total of 12 F2 populations involving either BR. 51 or IR. 36 as one parent were grown and studied. From among the 5250 F2 plants studied, a total of 124 promising single plants were selected for further evaluation.

Breeding lodging resistant, fertilizer responsive, medium height rice varieties for dry sown virippu season in uplands of Kerala

Two cultures, Cul. 1 and Cul. 2 selected from the cross Rasi x 1421 were yield tested and found to be on par with the check varieties PTB.28 and Suvarnamodan. This trial is to be repeated for confirmatory results.

1985. Jaya and PTB 20 are the cultivars used. The results indicated that grain and straw yields differed considerably with the cultivars. However, the differences due to PGR treatment showed conspicuous variations only in the case of straw yield with Miraculan recording the lowest yield and others being on par.

Permanent manurial experiment (dwarf indica series)

This experiment is being taken up with the object to study the effect of continuous application of cattle manure, green leaf and ammonium sulphate along and in combination with and without P and K on the yield of rice. The test variety is Jaya. The results revealed that application of cattle manure alone recorded the highest grain yield of 4168 kg/ha and showed significant increase of 12% over the organic and inorganic treatment and 31% over inorganic alone during the virippu season while during the mundakan season, the organic and organic + inorganic treatments were significantly on par with a grain yield of 4415 kg/ha and 4444 kg/ha respectively. Both these were significantly better than the inorganic alone with an increase of 18% in grain yield.

Permanent manurial trial (Tall indica series)

The experiment is being taken up with tall indica rice variety PTB-2 (Virippu season) and PTB/20 (mundakan season) with the main objective of studying the effect of continuous application of cattle manure, green leaf and ammonium sulphate, alone and in combination with and without P and K on the grain yield.

The results revealed that the application of organic manure alone recorded the maximum grain yield of 3358 and 4004 kg/ha during the two seasons which were on par with organic + inorganic treatment which recorded a grain yield of 2351 kg and 3247 kg/ha during the 2 seasons. The yield increase for the organic and inorganic treatments were 25 to 30% and 18% over the inorganic alone during the 2 seasons.

Nutritional studies on the organic and inorganic components of various new varieties of rice released by RARS, Pattambi

The total protein content of the 71 varieties of raw and parboiled varieties of rice were quantitatively determined. The local varieties of rice also were included in this study for comparison.

It was observed that increased nitrogen application has a positive effect on the levels as protein in grain. It was also noticed that the percentage of nutrient loss during parboiling varies considerably from variety to variety.

Monitoring crop productivity under continuous rice culture at moderate levels of fertilizer application

The treatments consisted of combinations of nitrogen (2 levels) P and K. During the first crop (Kharif) season all plots receiving nitrogen

recorded significantly higher grain yield than those without nitrogen. But during the second crop (rabi) season, plots with nitrogen supplemented with phosphorus recorded highest yield.

Rice varieties for late planted situation during Kharif season

Four long duration varieties (CNM-539, KET-7251, H4 and Mashuri) were tested under four dates of planting. Planting on July 20th was found best. The later planting had severe damage from birds and pests. It was also observed that under late planting situations, rice varieties H4 and CNM 539 were suitable to mitigate the loss and ensure a reasonable grain yield.

Weed control trial in transplanted rice

In this trial five chemicals were tested during the first and second crop seasons. During the first crop season, Arrosol, Benthocarb and Penthimethatin (all at 1.5 kg a.i./ha) recorded the grain yield in the range of 3.11 to 3.44 t/ha, which was on par with hand weeding twice (3.49 t/ha). Among the herbicidal treatment, Benthocarb (1.5) recorded the maximum grain yield of 3.44 t/ha. During the second crop season the weed problem during the critical stages of crop growth was nil.

Maximum grain yield of 3.64 t/ha was recorded in plot treated with Butachlor (1.5) closely followed by Benthocarb (1.0) giving an yield of 3.63 t/ha. They were on par with non weeded control with 3.57 t/ha. Therefore it is concluded that under transplanted rice cultures proper land preparation would contribute for weed management.

Economics of weed control in transplanted rice

The object of the trial was to conduct same sort of economic analysis on the efficacy of herbicide use for weed control on rice ecosystem. There was practically no weed in any plot and the treatments were effective. Under transplanted conditions, proper land preparation had taken care of weed management.

Increasing fertilizer nitrogen efficiency in low land rice

Nitrogen in four forms and three doses were tested under two methods of application (basal and split) It was observed that nitrogen source affected grain yield significantly. Maximum N-use efficiency was obtained with sulphur coated urea @ 58 kg N/ha, prilled urea gave significantly more yield than mussuriphos coated urea super granules.

Split and delayed application of phosphorus of rice

The object of this trial was to study the effect of delayed and split application of phosphorus through nitrophosphates. The treatments consisted of application of phosphorus in the form of Diammonium phosphate as basal and at 15 and 30 days after transplanting in full and split doses together with single super phosphate @ 60 kg P_2O_5 /ha as basal.

Yield differences were not significant, however, the response trend was in favour of basal application of phosphorus or within 15 DAT.

Nitrogen management for Disease control: Sheath blight

The object is to study the effect of slow release nitrogen sources on pest and disease pressure with Jyothi as the test variety. It was observed that disease pressure was low during the year. However moderate sheath blight incidence (score 5.0) was recorded at 50 DAT in plots treated with urea in 3 splits, but the yield differences were not significant.

PULSES AND OILSEEDS

Ongoing projects

Crop improvement

Evolution of high yielding sesamum variety for the uplands of Kerala by pureline selection in the variety "Pattambi local"

Forty five families representing single plants which recorded seed yields above 2.5 g were studied. From these 15 families which were showing uniformity and freedom from diseases were evaluated for yield and seven families recording seed yield over 495 kg/ha were selected for further evaluation.

Urd Co-ordinated Varietal Trial (Kharif, 1985)

Fourteen varieties of urd bean were under trial. The highest yield of 1462 kg/ha was recorded by Pant U. 30 and it was immediately followed by UH. 80-9 which produced 1442 kg/ha.

Mung Co-ordinated Varietal Trial (Kharif 1985)

Fourteen varieties of Mung bean were tested. The variations in grain yields were statistically significant. The entry MN. 309 recorded the maximum grain yield of 1126 kg/ha followed by Pusa 108 which recorded 1042 kg/ha.

Cowpea Co-ordinated Varietal Trial (Kharif 1985)

In this trial, fourteen varieties were evaluated. The variety RC-19 produced the maximum grain yield of 1593 kg/ha followed by V-16 which recorded 1506 kg/ha.

Early Arhar Co-ordinated Trial (Kharif, 1985)

Altogether, eighteen arhar genotypes were sown in this trial. Out of these, three genotypes, viz. MTH-6, GAUT 82-53 and GAUT H 82-86 produced the highest grain yield of 788 kg/ha.

Urd Co-ordinated Varietal Trial (Rabi, 1985-86)

Ten varieties of urd bean were tested. The variations in grain yields were statistically significant. The variety, LBG-17 recorded the maximum grain yield of 138 kg/ha followed by COBG-10 which recorded 1122 kg/ha.

Mung co-ordinated Varietal Trial (Rabi, 1985-86)

In this trial 18 varieties were evaluated. Statistical analysis indicated significant variations in grain yield. The mung variety PDM 84-146 produced the maximum grain yield of 1283 kg/ha followed by PDM 84-139 which recorded 1244 kg/ha.

Breeding for high yielding short duration cowpea varieties (Rabi, 1985-86)

The objective of the programme is to evolve varieties with better grain quality than Krishnamony, the latest released variety which has dark black seed colour.

The crossing programme was commenced during Kharif 1983. The Krishnamony (PTB-2) has been crossed with the variety Kanakamony (PTB-1) which has become very popular because of its appealing seed colour.

F₁ crop was raised during summer 1984. Subsequent generations were raised during the following seasons and selections were made mainly based on seed colour, synchronous flowering and grain yields. F₂ generation was raised during rabi 1985-86.

Culture-7 yielded the maximum of 781 kg/ha which was more than the yield of PTB-2 (737 kg/ha)-one of the parents and the check variety. Based on grain yield 6 cultures were selected for further evaluation.

Preliminary yield trial of the cowpea varieties bred for high yields and short duration (Summer, 1985)

Six cultures selected from the F₂ generation derived from the cross between Krishnamony and Kanakamony were put under preliminary yield trial.

Results, presented in table 8, show that all the selected cultures out yielded Krishnamony (PTB-2), though the variations in grain yield were not statistically significant. Culture-1 recorded the maximum grain yield of 1743 kg/ha followed by culture-4 which recorded 1625 kg/ha.

Evaluation of Vegetable cowpea genotypes (Summer, 1986)

Eight vegetable cowpea genotypes were evaluated. The variety IHR-6-1-B recorded the maximum green pod yield of 15575 kg/ha followed by Pusa Barathi which produced 14856 kg green pods/ha.

Germplasm Maintenance

The following collections of different pulse crops were maintained under the germplasm during the rabi season of 1985-'86.

Cowpea	: 694 Nos.
Black gram	: 37 Nos.
Green gram	: 56 Nos.

Agronomic evaluation of promising genotypes of cowpea

Eleven cowpea varieties were evaluated during rabi 1985-86. Among these V-118 produced the maximum grain yield of 1070 kg/ha which was significantly superior to the yield of all other varieties. Guj-2 (959 kg/ha) was the second best and it was statistically on par with V-16 (937 kg/ha). In terms of per day productivity V-118 with 14.34 kg grain ha/day. V-118 and Guj-2 recorded seed protein contents of 24.59% and 23.29%, respectively.

Studies on input contribution in summer cowpea

The trial was laid out with the object of qualifying the contribution of various production inputs in summer cowpea.

The results of the trial with Kanakamony cowpea conducted during summer, 1986 are presented in table 6a. Among the various production inputs, weed management was the most important followed by fertilizer use, plant protection, irrigation and rhizobium inoculation in the descending order, the absence of these inputs reduced the grain yield of summer cowpea by 22.53%, 15.64%, 11.42%, 8.33% and 8.02% respectively, over full package of practices (972 kg/ha).

Results of the trial pooled over 1985 and 1986 indicated that irrigation followed by weed control and fertilizer use were more important production inputs than others, withdrawal of which decreased cowpea grain yield by 40.41%, 30.63% and 18.67%, respectively, over full package of practices (99 kg/ha).

Evaluation of urdbean and mungbean genotype during Rabi planting

Three urdbean and six mungbean genotypes were evaluated for their agronomic suitability during Rabi planting. Among urdbeans, LBG-17 produced the maximum grain yield of 1342 kg/ha which was significantly superior to the yield of other two varieties, PDU-3 and PS-1. However, LBG-17 recorded the lowest seed protein content of 19.47%. Among mungbeans Pusa Co2 (663 kg/ha) was statistically on par with Pusa-104 (632 kg/ha) was significantly superior to all other varieties.

Evaluation of chickpea genotypes under rainfed conditions

In this trial, four chickpea genotypes were evaluated under rainfed conditions during Rabi, 1985-86. The general yield level of the chickpea genotypes was very low and the maximum grain yield of 89 kg/ha was recorded by ICC-37. Moreover, the high coefficient of variation recorded

for the grain yield indicated an instability in the production potential of the given genotypes in the environment tested. Rainfed cultivation of these varieties may not be economically remunerative.

Performance of grain legumes in rice fallows under different cropping systems

Black gram relay cropped with rice produced the highest grain yield of 922 kg/ha which was significantly superior to all other treatment combinations, whereas blackgram after rice (491 kg/ha). Cowpea after rice (489 kg/ha) and cowpea relayed with rice (471 kg/ha) were statistically on par and all other treatment combinations produced very poor grain yields. Relay cropping of rice with blackgram seemed to be promising for rice fallows.

Besides the above trials, two observational trials were also conducted during summer, 1986.

Studies on the drought tolerance of IITA cowpea

In order to study the drought tolerance of IITA cowpea, obtained from the International Institute of Tropical Agriculture, Ibadan, Nigeria, an unreplicated observational trial was laid out. The trial indicated that IITA cowpea could produce only lesser grain yield than Kanakamony in water stress or drought situations though it exhibited noteworthy rejuvenation capacity after rains.

Studies on the effect of soaking for different duration on germination, growth and yield of cowpea with and without irrigation

To study the desirability of soaking of cowpea seeds in water before sowing, in ensuring its germination and emergence in the field, an observational trial was laid out. Results showed that cowpea seeds did not germinate at all without irrigation on rains. The per cent of germination was maximum without soaking and it decreased with increase in the period of soaking indicating an adverse effect of soaking. Germination was more in Kanakamony than in IITA cowpea. Dibbling of seeds after soaking in water could not ensure germination, instead it adversely affected seed germination in cowpea in a moisture deficient soil.

Studies on the losses of applied N with the use of different sources and methods of application

This experiment was conducted to study the loss of N by volatilisation and leaching. Urea, (split and basal application), Lac coated urea, Neem coated urea, urea super granules, green leaf+urea were the various source of N tested.

The volatilisation loss estimated once in 3 days for the 1st and 15 days after application of N showed the lowest and highest loss in the case of 'lac coated urea' and N C Urea with 0.87% and 1.98% of applied N during the Virippu season. During the Mundakan season 'Urea split application' and 'Urea basal' recorded the minimum and maximum loss of

3.54% and 6.74% of applied N. Urea super granules also proved almost efficient to split application in minimising the loss by volatilisation occurred within 6 to 9 days after application.

The leaching loss of N varied from 2.7 to 5.3% of the applied N during Virippu and 0.39 to 2.8% during Mundakan.

About 45 to 50% of the total loss occurred by the end of 4th week after application and 75% was lost within 4 weeks. The loss of applied N during Mundakan season in 'Urea split' was very negligible which indicate that split application urea reduce leaching loss. U.S.G also offered good scope in reducing the leaching loss.

Causes for the lack of response to P and K—Response of rice to P and K in soils of central regions

This experiment aims at the most appropriate dose of P and K for soils of different fertility status of these nutrients and to determine critical levels of these nutrients in the soils for maximum yield of rice. Results indicated that in general there was no response for P and K in soils having low, medium and high levels of P and K respectively. Only in soils having medium level of P_2O_5 there was significant difference in yield (both grain and straw). The yield in the pots in which no P was applied was significantly lower than all the other treatments.

Micronutrient studies in the soils of Angamaly and Chittoor areas.

In order to determine the areas of micronutrient deficiencies and to study the response of rice to Zn at Angamaly and to Fe, Cu and Zn at Chittoor this experiment was taken up. The maximum grain and straw yields were reported by the cultivation practice with 240-120-45 NPK/ha. There is no significant difference between the treatments in which P_2O_5 and K_2O were applied @ 45 and 90 kg/ha. Economics worked out has shown that the application of N and P_2O_5 at a higher dose of 240 and 120 kg/ha is also economical as the net return per additional rupee invested over and above the package of practice recommendation is 3.00.

Softening of hardened laterite material for agricultural purposes

The object of this trial is to evaluate the effect of chemical agents on the softening of hardened laterites for agricultural purposes, to evaluate the suitability of growing certain plants in weathering the hardened lateritic materials and to assess the rate of growth of certain plant growth on the hardened laterites. The experiment is in progress.

Studies on the organic matter status of the laterite soil profiles of Kerala

This study aims at finding out the distribution pattern and nature of organic matter in the soil profiles originated under different situations and to assess the rate of decomposition of added organic matter applied during the pre-monsoon and in summer rice fallows. The study is in progress.

Research highlights

Extent of adoption and constraint of adoption of improved agricultural technology.

1 The main object of the study were to assess the extent of adoption of improved agricultural practices as recommended in the Kerala Agricultural University package of practices at the farmers level with particular reference the major crops grown in Palghat district.

2 To identify the important constraints responsible for non-adoption and transfer of technology.

3 To suggest ways and means to overcome these constraints.

The extent of adoption of high yielding variety of paddy and Nendran banana was more than 50%. For tapioca the extent of adoption was zero. The main constraints noticed for the poor adoption of this technology were the bad features of the high yielding varieties like poor straw yield susceptibility to pests and diseases in paddy, alternate bearing habit and buckling of bunches in coconut, poor cooking quality in the case of tapioca and comparatively high cost of seed material in banana.

Partial application of fertilizers and partial application of pesticides were also found to be important constraints.

Lack of finance and lack of proper marketing facilities were the other constraints.

Collection and evaluation of tapioca varieties suitable for rice fallows:

Twelve varieties collected earlier were yield tested in unreplicated trials in kharif and summer seasons. Based on the yield and cooking quality at 5 months after planting five varieties viz., Co. 2, Malavella, 12/77, M4 and 11/76 were selected for being multiplied and yield tested further.

SWEET POTATO

Ongoing projects

Collection and evaluation of sweet potato varieties

Two unreplicated yield trials with 25 varieties were conducted one in Kharif and the other in Summer seasons. Based on the performance during three seasons of testing so far, five varieties viz., H.4021, OP. 57, IR.8, 76-OP-219 and Kanjangad Local were selected for further replicated yield trials.

CHILLIES

Selection of a suitable variety of chillies for garden lands and summer rice fallows:

Twenty varieties were evaluated in an unreplicated yield trial during Kharif season. Based on the performance in Summer '85 and

Kharif '85 four varieties viz. 45969, 45978 and 45968 were selected for preliminary yield trial and seed multiplication for further evaluation.

BRINJAL

Ongoing projects:

Screening brinjal varieties for rainfed garden lands and summer rice fallows

Two trials, one in Kharif and the other in Summer were conducted with the single plants selected during the period from 1982 to 1984. Based on uniformity and fruit yield four promising types were selected for further yield evaluation.

Highlights

In summer season, where water scarcity is being felt, water saving method of irrigation can be practiced when the ground water table is within 120 cm from the surface. The treatments receiving 5 cm irrigation two days after the disappearance of ponded water was on par in yield to that of 5 cm continuous submergence throughout the crop period. The potential saving in irrigation water by resorting to this practice is in the range of 11-48% over continuous submergence. There was considerable reduction in the number of irrigations as this method require only 19.5 irrigation compared to 57 for continuous submergence.

When the N, P and K status is medium and N, P_2O_5 and K_2O dose of 50:25:25 kg/ha is sufficient to get grain and straw yields of 4.1 ton each for a few seasons for medium duration high yielding varieties in the first crop season. In the second crop season, also with the same fertilizer dose it was possible to get a grain and straw yield of 4.8 and 5.1 t/ha respectively.

In a study on the nutrient requirement (N, P, K) for rice-rice fallow cropping system, it was found that the treatment receiving 75% of the fertilizer dose i. e. N, P_2O_5 and K_2O @ 90:45:45 kg/ha recommended for Jaya for the first crop and 100% dose for the second crop has recorded a total grain yield of 8732 kg/ha which was on par with that of the treatment receiving full dose of fertilizer (8858 kg/ha) for both the seasons.

In rice-rice-kolingi cropping system where Kolingi raised in summer was incorporated before the planting of the first crop rice, the treatment receiving 75% of the fertilizer dose in the first crop and 50% of the dose in the second crop season was on par in yield to that receiving full dose of fertilizers in both the seasons.

Under continuous cropping of rice, application of nitrogen is essential for first crop. In second crop it has to be supplemented with phosphorus also. Field response due to N was 10.7 kg and that due to P was 8.0 kg per kg. of nutrients at 60 kg and 30 kg levels respectively.

For first crop of rice under conditions at Pattambi planting not later than July 20th is the best.

In weed control trial it was found that proper land preparation takes care of weed problem under transplanted system of rice culture.

Medium N use efficiency was obtained with sulphur coated urea at 58 kg/ha which was on par with prilled urea in split doses.

1.8.1 NARP SUB CENTRE, ERUTHENPATHY, PALGHAT DISTRICT

The sub centre started functioning from 1-6-1985 at ISD farm, Eruthenpathy.

The centre was started to assist the cultivators in this rain shadow area by way of recommending better varieties of crops for this low rainfall area under rainfed conditions and also for suitable and economical management practices for each crop.

A total rainfall of 635.5 mm only was received during the year under report.

Sri. M. Oommen, Associate Professor was in charge of the centre during the period.

Research

Total number of Research Projects was ten.

Research Highlights

Project I: Evaluation of rice varieties for the region

Evaluation of upland rice varieties for their drought tolerance and performance

In order to select a suitable upland rice variety for this rain shadow area, 12 rice varieties were evaluated in a replicated trial during kharif 1985. Only six varieties escaped the severe drought and performed well. The variety PTB 29 gave a maximum yield of 2066 kg/ha followed by the variety PTB 20, which in turn gave an yield of 1500 kg/ha. There is a difference of 87.18% between the highest yield obtained and the lowest yield recorded by the variety Culture 52-3-6.

Screening trial for upland rice varieties

Twenty three entries received from IRRI were evaluated in a replicated trial during kharif 1985. The entry No. 3 gave the highest yield of 2166 kg/ha followed by entry No. 5 (2040 kg/ha). These two entries were found to be significantly superior to all other varieties and were from Ivory Coast. The lowest yield of 353 kg was recorded by the entry No. 8.

Project No. II: Evaluation of varieties of millets

Evaluation of ragi varieties for their adaptability for dry farming regions

In order to find out a better ragi variety for this region nine ragi varieties were evaluated in a replicated trial during kharif 1985. The

variety Co-12 was found to be performing better under the rainfed conditions in this region. It gave an yield of 1664 kg/ha followed by Co-10 which in turn gave an yield of 1330 kg/ha. The difference between the maximum yield recorded by Co-12 and the lowest yield recorded by a local variety is 31.46%.

Evaluation of maize varieties for their drought tolerance and performance

Six maize varieties were evaluated during kharif 1985 to choose a suitable variety that can be recommended to the farmers in this region for raising under rainfed conditions. The dry, non rainy days affected the growth and yield of crop. The variety Pioneer recorded the maximum yield of 1615 kg/ha followed by Deccan and Co-1. The variety UMC-7 recorded the lowest yield of 657 kg/ha.

Comparative performance of bajra varieties for their drought tolerance and performance

Six bajra varieties were evaluated in a replicated trial to choose a suitable variety for this dry farming tract. The variety X-5 recorded an yield of 1115 kg/ha and was found to gave 71.5% higher yield than the local variety.

Project III: Evaluation of pulse varieties

Comparative performance of blackgram varieties under dry farming conditions

In order to choose a suitable blackgram variety that can be recommended to the cultivators in the dryfarming tract, five blackgram varieties were evaluated in a replicated trial during kharif 1985. The variety Co-4 recorded the maximum yield of 656 kg/ha followed by Co-5 (615 kg/ha). The variety Co-4 recorded 64% higher yield than the local variety.

Project IV: Evaluation of varieties of oilseed crops

Evaluation of groundnut under dryfarming conditions

Nine varieties of groundnut were evaluated in a replicated trial, during kharif 1985. The variety MK-374 gave the highest yield followed by TMV-7. The variety MK-374 gave the highest yield followed by TMV-7. The variety MK 374 recorded 8.2% increase in yield over the local traditional variety TMV-2 and 11% increase over the variety TG-14. The lowest yield of 1030 kg/ha was recorded for the variety GA 163.

Rabi

During rabi 1985, 11 varieties were evaluated in a replicated trial. During this season the crop was subjected to severe drought conditions and received only 38 mm rainfall. The variety Co-2 recorded the highest yield of 1333 kg/ha followed by variety Spanish Improved, POL-2, TG-14, and TMV-12. The variety Co-2 recorded a 37.9% higher yield than the local variety TMV-2 during the season.

Comparative study of sesamum varieties for their drought tolerance and performance

To study the comparative performance of different sesamum varieties under dry farming conditions, 10 varieties were evaluated during rabi 1985. The season was very dry and the crop received only 12mm rainfall during its growth period. This affected the growth and yield of the crop. The variety E-8 recorded 21% higher yield than the other varieties followed by ACV-1, SI 1029 and ACV 2. It also recorded 39.5% more yield than the variety Kayamkulam-1 and 37.8% over the variety Kayamkulam-2.

Project V: Evaluation of cotton varieties under dry farming conditions

During the year seven varieties of cotton were evaluated under dry farming conditions in this region. The drought conditions prevailed during the season affected the growth and production of the crop. Of the different varieties tried the variety Varalakshmy gave the highest yield of 528 kg/ha followed by Suvin and MCU-9. The lowest yield of 240 kg/ha was recorded by the variety DCH-32.

1.8.2 OPERATIONAL RESEARCH PROJECT FOR RESOURCE DEVELOPMENT ON WATERSHED BASIS, OZHALAPATHY

Sri. P. H. Latif, Assistant Professor (Agron) continued to be in charge of the scheme.

Research

Adaptive trials in farmers field with redgram varieties suited to the rain shadow regions of Palghat District.

1. Object is to identify the variety of redgram most adapted to the to the rain shadow region of Palghat Dist. (Vadakarapathy Panchayat).

An adaptive trial with 5 varieties of redgram was laid out as rainfed crop in farmers field during kharif season of 1985. The crop was given N and P_2O_5 at the rate of 25 kg and 50 kg per hectare as basal dressing. All varieties except Co-1 were harvested in 115-120 days, where as Co-1 took 135-140 days, Co-2 was the earliest to mature.

Co-3 variety of red gram was found to be the highest yielding and most suited, followed by Co-5.

2 Adaptive trials in farmers field with (transplanted) ragi varieties suited to the rain shadow region of Palghat district.

An adaptive trial with 4 varieties of ragi (transplanted) was laid out in farmer's field. Twenty one days old seedlings were transplanted in the field at 15 x 15 cm² spacing. The crop was irrigated once in 10 days. All the varieties were harvested in 95 days.

Co 12 variety of ragi was found to be the highest yielding and best suited followed by the variety TNAU 294.

3 Adaptive trials in farmer's field with grain maize varieties suited to the rain shadow regions of Palghat district.

An adaptive trial with four varieties of grain maize was laid out as rainfed crop in farmers' fields during kharif season of 1985. The crop was given only a basal application of 45 kg N and 67.5 kg P_2O_5 . Top dressing was not possible for want of enough soil moisture. The crop was harvested in 95 days.

Pioneer was the variety found most adapted to this region followed by MMH-1.

4 Adaptive trials in farmer's field with sorghum varieties suited to rains shadow region of Palghat District.

An adaptive trial with six varieties of grain sorghum was laid out as rainfed crop in farmers fields during kharif season of 1985. The crop was given only a basal application of 50 kg N, 30 kg P_2O_5 and 30 kg K_2O . Top dressing was not possible for want of enough soil moisture. The crop was harvested in 100 days.

Koilpetty Tall was the grain sorghum variety found most suited to the rain shadow region of Palghat district (Vadakaraphy panchayat) followed by Co-23 and TNS 27.

5 Adaptive trial in farmer's field with fodder sorghum varieties suited to the rain shadow region of Palghat Dist.

An adaptive trial with five varieties of fodder sorghum was laid out as rainfed crop in farmers field. The crop was given a basal application of 60 kg N, 45 kg P_2O_5 and 30 kg K_2O . The seed rate adopted was 44 kg/ha and mode of seeding was direct sowing and ploughing in. The crop was harvested on 70th day.

I.S. 3541 variety of sorghum was found to give the highest fodder yield followed by Koilpetty Tall.

1.9 AICRP ON AGROFORESTRY, LIVESTOCK RESEARCH STATION, THIRUVAZHAMKUNNU

1 The All India Co-ordinated Research Project on Agroforestry was started at Livestock Research Station, Thiruvazhamkunnu during December, 1983

Objectives

- 1 Collection, screening and selection of germplasm of indigenous and exotic spp. of analogue ecological regions.
- 2 Breeding and genetic improvement of trees, crops and fodder spp. to develop compatible associations in consonance with the cultural practices of local populations.
- 3 Developing techniques of cultural practices (in land preparation, propagation, spacing, thinning, pruning, pollarding etc.) and

cropping and harvesting systems suitable for different agroforestry systems (ie. Agri-horticultural, Silvi pastoral combinations) acceptable to local populace. This will help in ascertaining intercropping without reduction in crop yields, as far as possible, and evolving combinations of food and feed crops for nutrient production all the year round.

- 4 Developing sequential system of inter cropping, so that the inter and under space on the land is utilised as long as possible by crops and later till rotation by sciophytic fodder, shrubs and grasses with appropriate management practices.
- 5 Replacing, shifting cultivation with stable cultivation by adopting appropriate package of practices of land management related to agroforestry based on its capability.
- 6 Evaluating the economics of different agroforestry systems and establishing its correlation with the aims and objectives of correlation with the aims and objectives of resource management viz. conservation, development and utilisation.

Developments

Three field experiments under the following two research projects were newly laid out during the year and one field experiment laid out during the previous year continued. Biometrical observations and survival of the tree components were recorded, in all the field experiments.

Research

No. of research projects as on 31.3.85 is three.

Research highlights

Three thousand plants of 10 different tree spp. of fuel, fodder and timber uses were planted in the field experiment "Collection and evaluation of promising spp./cv. of fuel, fodder and small timber tree spp. Twenty six cv./varieties of different agro ecological origin of *Leuceana* spp. are maintained in the "Germplasm bank of *Leuceana* spp".

SUGARCANE AND OTHER MISCELLANEOUS GROUP

Ongoing projects

Crop improvement

Collection and evaluation of promising spp./cv. of fodder, fuel and small timber trees (Thiruvazhamkunnu)

Three hundred plants each of the multi-purpose tree spp. were planted during the SW monsoon period.

The growth rate of the above spp. were evaluated at an interval of six months. Similarly the survival (especially to withstand drought) of the tree spp. was also assessed. *Sesbana grandiflora* exhibited remark-

able growth rate. *Sesbana grandiflora* attained a mean height of 276 cm and a girth of 9 cm in six months. *Acacia auriculiformis*, *Albizia falcataria*, *Casuarina equisetifolia* and *Emblia officinalis* were the other tree spp. exhibited remarkable growth rate. The least height (38 cm) collar girth (1.7 cm) was seen in *Pterocarpus marsupium*.

However the survival rate of the tree gave a different picture. Only 10 percent of the *Sesbana grandiflora*, survived the summer. *Acacia auriculiformis* (97.7%), *Pterocarpus marsupium* (97.4%), *Ailanthus triphysa* (96.7%) and *Emblia officinalis* (96.3%) were the least affected.

As a part of the above project a germplasm bank of *leuceana* is also maintained. Twenty nine cv/ varieties of different *leuceanae* spp. were planted during this year. Observations on height and girth *leuceana* entries were recorded at an interval of six months. It is too early to comment on the trends now.

Crop management

Studies on management practices on agroforestry systems

Two field experiments under the above research project were taken up during the year.

1. *Compatibility of different components in agro-horticultural system*

The seven tree components viz. jack, mango, clove, nutmeg, tamarindus and mulberry were planted and their after care was done during the year. The growth of jack, mango, tamarind, nutmeg and mulberry are quite satisfactory while survival rate of clove is only 50%.

2. *Spatial arrangement and harvesting schedules in silvipastoral system*

Observations on yield of guinea grass as well as *leuceana* was taken. None of spatial arrangement was observed to have any effect on the yield of guinea grass. However, the growth of *leuceana* was not observed to be satisfactory. Hence, the total biomass production as well as the competitive and complimentary effect can be studied only after the proper establishment of the *leuceana* seedlings.

1.10 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 Region Rice Research Station. With the for-

mation 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.

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, in the year 1983-84. The Agricultural Research Station, Mannuthy forms a sub centre of the Central Region of the NARP and Special zone for problem areas covering the kole lands of Trichur. Apart from the projects undertaken under NARP, experiments under All India Co-ordinated Rice Improvement Project, Adhoc scheme on Annual oil seeds and university projects are being implemented at this station. Prof. T. F. Kuriakose, Project Co-ordinator (Rice) continued to be the head of the station.

Agricultural Research Station, Mannuthy

Total Area of the station is 38.34 ha. and the total cropped area 34.75 ha.

Instructional Farm, Vellanikkara

The total area of the instructional Farm, Vellanikkara is 95.35 ha. and the total cropped area 48.09 ha.

Seeds and planting materials distributed to farmers

6.278 tons of paddy seeds, 2643 Nos. of coconut seedlings, 5292 Nos. of spices and fruit plants and 4014 Nos. of ornamental plants, and 327.2 kg. of other seeds were distributed to farmers during the year.

The total expenditure of the farm during the year is Rs. 5,54,282.35 and the receipts from the farm is Rs. 2,35,712.67.

Research

No. of Research Projects as on 31-3-1986 are 45.

Concluded projects and results

RICE

1. Nitrogen management for dry sown low land rice

The experiment was conducted for three years and was found that the highest grain yield was recorded in treatment where urea supergranules applied with seeds in the same furrow at the time of sowing. Application of nitrogen fertilizers in the furrows found to be useful in reducing the weed growth.

Ongoing projects

RICE

Crop improvement

1. Uniform variety trial - I

With an object to evaluate comparative performance of very early maturing selections, 18 test entries including local check variety

Annapoorna are being tried. Maximum grain yield of 4784 kg/ha was recorded by IET Nos. 7991 and 8679.

2. *Uniform variety trial—II*

A trial to study comparative performance of early duration varieties is taken up and twenty three entries are being tested. Maximum grain yield of 2431 kg/ha was recorded by IET No. 8046.

3. *Uniform variety trial—III*

The object is to study comparative performance of medium duration varieties. Nineteen entries are being tested. Maximum grain yield of 4427 kg/ha was recorded by IET No. 8025. The check variety Karthika yielded 4269 kg and ranked second.

4. *Gall midge resistant variety trial*

To study the comparative yield performance and relative resistance to gall midge seventy two gall midge resistant selections, are being tried. Observation on 50% flowering, plant height were recorded. Out of the seventy two selections 17 nos. showed zero infestation to gall midge.

5. *Preliminary variety trial-I*

The object of the trial is to evaluate comparative performance of very early maturing selections. Seventy two entries including check variety Annapoorna are tested. Maximum grain yield of 5500 kg/ha was recorded by IET No: 9777 followed by IET No: 9812 (5408 kg/ha)

6. *Preliminary variety trial—II*

To evaluate comparative performance of early maturing selections 81 entries are being tried. Maximum grain yield of 5682 kg/ha was recorded by IET No: 8618 followed by IET No. 9945 (5341 kg/ha)

7. *Preliminary variety trial—III*

The object of this trial is to evaluate comparative performance of early maturing selections. Eighty one entries including check variety Karthika are being tried. Maximum grain yield of 3920 kg/ha was recorded by IET No. 9297 followed by IET No: 9849 (3780 kg/ha)

The local check Karthika yielded 2500 kg/ha only.

NARP PROJECTS

1. *Screening Rice Varieties/Cultures resistant/tolerant to water stress conditions*

The object of the study is to identify varieties/cultures, having drought resistance/tolerance in the early stages of growth during virippu and towards the fag end of mundakan season. The study on the effect of K_2O on drought resistances also is aimed at growing at different levels of K_2O . The experiment was conducted in two duration groups namely short and medium during early first crop and late second crop seasons. Among short duration cultures and varieties, the highest yield was re-

corded by the culture 23332-2 followed by Annapoorna. The culture 23332-2 is found to possess drought tolerance. Positive response to potash with regard to drought tolerance is indicated in all the varieties/cultures tested.

2. *Nitrogen management for dry sown low land rice*

To develop a suitable N management technology for dry sown low land rice, this experiment was conducted during three seasons. The analysis of the three seasons data revealed that application of urea in the form of urea supergranules increases the grain yield in paddy. Application of fertilisers after first weeding and enriched farm yard manure also recorded higher yield.

3. *Screening groundnut varieties ideal for coconut gardens*

The object is to select high yielding groundnut varieties suitable to the partially shaded coconut gardens. 20 varieties were tested. The highest yield was recorded by Spanish Improved (802.5 kg/ha) followed by TG 3 (557.5 kg/ha)

4. *Cataloguing of groundnut germplasm*

The experiment was laid out with 400 groundnut accessions to describe its important characters and catalogue them into different groups. Among the 400 lines raised, there were 5 early maturing lines, maturing between 90-100 days. The plant and seed characters were studied and described.

5. *Weed control studies in groundnut*

The experiment was laid out to find out the most suitable weedicide and its dose for controlling weeds in groundnuts crop. Five weedicides were tested.

Among the chemicals tried, the plot applied with Benthiocarb at the rate of 1 kg ai/ha gave higher grain yield but was only second to hand weeded plot.

6. *Screening rice cultures for deep submergence rice*

Six IET cultures were tested for their performance under deeply submerged condition. Two rice cultures (IET 6212 and IET 6669) were found to be promising.

7. *Screening groundnut varieties for seed dormancy*

The object of the trial is to screen groundnut varieties for seed dormancy and 408 accessions of groundnut were screened. Freshly harvested seeds/pods were sown in sand culture giving ideal moisture conditions. The study revealed that among the test entries 69 numbers possessed strong seed dormancy upto to 30 days.

8. Purification of culture 10-1-1

With an object to purify culture 10-1-1200 ear heads of the culture were collected from different localities of the kole lands of Trichur. Based on their vigour and relative resistance to pest and diseases 11 lines were selected and planted for further evaluation and testing.

9. Screening very short duration rice cultures for kole lands

Three screening trials were laid out in the kole lands with 19 culture and Annapoorna as check variety. The result from the two trials, Kanjani and Adat kole revealed that 10 cultures falling within the duration group of 80 to 90 days have outyielded the check variety Annapoorna.

10. Screening saline tolerant resistant rice cultures for kole lands

The objective of the trial is to screen saline tolerant/resistant, varieties/cultures for cultivation in kole lands having salinity problem. Thirty entries were raised at Kaduppookara near Puthenchira where salinity is a problem. As the salinity level reached intolerable limits all the cultures and varieties failed.

11. Evaluation of rice varieties/cultures for kole lands

The object of the trial is to select suitable rice varieties for kole lands. Newly released rice varieties and promising pre release rice cultures from various research stations were evaluated in two duration groups namely short and medium in kole lands during puncha season, along with local popular high yielding varieties as check.

The crop was raised in Kanjani kole. Scarcity of irrigation water affected crop to a large extent. The short duration entries escaped drought to a certain extent; while medium duration ones suffered much.

a. Short duration group

Nine entries were tested. Annapoorna recorded the highest yield (4822 kg/ha) followed by Jyothi (4606 kg/ha).

b. Medium duration group

All the 13 varieties were affected by drought. However, among them Jyothi recorded maximum yield followed by 10-1-1.

12. Fertilizer management for kole land paddy

The object is to find out the optimum dose of N and K for short and medium duration rice in kole lands. Two experiments were conducted under the project at farmers field in kole lands.

a. Short duration Annapoorna

There was significant difference in grain yield. The highest grain yield (3546 kg/ha) was recorded by the treatment receiving NPK at the rate of 110-35-55 kg/ha which is significantly superior to the present recommendation. (70:35:35 NPK kg/ha.)

b. Medium duration variety—Jaya

The highest grain yield (4337 kg/ha) was recorded by the treatment receiving NPK at the rate of 130-45-65 kg/ha which is significantly superior to the present recommendations (90:45:45 kg/ha)

13. Cropping system for double crop kole lands

The object of the experiment is to find out suitable crop combination for double crop kole lands. The experiment was vitiated as the medium duration variety (Jaya) in the cropping system could not be harvested along with the general harvest of cultivators crop in the neighbouring area, during the first crop season. The cropping system with medium duration variety followed by short duration gave highest grain yield which was significantly superior to short duration variety.

14. Evaluation of neem-cake urea carbofuran blends for increasing NUE and efficiency of carbofuran

The object of experiment is to evaluate the efficiency of neem cake urea carbofuran blend for increasing rice yield and better control of pest. Application of urea + neem cake + carbofuran as basal dressing followed by urea as top dressing recorded the highest grain and straw yield. On the other hand low grain yields were recorded when urea was used as per package of practices recommendations and absolute control.

Whorl maggot incidence was highest in absolute control and treatment plots without carbofuran application.

15. Studies on increasing the efficiency of urea fertilizers in kole lands

The objective of the experiment is to increase the nitrogen use efficiency in rice by urea coating, thereby minimising nitrogen loss through leaching, volatilisation and denitrification.

The results reveals that application of 50 kg N/ha as rock phosphate coated urea was as effective as application of higher dose of N (upto 90 kg N/ha) as prilled urea or urea coated with any other materials tried.

16. Bioefficiency test with new herbicides in transplanted rice in kole lands

This trial was conducted at Chittilappali kole (Trichur district) during the pancha season 1985-86. The lowest dry weight of weeds was recorded by Anilghard + 2, 4-D, (200 + 400g ai/ha). Since the sedges were the major weeds followed by Echinochola sp. 2, 4-D played vital role in controlling the weeds.

17. Adaptive trial with short duration culture 24-20 in kole lands

During pancha season adaptive trials with culture 24-20 was conducted at three locations in Trichur, kole lands, viz. Eravu, Kanjani and Irinjalakuda. A mean yield of 3542 kg/ha was given by culture 24-20 where as the check variety Annapoorna gave only 2920 kg/ha. On an

average culture 24-20 matured in 75 days while Annapoorna took 89 days thus giving a per day production of 47.23 kg/ha and 32.58 kg/ha respectively.

K. A U projects

18. Comparative yield trial with selected AICRIP cultures

Comparative yield trial with selected AICRIP cultures from UVT-1 and GMT of the kharif 1985, were laid out in the rabi season. The cultures selected from UVT-1 are short duration type high yielding and comparatively resistant to pests and diseases. From the GMT also 5 cultures showing zero infestation to gall midge were selected. During this season they gave an yield ranging from 2.7 to 4.2 ton/ha. No severe attack of pests or diseases were noticed during the crop period.

19. Evaluation of pulses and oil seed varieties for their performance in kole lands

To select suitable pulse and oil seed varieties for kole lands five independent experiments were conducted in the farmers field, for cowpea, greengram, blackgram, sesamum and groundnut.

Among the cowpea varieties, Krishnamony recorded the highest yield (1282 kg/ha).

The greengram variety S.8 recorded the highest yield followed by PDM-54.

Among the blackgram varieties Pant-U-30 recorded the highest yield.

Sesamum variety SI-1885/I recorded the highest yield followed by TMV-2.

The groundnut variety MK-374 recorded the highest yield followed by TG-14.

20. Multilocational trial on rice culture 1727

A comparative yield trial was conducted with rice culture 1727 using Jaya, Bharati and Pavizhom as check varieties. Highest grain yield was recorded by Jaya (4533 kg/ha) which is significantly superior to culture 1727 and Pavizhom. Severe incidence of blast was noted in all the varieties.

21. Effect of 2, 4-D applied as foliar spray on the flowering and yield of brinjal

With the object of increasing the fruit set and yield of brinjal by the application of 2, 4-D an observational trial was conducted during the rabi season. The highest fruit yield of 1718 kg/ha with 80% fruit set was obtained when 2 ppm 2, 4-D was applied 30 days after planting.

22. Effect of graded doses of NPK on the yield of brinjal

Object is to find out optimum dose of NPK for brinjal. The results revealed that the effect of N was significant on the yield of brinjal while

P_2O_5 and K_2O had no significant effect on the yield. Yield was increased with increasing doses of nitrogen.

23. *Studies on the effect of different levels of NPK on the yield of snake gourd*

With the object of finding out the effect of different levels of NPK on the yield and yield contributing characters of snakegourd an experiment was laid out. Results obtained during the season revealed that when compared to control (000 NPK) all the treatments were superior with respect of yield, number of fruits, length of fruit and girth of fruit. But different levels of N, P and K tried had no significant effect on these characters.

24. *Multilocational trial on promising Nendran clones*

The object of the trial is to locate promising clones of Nendran for yield. Five promising Nendran clones are being tested with the local check. Harvesting of the crop is continuing.

25. *Suitability of various tuber crops as intercrop in irrigated Nendran banana*

Five types of tuber crops namely tapioca, amorphophallus, xanthosoma, sweet potato and dioscorea were grown as intercrop in Nendran banana. It was found that intercropping tapioca in irrigated Nendran banana is profitable.

26. *Manurial trial on jack*

This trial was started with the object of fixing the optimum level of nutrients required for the jack tree. The experiment was started during 1980 on freshly planted Muttan Varikka grafts with three levels of NPK. The experiment is in progress.

27. *Maintenance of germplasm collection of jack*

A germplasm collection of jack consisting of 63 types are maintained at this station.

28. *Effect of gamma irradiation on vegetatively propagated ornamental plants*

The objective of the trial is to induce somatic mutation and to select commercially interesting mutants in respect of colour, form and size. Cuttings of coleus, mussaenda, croton and canna suckers were treated with r-rays at a dose of 0, 1, 2, 3 and 4 KR to fix the optimum dose. Two mutants each in leaf colour and leaf size were observed in coleus, canna and mussaenda are found to be highly sensitive to irradiation.

29. *Screening rice bean cultures/ varieties*

An observational trial was conducted with nine varieties of rice bean received from NBPGR, Vellanikkara.

The highest yield (613 kg/ha) was recorded by type-2. The pods of all rice bean varieties were found to be free from the attack of pest whereas the pods of green gram, black gram and cowpea planted simultaneously were severely affected by pests.

30. *Spacing trial for newly recommended groundnut varieties*

The newly recommended varieties of groundnut namely TG-14, Spanish Improved and TMV-2 were planted at 6 spacing during summer and kharif seasons. During summer season closer spacing was found to be ideal for varieties TG 14 and Spanish Improved, whereas a wider spacing was better for TMV-2.

1. *Evaluation of groundnut varieties for suitability as intercrop with tapioca*

To identify the most suited groundnut variety for growing as intercrop with tapioca, (var-M4) a trial was laid out during kharif 1985. Results obtained revealed that maximum dry pod yield was obtained when groundnut variety TMV-2 was grown along with tapioca closely followed by Dh-8.

2. *Germplasm maintenance of groundnut*

Two hundred varieties of groundnut in the germplasm collection were raised during this year. In addition to it, other 200 varieties were newly acquired from ICRISAT and added to the germplasm forming a collection of 400 varieties.

3. *CYT of 18 varieties of groundnut*

To identify suitable varieties for summer rice fallow cultivation in Kerala, eighteen varieties of groundnut selected on the basis of previous trials, were put under yield trial in rice fallow during summer 1985. Of the 18 varieties tested J4 gave the highest dry pod yield of 1992 kg/ha and was closely followed by JL-24 and Ga-163 with 1987 kg/ha and 1956 kg/ha respectively.

4. *Comparative yield trial of 23 selected sesamum varieties*

To identify varieties suited for rabi upland, and summer rice fallow cultivation, twenty three varieties of sesamum originally selected from the initial evaluation of 170 varieties collected from various sources were put to comparative yield trials.

The variety C-14-3 gave the maximum of 811 kg/ha during summer 1985. The earliest variety is N-62-32 which took 80 days to maturity in the rabi season.

5. *Germplasm maintenance of annual oil seed crops*

A germplasm of 120 varieties of sesamum, 12 varieties of sunflower and 6 varieties of castor were maintained.

1.11 ALL INDIA CO-ORDINATED SPICES AND CASHEWNUT IMPROVEMENT PROJECT (AICS & CIP) SUB-CENTRE, 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 layout 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.

Objectives :

The major objectives of the Project are :

- (i) To identify high yielding cashew types by screening existing germplasm collections.
- (ii) To evolve new types through hybridization.
- (iii) To standardize the techniques of vegetative propagation suited to the total conditions.
- (iv) To work out manurial schedules for cashew by conducting fertilizer experiments.
- (v) To evolve effective control measures against the pests and diseases affecting the crop.
- (vi) To standardize the seedling selection and
- (vii) To conduct comparative yield trials with types collected from different cashew growing areas in order to identify types suited to the locality.

Sri. S. Balakrishnan, Professor of Horticulture, Multi State Cashew Research Project functioned as Head of the Project.

Sri. P.G. Veeraraghavan, Professor (Agronomy) and Sri. D. Sitarama Rao, Assistant Professor (Ent.) attended the VIIth Workshop on Plantation Crops, Cashew and Spices held at Kanakakkunnu Palace, Trivandrum from 6th to 9th November 1985.

Research

Number of Research Projects as on 31-3-86 is ten.

Ongoing projects

i) Germplasm collection in cashew and description of varieties

Between 1976 and 1979, 93 accessions consisting of 164 trees were planted and they are being maintained. The growth measurements, flowering duration, yield, nut characters, resistance to pests and diseases etc. of individual trees were recorded. Three trees from these accessions could be identified as promising for carrying out further detailed studies. These were tree No: 1956 (accession No: Muliya 8-2), tree No: 1963 (accession No: Muliya 1-2,) and tree No: 2052 (accession No: Adhoor 26-2) which gave mean nut yields of 8.76, 9.90 and 12.63 kg/tree respectively over the last three years.

Breeding improved types through hybridization

The project was aimed at evolving high yielding hybrid types with desirable characters like high shelling percentage, medium sized nuts, compact flowering period, high sex ratio and pest and disease resistance.

Based on the performance from 1982-83 to 1985-86, 10 hybrids were found promising the mean tree yields of which ranging from 11.76 to 19.84 kg. During the year maximum yield was recorded by tree No: 1591 (29.00 kg) followed by tree No: 1602 (24.45) and 1610 (23.40 kg)

During the year studies on kernels were also taken up. Hybrids 856 and 1602 recorded the best international grade (w 180) followed by hybrids 1608 and 1610 which fell under the international grade w 210.

Comparative yield trial of Anakkayam selections and hybrid progenies (air-layers)

Clonal progenies (air-layers) of thirteen high yielding selections and three hybrids evolved at the Cashew Research Station, Anakkayam were being studied since 1975 for their performance at Madakkathara.

The data collected for the last 4 years were pooled and analysed. The selection NDR-2-1 gave the maximum mean yield of 5.562 kg/tree followed by BLA 39-4 with 5.034 kg/tree.

Standardization of seedling selection technique in Cashew

The object of the experiment was to correlate the characters like nut size, nut weight etc. to the seedling vigour, earliness and the economic attributes of the grown up tree.

Out of the 150 seedlings of 10 types planted during 1978, 108 plants established in the mainfield. Of these 31 trees yielded during the year under report. Yield varied from 0.20 kg. to 12.80 kg. per tree.

Propagational trials on Cashew (Madakkathara) Soft wood grafting

During the year 1982-83 and 1983-84 epicotyl grafting were standardized. However, heavy incidence of collar rot in root stocks resulted in a final take of only 10-12% when large scale epicotyl grafting was attempted during the years 1984-85 and 1985-86.

During 1986 season, a modified method of grafting in collaboration with Multi State Cashew Research Project was attempted to circumvent the attack of disease. Since it was inferred that the disease was more due to physiological reasons than pathogenic reasons, the grafting was done on root stocks of advanced age (20-25 days). While beheading the root stocks, a pair of leaves were retained. The selection of scion, grafting operations and after care were identical to those in epicotyl grafting.

Studies to find out the best season for soft wood grafting

Grafting was done on large scale at fortnightly intervals from the second fortnight of February '86 upto the first fortnight of June '86.

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Studies to find out the best season for soft wood grafting

Grafting was done on large scale at fortnightly intervals from the second fortnight of February '86 upto the first fortnight of June '86.

The success ranged from 14.57% during the second fortnight of March to 43.71% during the second fortnight of May. These studies are continued.

Varietal response to softwood grafting

Response to six varieties to softwood grafting was studied. The varieties were BLA-139-1 (Anakkayam-1), BLA 39-4, H-3-13, H-3-17, NDR-2-1 and K-22-1. Maximum percentage success was obtained in the variety K-22-1 (71.11) during the period from April to June '86. The trial is continued.

Crop management

Trial on foliar application of urea along with insecticides

An observational trial with 5 treatments was laid out to study the efficacy and economics of foliar application of urea combined with insecticide sprays, as compared to soil application.

As per the recommendations of the VII workshop on cashew, the trial is modified and the same will be laid out during the ensuing season.

Studies on root activity pattern of cashew

The experiment with 15 treatments was carried out at this station by the Radio Tracer laboratory of the College of Horticulture, Vellankkara.

Labelled phosphorus (P^{32}) was applied in combinations of 5 lateral distances and 3 depths around the trees. Leaf samples were analysed for radio activity at fortnightly intervals by Cerenkov counting technique using a computer controlled liquid scintillation system.

The analysis of data indicated that the uptake of radio phosphorus increased progressively upto a period of 2 months. Absorption at 15 cm depth was significantly higher than at lower depths.

Plant protection

Insecticidal control of tea mosquito

1) Helopeltis antonii

Efficacy of 7 insecticides in controlling the pest complex of cashew was studied for the third year in succession. Insecticides were sprayed thrice coinciding with flushing, panicle initiation and fruitset initiation. Observations on the incidence of leaf miner, tea mosquito and thrips were recorded and analysed statistically.

Incidence of tea mosquito was lowest in carbaryl treated plots followed by monocrotophos one month after the third round of spray.

Thrips damage was the lowest in quinalphos and endosulfan treated plots during all the three stages of observation.

Leaf miner damage was significantly lower in all insecticides than that in control.

(ii) *Control of stem borer*

Bark treatment with monocrotophos EC

Cotton pads soaked with 30 ml. of monocrotophos (Nuvacon 40 EC) were used to treat the infested trees. The larvae and pupae in the treated trees were found killed after treatment. Based on these results, detailed experiment has been drawn up for taking up during the ensuing season.

Effect of combined sprays of insecticides and NAA on control of tea mosquito (Helopeltis antonii) and on yield of cashew

The object of the experiment was to find out the effect of combination sprays of endosulfan, phosphamidon and carbaryl with NAA on the control of tea mosquito and yield of cashew and also to find out the degree of synergism, if any, due to these combinations.

The experiment was conducted for the second year. Observations on the intensity of flowering and yield were recorded apart from the intensities of damage due to pests.

Analysis of data revealed that there was no significant difference in the intensity of flowering and yield of nuts among different treatments. Treatment effects were not significant with respect to control of pests like tea mosquito, leaf miner and thrips. Hormone application could not significantly increase the intensity of flowering or yield.

MULTI STATE CASHEW RESEARCH PROJECT (MADAKKATHARA)

The Multi State Cashew Research Project started functioning at the Cashew Research Station, Madakkathara from 15-2-1982. The World Bank aided Project obtained the technical and administrative sanction from the ICAR, New Delhi as per F. 4-3/78 (H&MC) dated 24-7-1981. The sanctioned duration was for 5 years from 1980-81 to 1984-85 at the first instance. Subsequently it was extended upto to 31-3-1986 (1985-86) subject to approval by funding agency as per ICAR's No: 26(1)/84/H&MC dated 1-7-1985.

The major objectives of the Project are:-

1. Standardisation of vegetative propagation.
2. Establishment of trial cum demonstration cum multiplication plots with improved types in different institutions and cultivator's field located in different agroclimatic and soil conditions of the State.
3. Demonstration of package of practices in cashew including chemical and sanitational control of pests and diseases, and
4. Training of field staff (Agrl. Demonstrators & Malis) in cashew propagation and cultivation.

Training programme for field staff in cashew

During the year, training with special emphasis on vegetative propagation and plant protection was given for the Agricultural Demonstrators (88 nos) working in Multi State Cashew Project, Department of Agriculture, Kerala State from 17-2-86 to 14-2-86. A kit containing garden tools and literature was also supplied to each trainee, the cost of which was met by the Govt. of Kerala.

Besides, the following training programme were also taken up:

Cashew Development Officers, Junior Agricultural Officers, Agricultural Demonstrators, Agricultural Diploma Students. A total of 150 persons were trained.

Research

No. of research project as on 31-3-1986 was six.

Ongoing projects

Standardization of vegetative propagation in cashew-testing different propagation techniques on large scale for extensive adoption under field conditions

Air layering

In cashew propagation air layering is still continued as an easy and cheapest method of vegetative propagation. Rooting efficiency of different types was noted to differ significantly. Hence the following studies were undertaken during the year.

Efficiency of production of shoots for air-layering in types

Out of the 6 types studied, NLR-2--1 produced maximum number of shoots (32.2) followed by BLA-39-4 (28.6) and NDR-2-1 (26.5). Least shoot production was noticed in the type Anakkayam-1 (17.7).

Rooting efficiency of types

Rooting efficiency was maximum in type K-22-1 (64.23%) followed by NDR-2-1 (62.13%) and NLR-2-1 (60.57%) which was significantly higher than in BLA 39-4 (41.11%), Anakkayam-1 (43.5%) and H-3-17 (37.1%).

During the year, 1730 rooted air layers were produced and distributed.

Epicotyl grafting and soft wood grafting

During the previous years epicotyl grafting was undertaken on large scale. Eventhough this method gave a high initial take, subsequent mortality of grafts due to collar rot was noticed, in spite of regular plant protection measures. The etiology of the disease could not be established. Hence, modified techniques were tried and it was found that when the age of root stock was enhanced upto 30 days after germination, success rate also enhanced to 40-60%.

The modified method of grafting was adopted for producing grafts on large scale. About 3000 grafts were prepared by adopting soft wood grafting. Further studies on this method are in progress.

Establishment of Progeny gardens

Two progeny gardens one at Madakkathara (1.03ha) with 15 varieties/types and another at Central State Farm, Aralam (10 ha) with 6 types were maintained. During the year 1985-86, the progeny garden at Aralam was expanded by planting 11 hybrids produced at CRS Madakkathara.

Establishment of Progeny

Nurseries and clonal banks (quick multiplication plots)

Close planted progeny nurseries for quick multiplication of vegetatively propagated planting materials were planned to be established in all the cashew growing tracts. Accordingly CPP nurseries were established Madakkathara, RARS, Ambalavayal and Central State Farm, Aralam during 1982-83 with 6 recommended high yielders. During the year 1985-86 similar nurseries was existing ones. The CPP nursery at Madakkathara was further expanded by planting 63 grafts and layers of the type Anakkayam-1 to meet the increased demand and 8 grafts each of the 11 hybrids evolved at this Centre. Grafts of the hybrids are being supplied to various co-ordinating centres for multilocal trials.

The Department of Agriculture, Kerala has decided to establish clonal banks in different districts with technical guidance of this scheme during the year 1985-86. The locations selected for this purpose were District Agricultural Farms at Malampuzha, Koothali, Neriamangalam and Peringamala. A total of 720 grafts were supplied to the Department of Agriculture for this purpose.

Studies on the physico-chemical analysis of fruits, nuts and kernels of different types

Studies on physico-chemical analysis of apples, nuts and kernels are in progress from 1984-85. Studies on 13 types were completed so far. Data on weight, volume, juice content, TSS, reducing sugars, acidity and brix acid ratio in respect of cashew apples, and in respect of nuts and kernels data on weight, length, breadth thickness, shelling percentage, protein content and kernel export grades were collected.

Apple size was highest in type H-3-13 (132.7 g) and smallest in type K-28-2 (31.3 g). Maximum apple production per tree was recorded in type H-3-17 (358.5 kg) followed by Anakkayam-1 (323.4 kg). Type BLA 273-1 was significantly superior to others in TSS content (16.53%). The TSS was lowest in K-22-1 (9.07%). Reducing sugars were maximum in BLA 273-1 (13.84%) and least in NLR-2-1 (5.88%). Shelling percentage was maximum (32.85%) in type Anakkayam-1. H-4-7

recorded highest protein content (43.01%). Kernels of type NDR-2-1 gave W 210 grade followed by BLA 39-4. Anakkayam-1, K-10-2, K-19-2, K-22-1, H-3-13, and H-3-17 which gave W 240 and types NLR-2-1, K-25-1, K-28-2 and H-4-7 fell under Grade W 320.

Trial cum multiplication plots of recommended types of cashew

The trial started during the year 1983-84 is being continued. Observations on growth parameters such as height, spread and plant girth were recorded.

Demonstration on package of practices

Eight demonstration plots laid out in 4 districts of Kerala viz. Palghat, Malappuram, Calicut and Cannanore districts laid out during 1983-84 was continued for the third consecutive year. Operations were carried out as per recommendation of Package of Practices. Highest mean yield of 9.51 kg/tree was recorded in the treatment "Spraying + fertilizer application" as against 5.50 kg/tree in control plots. Among the insecticides, endosulfan treated plots recorded the highest per tree yields in Cannanore, Calicut and Palghat districts. Quinalphos treated plots gave highest yield in Malappuram district. Cost benefit analysis indicated that by adoption of "Plant protection and fertilizer application", resulted in an increased income to a tune of 1:5.6.

Highlights

Softwood grafting technique was standardised. Collar rot disease in grafts were checked.

Physico-chemical analysis of fruits and nuts of 13 types completed.

Highest protein content of 43.03% recorded by type H-4-7.

Kernel studies were undertaken to determine their international grades.

Adoption of package of practices recommendation is beneficial exhibiting a cost benefit ratio of 1:5.6.

Visitors

Dr. Ian Baker, Department of Primary Production and Dr. Bruce Toohil, Horticultural Research Officer, Australia, visited the station during May 1985.

Dr. Ahmed Abdulla and Dr. Sumangat of Research Institute of Spices Medicinal Plants, Bogor, Indonesia visited the station During December 1985.

1.12 BANANA RESEARCH STATION, KANNARA AND PINEAPPLE RESEARCH CENTRE, VELLANIKKARA

The Banana Research Station, Kannara started research work on Banana and Pineapple in an area of 19.7 ha at Maraickal from 1963 onwards. In 1970, the Station became one of the centres of All India Co-ordinated Fruit Improvement Project of ICAR.

Major objectives are to collect available genetic stocks of banana and pineapple including related and wild species and to maintain them to utilize as the base material for further improvement of these crops; develop better varieties of banana and pineapple by introduction, selection, hybridization and induced mutagenesis; evolve better cultural and manurial recommendations based on experimental data; specify appropriate methods of planting, irrigation, ratooning, intercropping etc. for banana and pineapple for profitable cultivation and to find out suitable control measures for pests and diseases affecting banana and pineapple.

Dr. K. Pushkaran, Associate Professor continued to be in charge of the station.

During the year under report, irrigation facilities and drainage systems were improved. Fencing and river side protections were made.

The receipt from the station was Rs. 2,03,287 as against Rs. 1,55,914 during the previous year.

A Krishidarsan programme as per direction from the Directorate of Extension, KAU, was conducted for 100 selected farmers of Maraickal and neighbouring areas. As part of the Village Adoption Programme and Lab-to-Land Programme of College of Horticulture, Vellanikkara, two day Karshika Mela, Cattle Show and a Station visit were conducted effectively and successfully at Maraickal.

Field trainings were given to final year B. Sc. (Agri.) Students of College of Horticulture and final year diploma Agri. students of Rural Institute, Tavanur.

All the Scientists of the Station participated in the National Fruit Research Workshop held at the KAU, Vellanikkara. The Station had actively participated in the Trichur Pooram Exhibition and also participated in the Trichur Flower and Fruit Show 1985 and won four prizes.

The Scientists took classes on banana and pineapple to the station visitors such as High School Teachers, Students of Colleges and Teachers KGT Agricultural Students, Tribal Youth and Students, progressive farmers from Lakshadweep, Farm Information Exchange Club, FACT unit and IFFCO. The Head of the Station handled three courses—one P. G. and two U. G. for the students of College of Horticulture, Vellanikkara.

Research

The total No. of research projects as on 31-3-86 was 41.

Research Highlights

From an extensive survey 144 Nendran clones were selected and they were evaluated for three years. Based on the performance 15 clones were identified as promising. The study had led to the selection of five very promising clones. The five clones viz., 35 (Matta-thukonam), 49 (Kothala), 100 (Andallors), 123 (Puthur) and 132

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(Poovanchira) are being tried in the following six different locations (i) A. R. S., Mannuthy. (ii) R. A. R. S., Pilicode. (iii) R. A. R. S., Ambalavayal. (iv) R. A. R. S., Kumarakom. (v) A. R. S. Chalakudy and (vi) B. R. S., Kannara to assess their adaptability in different agro-climatic conditions of the State.

Hybridisation work was taken up during January 1985 to August 1985 using different cross combinations. As a result of a series of crosses done in banana a large number of hybrid seeds could be obtained. But only 24 hybrid seedlings were got established from the cross Karpooravally x Pisanglilin and one seedling from Klue teparod x Pisanglilin. These seedlings are now under observation for their performance in the field.

Soil application of phorate or carbaryl at the rate of 20g/pit at planting and again at 25 g/plant three months after planting reduced banana rhizome weevil attack.

Two sprays with Bavistin 0.12% or Bordeaux mixture 1% at an interval of one month starting from the first monsoon showers (May-June) reduced leaf spot diseases and increased yield.

The kokkan disease is seen transmitted through suckers from one generation to the other.

Application of Furadan 3G @ 20 g/pit at the time of planting and 20g/plant on 65 and 175 DAP in the leaf axils is effective in controlling bunchytop, rhizome weevil and nematodes in Nendran banana.

The hybrid from the cross Agniswar x Pisanglilin was found to recombine the desirable attributes of the parents.

Cucumber, amaranthus and colocasia were found to be suitable intercrops in Nendran banana.

In Palayankodan, trimming of the last one/two terminal hands helps to produce bunches with uniform finger size without appreciable reduction in bunch weight.

Germination of banana seeds was found to be enhanced by gamma ray irradiation at 40 KR.

Deep trenches are preferable for high density planting in pineapple.

Mulching with pineapple leaves was found to be useful for conservation of moisture in pineapple gardens.

Ongoing projects

Varietal studies in banana

Collection and Evaluation

A total number of 113 varieties were maintained in the germplasm collection. Important plant and bunch characters were recorded. In general, diploid acuminata type (AA) produced comparatively smaller bunches whereas the bunches produced by culinary varieties (ABB) were heavier. Other triploid banana (AAB and AAA) produced medium to

heavy bunches. The heaviest bunch was produced by Peyan (17.5 kg). In duration, the earliest was Pisanglilin (231 days) while the latest was Gros Michel (388 days).

A similar trend was observed during last year.

Clonal variation studies in banana var. Nendran

From an extensive survey 144 Nendran clones were selected from the various Nendran tracts of the State. Based on the performance, 15 promising clones were identified. On critical comparison with local check for three years had led to the selection of 5 very promising clones along with control were put to multi-local trials in six centres to test local adaptability.

They are identified to be superior over the control.

Intraclonal variation in rainfed banana c.v. Palayankodan

In one of the Ph. D. programmes conducted at the station during 1981-84, five clones were found to be promising with respect to bunch weight out of the 23 clones evaluated. These selected clones are now put under a detailed trial along with a local control to evaluate their performance and to multiply suckers.

Banana improvement by selection, hybridisation and mutation breeding.

Hybridisation between different varieties from the genomic groups resulted in four hybrid plants. The F_1 seedlings were later planted in the main field. Observations on total duration (days), growth parameters at harvest and bunch characters both quantitatively and qualitatively were studied.

The hybrids evolved from Mannan x Pisanglilin and Harichal x Pisanglilin produced bunches of poor quality weighing 9.5 and 6.0 kg respectively. The respective durations were 535 and 556 days. The suckers obtained from these hybrids were planted along with their parents for critical comparison.

Induced mutagenesis in banana var. Nendran

Since gamma irradiation of suckers of different sizes have not generated any positive result, rhizome buds of Nendran were scooped out with a portion of mother rhizome (weight ranging from 30 to 70g) and irradiated. 50 such buds each were irradiated at 1 KR to 5 KR with a dose difference of 0.5 KR. The irradiated buds were raised in nursery beds of convenient size and the seedlings were later transplanted to the main fields for observations on any genetic variation. Moreover 700 hybrid seeds obtained from the cross Karpooravally x Pisanglilin were also irradiated from 20 KR to 80 KR at 10 KR interval. The treated seeds along with control were sown for germination and 22 seedlings so obtained were under observation.

It is seen that irradiation of banana seeds at 40 KR enhanced seed germination to some extent.

Combination breeding in banana

Fifty five selected inflorescences were pollinated using Pisanglilin, Sikuzani, Robusta, Kanchikela, *Musa balbisiana*, Chenkadali, Wather, Anakomban and Namrai as male parents. The female parents selected were Nendran, Poovan, Palayankodan, Karpooravally, Poomkali, Klue teparod and Bodles altafort. The large number of seeds obtained from these crosses were sown in sand bed after giving acid treatment.

The seeds of only two crosses i.e. Karpooravally x Pisanglilin and Klue teparod x Pisanglilin were germinated. The twenty four seedlings obtained from the former crosses and one seedlings obtained from the latter are coming up well.

Flower bud initiation studies in banana

Morphological observation on height, girth and number of leaves were recorded from five popular varieties of banana viz., Nendran, Palayankodan, Poovan, Robusta and Red banana. To study the time of flower bud differentiation and the chronological development of flower bud, the flower primordia collected were also fixed and preserved.

Crop management

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 & 400 g/plant in all combinations were tried on three plant crops, three first ratoon crops and one second ratoon crop. A second ratoon crop is now in the field. During the year one first ratoon crop was harvested.

The application of N at 150 g/plant and K at 200 g/plant were the most economical. The application of P at the levels tried did not exhibit any significant difference.

Population density trial in banana var. Palayankodan and Poovan.

The experiment was conducted separately for each variety. The population densities tried were 4444, 3268, 2500, 1976 and 1600 plants/ha in square and rectangular methods. The experiment in palayankodan was conducted for one plant crop and one ratoon crop. The experiment on poovan was conducted on the second plant crop.

The optimum plant population density of 2500 per hectare under rectangular method of planting recorded highest yield in the case of poovan. The results on palayankodan was 2500 plants/ha in square and rectangular method.

Effect of number of suckers retained on the performance of ratoon crop of banana var. Palayankodan.

In the first ratoon crop, retention of two suckers along with the application of NPK @ 200:400:800 g/clump was found to be economic.

Plant protection

Studies on the control of banana rhizome weevil by soil application of insecticides

Observations on the growth and yield parameters as well as rhizome damage due to weevil attack were recorded at harvest.

The results in general indicated that soil application of phorate or carbaryl twice around the banana rhizosphere offer protection to the plants.

Control of banana rhizome weevil by insecticidal treatment of suckers

Banana suckers were dipped in different insecticides mentioned below for 30' just before planting: Phosphamidon 2%, Quinalphos 1%, Monocrotophos 2%, Dimethoate 1%, Carbaryl 2%, and HCH 2%. Apart from the morphological and yield characters, the rhizomes were also examined at the time of harvest to find out the extent of damage due to weevil attack.

Sucker treatment with Phosphamidon, Quinalphos, Monocrotophos, Carbaryl and HCH were effective in controlling rhizome damage by weevil attack.

Varietal screening against rhizome weevil

Fifty five varieties have been screened under field conditions to locate varieties resistant to weevil attack. All the varieties are found susceptible to weevil attack in different grades.

Studies on the nematodes associated with banana

Survey and identification of nematodes

Random sampling was done in Trivandrum, Idukki, Ernakulam and Trichur districts.

The survey revealed the association of *Radopholus similis*, *Heterodera oryzae*, *Helicotylenchus multicinctus*, *Rotylenchulus reniformis* and *Meloidogyne* sp.

Control of burrowing nematode of banana using intercrops

The banana var. Nendran was intercropped with *Tagetes erecta*, *Crotalaria*, *Alpinia galanga* and *Asparagus*. In order to compare the effect of these intercrops in reducing nematode population, Carbofuran 3G @ 1 g ai/plant was applied once at planting and again 3 months after planting.

Carbofuran was effective in checking nematode infection to a minimum level. Among the different intercrops tried, *Crotalaria* was found to check the nematode population better than the other crops.

Banana disease

Fungal diseases of banana and their control

Two sprays with six fungicides were given at an interval of one month starting from the first monsoon showers (May-June).

Bavistin treated plants produced the lowest percentage of disease index and found to be superior to all other fungicides.

Investigations of kokkan disease

The disease was carried from the suckers on infected mother plants. The banana rhizome weevil and nematodes did not have any direct role on the incidence of the disease. The leaf status of micronutrients viz., Mn, Fe, Zn and Cu did not differ significantly.

PINEAPPLE

Crop improvement

Varietal studies in pineapple

The morphological and biometric characters of twenty five varieties were studied.

Marked difference were observed with regard to plant nature, presence of spines, colour of leaves and floral characters.

Clonal variation studies in pineapple var. Kew

Nineteen clones collected from seven districts were observed for their yield and fruit characters. In a new area uniform suckers obtained from each clone is being planted as and when the suckers get matured for transplanting.

Observations made on the plant crop and first ratoon crop indicated that among the 19 clones collected, Clone No. 2/82 (collected from Ernakulam dist) and Clone No. 2/81 (collected from Trichur dist) are the best in yield.

Breeding new varieties of pineapple

Crosses between kew and the *Valera balanca*; Singapore Spanish and Mauritius were made.

Reciprocal crosses were also taken up. Besides, direct and reciprocal cross between two very promising varieties viz., Mauritius and *Valera balanca* was also taken up.

Seed sets were noticed from these crosses.

Crop management

Nutritional requirement of pineapple var. Kew

The experiment was discontinued so as to conclude the trial. But as per the proceedings of the Fruit Workshop held at Vellanikkara during 1985 the experiment has to be continued with the same technical programme for confirmatory results.

Nitrogen application significantly influenced weight of D' leaf and total number of leaves/plant. Phosphorus application influenced width of D' leaf and D' leaf area. Application of potash significantly influenced all the characters except total number of leaves/plant.

Mulching studies in pineapple

The five materials used for mulching were dry leaves of jungle trees, pineapple leaves, banana leaves (dry), chopped banana pseudostem, sunhemp grown in situ.

Trend observed

The treatments did not differ significantly with regard to yield/ha and flowering percentage.

Standardisation of depth of trench for planting pineapple

The experiment was conducted with two spacing levels and three depth of trenches.

The data collected on the 2nd ratoon crop did not differ significantly with regard to yield per hectare and flowering percentage.

Ratooning under high density planting pineapple

The yield/ha was found superior in population densities 53,333 plants/ha and 44,444 plants/ha with a yield of 55.61 tonnes/ha and 62.72 tonnes/ha respectively. It was also observed that the growth, size and weight of the crowns get increased as population density increases. In fruit quality attributes no significant difference was noted due to treatments.

Studies on the effect of certain chemical and growth regulators on pineapple crown, fruit size and quality (Observational trial)

Two separate experiments were conducted with the following treatments:

- 1 Removal of meristem of crown mechanically, removal of whole crown by hand, application of MH 100 ppm, Alar 100 ppm, CCC 100 ppm, TIBA 100 ppm and Conc. HCl 1 drop/plant on the meristem and a control.
- 2 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, Kerosine and a control.

In the first experiment, mechanical removal of the crown was found to be significantly superior in reducing crown length, weight and crown yield per hectare. The reducing sugar content was also found to be higher which is similar to 100 ppm Alar treatment. Application of 1 drop of conc. HCl was found to be the next treatment.

In the second experiment, application of Kerosine (5 drops) was found to be effective in reducing crown length, weight and crown yield/ha.

Survey and identification of pineapple nematodes

Survey conducted in important pineapple growing areas of Trivandrum, Idukki, Ernakulam, Trichur and Palghat districts revealed the association of *Rotylenchulus reniformis*, *Meloidogyne* sp. and *Helicotylenchus* with the crop.

Nematode population was more in ratoon gardens.

Farming systems and cropping patterns

Standardisation of cropping system for pineapple

The intercrops tried were ginger, turmeric, tapioca, colocasia and cowpea. Among the intercrops colocasia gave the highest net returns.

Visitors

Dr. Ronald H. Pelloch of USAID, New Delhi, visited on 23.5.1985. Field Officers and Area Managers of IFFCO and fifty progressive farmers from Andhra Pradesh, Tamil Nadu and Karnataka visited the station on 20-1-1986.

Dr. K. V. Ahammed Bavappa, Member of KAU Commission visited on 26-1-1986 and 27-1-1986 along with Dr. P. C. Sivaraman Nair, Director of Research.

50 farmers from FACT Unit, Alangad visited the station on 22-2-86.

Tribal leaders from Wynad district visited on 28-2-1985.

Doordarshan team visited the station on 15th and 16th March 1986 and recorded two T. V. Programmes on the cultivation of Banana and Pineapple.

50 farmers belonging to Farm Information Exchange Club, Udayagiri visited on 18-3-1986.

Fifty farmers from Lakshadweep and six high school teachers visited on 24-3-1985.

100 selected farmers from neighbouring area of the station visited on 25-3-86 under the Krishidarsan programme.

A number of school going children and college students visited the station to get acquainted with the works in the station and for training.

Vice-Chancellor and Members of the Executive Committee visited the station.

1.13 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 carryout 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 research station was re-established at the present site in 1972 in an area of 8.95 ha. acquired by the Department of Agriculture under the scheme for conducting research in irrigated areas. 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 has started functioning at this centre from July 1974 onwards. The administrative office and laboratories of the station started functioning in the new laboratory block from 9th June 1980 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. In addition to ICAR sponsored projects, agronomic studies which have relevance to irrigated agriculture has also been implemented at this station as University Projects.

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 M. S. L.

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 area runs to a fine gradient to south-west and wet lands are terraced into block and plots.

The major objectives of the station are:-

To develop cropping patterns suitable for varying water management and fertility situation; test new crops and varieties for their adaptability and performance under different moisture condition; estimate the water requirement of rice, pulses, oil seeds, vegetables, banana, tapioca and other important crops of Kerala evolve suitable measures to increase water use efficiency of crops; work out economics and optimum schedule of irrigation for important crops cultivated in the region; study the ground water fluctuation, quality of groundwater and recycling of drainage water for irrigation; findout cheap and efficient methods of irrigation for important crops; and to conduct operational research programme on water management in the command area.

Dr. G. R. Pillai, Professor of Agronomy continued to be in charge of the station.

The NARP sub project for water management studies in the central region of Kerala has started function during 1983-84 continued to operate under the technical and administrative control of this research station at various locations. The new NARP laboratory was opened during the year under report.

Under the ICAR sponsored Co-ordinated Project for Research on water management, the Operational Research Project (O. R. P.) in water

management was continued to be operated at Palissery with a view to test 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 20.8 ha. of rice fields owned by 75 farmers. With the adoption of scientific crop management practices, especially improved water management practices, the farmers in the study area could increase the rice yield during the crop season the normal yield level of 1700 kg/ha to 2893 kg/ha.

An area development programme was simultaneously implemented in the O. R. P. area at Palissery with limited 'critical' input assistance aiming at the integrated development of the locality under the lab to land programme. Under the village adoption programme, North Kothakulangara was continued to be the adopted village and various agricultural extension programmes including some frontline demonstrations were implemented in this village.

In the educational front, the research centre has organized an inservice training to the Agricultural Demonstrators of the Department of Agriculture and field training to the final B. Sc. (Ag.) students from the College of Horticulture, Vellanikkara.

Inservice training to Agri. Demonstrators

Seventeen Agricultural Demonstrators from the Department of Agriculture were given inservice training from 26-2-86 to 12-3-1986.

Field training to B. Sc. (Ag.) students

Eight undergraduate students from the College of Horticulture, Vellanikkara were given field training from 15-2-86 to 21-2-86.

Practical training to VHSC (Agriculture) students

40 students from the Vocational (Agriculture) Higher Secondary Course attached to Government High School, Pudukad were given practical training on various aspects of crop husbandry on 23-8-85, 4-3-86, 21-3-86, and 25-3-86.

Correspondence course on flower gardening

Two contact classes were organised for the participants of the correspondence course on flower gardening during July 1985.

Kisan mela and farmer's training camp

Under the lab to land programme, a one day 'Kisan mela' and farmer's training' was conducted at Palissery on 30th September 1985 in which 125 farmers participated.

Another one day farmers seminar was organized under lab to land programme on 24th February 1986 in which 200 farmers participated.

Dr. G. R. Pillai, Professor of Agronomy attended the group meeting of the Chief Scientists of the Co-ordinated Project for research on water management at Rajendra Agricultural University, Pusa, Bihar from 20-22nd June 1985.

Mr. Kuruville Varghese, Assistant Professor of Agronomy participated in the summer institute on 'Recent advances in production and utilization of tropical tuber crops' held at C. T. C. R. I., Trivandrum from 11th to 30th June 1985.

Research

Number of Research Projects as on 31-3-1986 is 12.

Research Highlights

RICE

Crop management

Effect of various water regimes and nitrogen levels on yield of rice

Studies were conducted to formulate an optimum irrigation schedule for transplanted short duration rice varieties under different levels of nitrogen during the second crop seasons 1983-84, 1984-85 and 1985-86. Four water management practices (continuous submergence of 5 ± 2 cm and 7 cm irrigation one, three and five days after the disappearance of ponded water) and four nitrogen levels (0, 35, 70 and 105 kg/ha) in factorial combination constituted the treatments. The nitrogen levels influenced the grain yield whereas management practices and interaction did not.

From the three year study which showed identical results, it was inferred that under condition of water scarcity during the second crop season irrigation for rice can be postponed up to five days after the disappearance of ponded water especially in areas where the ground water table is shallow and evaporative demand loss.

The study also revealed that application of 70 kg N/ha is optimum for short duration rice variety under all water management situation.

Ongoing projects

Crop management

Effect of different water regimes under varying levels of nitrogen on the growth and yield of medium duration rice

The experiment was taken up for the second consecutive year with a view to find out an optimum water management practice for rice under different levels of nitrogen under Alathur Agro-climatic situation during second crop season. The test variety was IR-20. Four nitrogen levels (0, 45, 90 and 135 kg N/ha) and four water management practices

(continuous submergence of 5 ± 2 cm and 7 cm irrigation one, three and five days after the disappearance of ponded water) in factorial combination constituted the treatments.

Statistical analysis of the data indicated the significant effect of nitrogen levels on the grain yield of rice whereas the effect of water management practices and interaction were not significant.

Among the nitrogen levels, the highest yield was recorded by 135 kg N/ha which was significantly higher than the lower doses of nitrogen. This dose is 50 per cent higher than the recommended dose of 90 kg N/ha for medium duration rice varieties.

It can be inferred that irrigation for medium duration varieties during second crop season at Alathur locality can be delayed upto five days after the disappearance of ponded water under condition of shallow water table.

Potassium nutritio periodism in higher yielding dwarf indica rice

Studies with nine treatments comprising of different doses of Potash (0, 22.5 and 45 kg K_2O /ha) applied as different splits ($1/3$, $1/2$ or full) at different growth stages (basal, active tillering and panicle initiation stages) revealed that the grain yield was not significantly influenced by the treatments. However the treatments exerted significant influence on straw yield. The highest straw yield was recorded when 45 kg K_2O /ha was applied as $1/3$ basal, $1/3$ active tillering stage and $1/3$ panicle initiation stage followed by the same dose applied $1/2$ at active tillering and $1/2$ at panicle initiation stages.

PULSES AND OIL SEEDS

a) Cowpea

Crop management

1 Response of cowpea to water management practices and phosphorus

This experiment was initially taken up during 1981-'82 and was repeated during 1984-'85 and 1985-'86. Five water management practices (irrigation at three critical stages of branching, flowering and pod formation and at IW/CPE ratio of 0.25, 0.50, 0.75 and 1.00 with 50 mm water) and four levels of phosphorus (0, 15, 30 and 45 kg P_2O_5 /ha) in factorial combination constituted the treatments. During all the three years of study irrigation at 1.00 IW/CPE ratio recorded the highest yield which was on par with 0.75 IW/CPE ratio and with the critical stage irrigation during the last two years of study. Thus from the three year study it was observed that irrigation at 0.75 IW/CPE ratio (at about 15 days interval or at critical stages of branching, flowering and pod formation) is the

optimum water management practice for cowpea grown in rice fallows during summer season from the point of view of water economy and increased grain yield.

Though the highest yield of grain was recorded by the application of 30 kg K_2O_5 /ha during the third year of study, it was comparable with the lower (15 kg P_2O_5 /ha) and higher (45 kg P_2O_5 /ha) levels of phosphorus and significantly superior to no phosphorus control. This indicates that 15 kg P_2O_5 /ha is sufficient for cowpea grown during summer season in rice fallows.

b) Sesamum

1. *Effect of various irrigation schedules on the growth and yield of sesamum under graded doses of nitrogen*

It was the third year of study and was previously conducted twice during 1982-'83 and 1984-'85. The study was conducted with five water management practices (No irrigation and irrigation at 0.25, 0.50 and 0.75 IW/CPE ratios and at critical stages of 3-4 leaf stage, branching, flowering and pod formation) and four nitrogen levels (0, 15, 30 and 45 Kg N/ha.) The three year study indicated that irrigating sesamum at critical stages of 3-4 leaf stage, branching, flowering and pod formation or at 0.75 IW/CPE ratio will ensure significantly higher grain yield as compared to unirrigated or less frequently irrigated crops. It is also inferred from the study that 30 kg N/ha is sufficient for higher grain yield in irrigated sesamum.

(c) Groundnut

1) *Response of groundnut to different irrigation schedules and phosphorus levels*

The experiment was conducted in a farmer's field at Alathur during the two summer-season of 1984-'85 and 1985-'86. The trial consisted of four levels of irrigation (0.25, 0.50, 0.75 and 1.00 IW/CPE ratios) and four levels of phosphorus (0, 30, 60 and 90 Kg. P_2O_5 /ha) and the variety used was TMV-2.

The water management practices showed an increasing trend upto 0.75 IW/CPE ratio where upon the yield declined. This shows that irrigation at 0.75 IW/CPE ratio is optimum for groundnut for increased pod yield at Alathur locality.

With incremental doses of phosphorus, the pod yield showed an upward trend upto 60 Kg. P_2O_5 /ha and thereafter the yield declined. This indicates that irrigated groundnut responds only upto 60 kg P_2O_5 /ha under Alathur condition.

SOILS AND AGRONOMY

1) Evaluation of long term effect of canal irrigation on changes in physical and chemical properties of soil

The study has been initiated in collaboration with the soil survey department of Kerala in the command area of the Periyar Valley Irrigation Project to evaluate the long term effect of canal irrigation on changes in the physical and chemical properties of soil. Studies on the morphological and physico-chemical characteristics of six soils upto 120 cm depth representing the following irrigation and land use patterns are envisaged in the study.

- 1 Intensively canal irrigated area : i) wet land ii) Garden land.
- 2 Unirrigated cultivated area nearby ii) wet land ii) garden land
- 3 Unirrigated cultivated area likely to be brought under canal irrigation shortly i) wet land ii) garden land.

In situ determination of infiltration rate and laboratory determination of hydraulic conductivity of the samples have been completed. Studies on the other physical and chemical properties are in progress.

Farm economics and Extension

Studies on farm irrigation water management in the command of an irrigation minor

An 'operational research project in water management' was implemented for the second consecutive year at Palissery in the Chalakudy command area. A compact area of 20.8 ha. of rice field belonging to 75 farmers was selected as the study area. Apart from the adoption of scientific crop and water management practices, suitable cropping patterns were formulated and implemented in the different fields of the study area based on the irrigation water availabilities.

While the grain yield of rice in the study area during the third crop season was 2893 kg/ha, it was only 1700 kg/ha in the control area. The saving in irrigation water in the study area as compared to the control area was worked out to 350mm. While the WUE in the study area was 2.46 kg/hamm, it was only 1.11 kg/hamm in the control area. The study clearly revealed and convinced the farmers of the neighbouring area the feasibility and advantages of adopting scientific water management practices in rice culture under farmer's field condition on a large scale.

Cropping patterns and Farming systems

1. Input requirement of rice based cropping pattern

With a view to identify the most economic rice based cropping pattern for the locality and to estimate the input reduction, in terms of fertilizer, that could be achieved by following different cropping patterns.

an experiment with four cropping patterns, and seven fertilizer levels was carried out for the eighth consecutive year.

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. The above sequences out-yielded rice-rice-sesamum and rice-rice-fallow sequences. Considering the additional income, unlike daincha, obtained from the third crop itself by way of grain yield and the favourable influence on the grain yield of the succeeding crop which may enable the farmers to reduce their fertilizer bill by 25 per cent it is inferred that a crop of cowpea is ideal after two crops rice than daincha or sesamum or keeping the field fallow.

With regard to fertilizer levels it can be seen that the highest yield of rice was obtained during both the seasons when the recommended dose of fertilizer was applied in every season. However comparable yield was obtained when 75 per cent of the recommended dose of fertilizer was applied during each season. This indicates the possibility of reducing the existing recommendation of fertilizer dose (90:45:45 kg NPK/ha) for rice to its 75 per cent when appropriate cropping patterns are followed.

2. Studies on rice based cropping patterns under constraints of irrigation water

Studies for the third consecutive year were conducted with five cropping patterns (Two crops of rice followed by a third crop of rice, cowpea, groundnut, sesamum or 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 third crop season (7 cm irrigation one, three and five days after 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 patterns under constraints of irrigation water.

The results of the study indicated that there was no residual effect of the cropping sequence on the growth and yield of the succeeding crops. As in the previous years, it was observed that during the second crop season, rice requires irrigation only at three days after the disappearance of ponded water. On the other hand, in the third crop season more frequent irrigation (one day after the disappearance of ponded water) was found necessary for higher yields. Other crops in the sequence viz. bhindi, cowpea and groundnut needed frequent irrigation at IW/CPE ratio of 0.9. However, sesamum performed well under less frequent irrigation schedule (0.3 IW/CPE ratio).

COCONUT AND ARECANUT

COCONUT

1. Studies on the effect of irrigation schedules on the growth and yield of coconut

The experiment was started in farmer's field at Kodassery with a view to formulate a suitable irrigation schedule for coconut during summer season and comprised of five levels of irrigation (irrigation at 25 mm, 50 mm and 75 mm CPE and once in three days and no irrigation). Since the experiment was conducted in adult bearing palms, the pre treatment data on nut yield was collected during 1981-'82 for laying out the experiment. The irrigation treatments were applied during the four summer seasons of 1982-'83 to 1985-'86. 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 the irrigated treatments fared better than the unirrigated treatments though the general yield levels was comparatively low. The treatments receiving irrigation once in three days recorded the highest yield followed by the other three irrigated treatments (25, 50 and 75, CPES). The unirrigated treatment recorded the lowest yield. The trend observed during the third year was more or less similar to that of the second year. The data indicated that the highest yield was recorded by the treatment receiving irrigation at 25 mm CPE closely followed by irrigation once in three days. The increase as compared to the no irrigation control was 34 and 29 nuts per palm per year which was worked out to 36 and 30 per cent increase.

Highlights

RICE

Under conditions of water scarcity during second crop season irrigation for rice need be scheduled only five days after the disappearance of ponded water especially in areas where the ground water table is shallow and evaporative demand is less. This schedule can be adopted both in the Chalakudy and Malampuzha command areas.

Application of 70 kg N/ha is optimum for short duration rice varieties during second crop season under the water management practices of continuous submergence and 7cm irrigation one, three and five days after the disappearance of ponded water. However medium duration varieties responded to 135 kg/ N/ha under the above water management practices in the Malampuzha command area.

COWPEA

Cowpea grown in rice fallows during summer season requires irrigation at 0.75 IW/CPE ratio (at about 15 days interval) or at critical stages (branching, flowering and pod formation) for increased yield.

SESAMUM

Sesamum is to be irrigated at the four critical stages of 3-4 leaf stage, branching, flowering and pod formation or at 0.75 IW/CPE ratio to ensure higher grain yield during summer season. Nitrogen requirement of irrigated sesamum is 30 kg N/ha.

GROUNDNUT

Irrigation for groundnut during summer season is to be scheduled at 0.75 IW/CPE ratio (50 mm depth) in Malampuzha command area for ensuring increased pod yield. Irrigated groundnut responded upto 60 kg P₂O₅/ha.

The results of the 'operational research project in water management' implemented at the Palissery area of Chalakudy command revealed the tremendous importance of 'on farm water management' coupled with scientific crop management in maximising the grain yield of rice and increasing irrigation water use efficiency.

Raising daincha and cowpea during the third crop season was found to be effective in increasing the grain yield of rice during the succeeding first crop season. Cowpea has the additional advantage of yielding an economic produce.

In cropping patterns of two crops of paddy followed by fallow or a third crop of cowpea, sesamum or daincha, rice crop (medium duration) raised during first and second crop seasons requires only seventy five per cent of the present recommended dosage of fertilizer of 90:45:45 kg NPK/ha.

1.14 RICE RESEARCH STATION, VYTTILA

Rice Research Station, Vyttila was started in the year 1958 in leased land in Kannara area near Powerhouse, Vyttila. 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 81-82 an area of 0.770 acres were also acquired thus making the total area to 8.91 hectares.

4.2500 hectares is under rice and area used for fish ponds is 3.0552 hectares. The dryland area used for coconut cultivation, buildings and roads are 1.6082 hectares.

The main 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 type 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.

A unit of the scheme for investigation of coconut root (wilt) disease is being implemented from 1981 in this station. This station is included under National Agricultural Research Project for special region. On termination of All India Co-ordinated Research Project on Brackish water Fish Farming functioning in the 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.

Professor T. U. George continued to be incharge of the Station.

Monthly Workshops under T and V programme for the District Ernakulam were conducted in this Station during the year under report. One Agricultural Seminar was conducted in this station on 15th June '85 and more than two hundred people attended the seminar. Three trainings were conducted for the farmers and two trainings were conducted for school children under the Lab to Land Programme.

Sri T. U. George, Professor of Botany attended the package of practice workshop conducted at Vellanikkara on 13th and 14th June '85. He also attended the zonal workshop conducted at Regional Agricultural Research Station, Pattambi on 22nd, 23rd January '86 and zonal workshop conducted at Kumarakom on 17th and 18th February '86 under NARP.

Smt. Reena Grittle Pinheiro, Junior Assistant Professor, attended the orientation training on flower gardening conducted at Communication Centre, Mannuthy on 3rd June '85.

Research

The total number of Research Projects as on 31-3-'86 is 16.

Crop Improvement

Hybridization programme-Improvement of Pokkali rice

Cul 4-4 evolved from the hybridization between Pokkali x T(N)1 has out yielded the present improved varieties in the comparative yield trials and in district trials. Cul 4-4 has a duration of 115 days with tall plant type. The grain size and cooking quality are similar to Vyttila 1. In yield trials this culture gave 15 to 20% higher grain yield than Vyttila 1. Hence this culture has been released as a new variety-Vyttila-3-for the general cultivation in the Pokkali areas-Ernakulam and Alleppey District.

Under the same project, another crossing programme between Vyttila 1 x Jaya was taken up and two cultures (Cul-11 and Cul-53) were evolved in the third year of comparative yield trial during the period under report. As in the previous years Cul 53 gave higher yield than Vyttila 1 though the yield difference was not statistically significant. It is necessary to conduct further yield trials to get conclusive results.

Breeding for earliness in the variety Mashoori by induced mutation

The object of the project is to reduce the duration of the variety Mashoori by using physical mutagens. Six early cultures were selected and these culture were in a comparative yield trial during the period under report. These cultures have a duration of 115 to 125 days and giving an yield comparable to that of the present improved varieties. Further yield trials are to be conducted to get conclusive results.

Breeding high yielding rice varieties suitable for Pokkali area by hybridisation—Vyttila

The object of the project is to evolve high yielding rice varieties suitable for Pokkali area by hybridization between Pokkali varieties and IR5. Along with high yield other requirements fixed are the tall plant type, short duration, ability to withstand salinity, acidity and water logging. With these objectives the programme was initiated during the year 1980 by crossing Vyttila 1, Vyttila 2 and Ponkuruka with IR 5. An unreplicated preliminary yield trial of 82 F6 cultures was conducted during the year 1985-86. Twentyone promising cultures were selected from the F6 progeny on the basis of duration, number of productive tillers, height of the plants, number of grains per panicle etc. Further trials can be conducted with these cultures during the next cropping season.

Breeding for earliness in variety H4 and SR 26 B by induced mutations

The object of the project is to reduce the duration of the rice varieties H4 and SR 26 B by using physical and chemical mutagens. It was found in the varietal trials conducted earlier that these varieties are suitable for cultivation in Pokkali area but for their long duration. Hence a mutation breeding programme was initiated during 1980 to reduce the duration in the variety H4. Six promising cultures were selected from the M6 generation on the basis of duration, height of the plant, number of productive tillers, number of grains per panicle etc. Further yield trials can be conducted with these six promising cultures in the next cropping seasons.

Collection, maintenance and utilisation of saline resistant rice varieties

The object is to have a collection of saline resistant rice varieties to select 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. Thirtynine saline resistant varieties/types

were collected and maintained under the project during the year under report. From this collection has already been used for a hybridization programme initiated in the station.

Crop management

Technology for manuring of rice in flooded soils

The results showed that there was no significant difference between treatments. However, the highest yield was recorded by PCa (2245kg/ha) followed by NPCa and NP (2183 kg/ha, 2153 kg/ha respectively). It may be noted that flooding occurred due to continuous rains during June July and after the fertilizer application the water level in the field could not be controlled. Hence the treatments effects might have vitiated.

As it is a permanent manurial trial, the experiment is to be continued.

Evaluation of fertiliser response and production potential of promising saline tolerant cultures

The experiment consists of combination of eight varieties and two fertilizer levels. Fertilizer levels were L_0 —without fertilizer and L_1 —20-40-0 NPK kg/ha. The experiment was conducted during May-October 1985.

On statistical analysis of the yield, it was found that the levels of fertilizers, as well as the interaction effect between levels of fertilizers and varieties were found to be non-significant. But the varieties differ significantly. The variety IR 5055 was found to give the highest yield which was on par with IR 5074, Culture 53 and Culture 11, but significantly superior to C 23-2-1, CSR-4, Vyttila III and Vyttila I. Variety IR 5055 was found to give 25% and 37% more yield from that of Vyttila III and Vyttila I respectively. Variety IR 5074 was found to give 20% and 31% more yield from that of Vyttila III and Vyttila I respectively. It may be noted that flooding occurred due to continuous rains during June-July and after the application of fertilizers the level of water in the field was high and could not be possible to control it. Hence, the fertilizer effects might have vitiated by the water level.

Evaluation of various lining materials for country baskets used for sprouting pokkali seeds

An observational trial was taken with six lining materials and three time intervals. The Banana leaves, Koova leaves, Polyfilm 250 gauge, Polyfilm 600 gauge, Teak leaves Karingotta leaves the time intervals and were 2 weeks, 3 weeks and 4 weeks after soaking period.

From the results, it is found that for keeping the seeds for two weeks, koova leaves was found to be the best lining materials (sprouting 96%) followed by karingotta leaves and teak leaves. For three and four

weeks periods teak leaves was found to be the best lining material in terms of sprouting, healthiness and disease free condition of sprouts followed by Koova and banana leaves. In all the cases, polyfilms 250 and 600 gauges were found to give lesser percentage of sprouted seeds except in two weeks period. Fungus attack was also severe in these two treatments during 3 weeks and 4 weeks period compared to other materials. The results then indicated that teak leaves, banana leaves and koova leaves are better lining materials for the country baskets used for sprouting pokkali seeds.

COCONUT

Studies on the growth, performance and disease tolerance of coconut cultivars and hybrids under disease stress conditions of Vyttila

The experiment consists of 9 treatments with 5 hybrids and 4 cultivars.

Fertilizers were applied as per package of practices recommendations. From the observations it can be seen that the highest no. of leaves was produced by T x D followed by T x NCD and Cochin China. The highest no. of nuts (98.8) was produced by D x T followed by Cochin China and Andaman Ordinary. Highest intensity of leaf rot was noted in T x NCD followed by LO x G and LO and AO. Andaman Giant was completely free from leaf rot and in D x T and T x D, the intensity of leaf rot was very less.

Response of diseased and apparently healthy palms to fertilizer levels and organic manuring in reclaimed soil type Ponnurunni, Vyttila, South Chittoor, Edayakunnam

The experiments consists of 7 treatments laid out during September 1981 at four locations viz. Vyttila, Ponnurunni, South Chittoor and Edayakunnam. Each treatments were tried in four palms both under diseased and apparently healthy condition.

There were 56 palms (28 apparently healthy + 28 diseased) under the experiment in each location. Fertilizers and organic manure were applied as per technical programme. Indexing on Root (Wilt) disease intensity and other biometric observations and yield were recorded periodically.

A reduction in disease intensity was noted in all the treatments. The highest increase was noted in L₄. With regard to yield of nuts, in all the treatments except in L₁ and L₇ an increase was noted. The highest increase was noted in L₁ followed by L₂ and L₄.

Diseased palms

There was a decrease in disease intensity in all the treatments. The rate of decrease was more or less same in all the treatments. Yield of nuts increased in all the treatments except in L₁ and L₄.

Studies on the mono and polyculture of finfish and shellfish with and without supplementary feeding

Two objective of the project is to find out the best species combination in order to achieve maximum fish production from brackish water ponds. It also aims to formulate cheap, nutritive supplementary feed readily acceptable to the prawn and fishes utilizing the locally available materials.

Under this project four experiments have been completed and three are in progress.

Experiments completed

*Monoculture of *Chanos chanos* with and without manuring*

In four prepared ponds *C. chanos* fingerlings were stocked @ 4000/ha. Out of the four ponds, two were manured with cowdung and mussoriphos @ 7500 kg/ha/yr and 600 kg/ha/yr respectively in 12 monthly instalments. The other two ponds were kept as control without manuring. Management practices except manuring were same in all the four ponds.

The first set of ponds when harvested gave fish production to the tune of 1138 kg/ha/yr and 328.7 kg/ha/yr from the manuring and control ponds respectively. The net profit from the manuring pond worked out to Rs. 12,698/ha/yr where as the fish production from the control pond was very low, which resulted in loss.

The fish production from the second set of experiment worked out to 1565 kg/ha/yr and 343.2 kg/ha/yr from the manuring and control ponds respectively. Based on the inputs alone, the net profit from the manuring pond works out to Rs. 19,061/ha/yr. From the control pond profit was meagre.

*Biculture of *C. chanos* and *Etroplus suratensis* with manuring and supplementary feeding*

A pond having 0.15 was suitably prepared and fingerlings of *C. chanos* and *E. suratensis* were stocked @ 4000 ha in 1:1 ratio. During the rearing period cowdung and mussoriphos were applied in the pond @ 7500 kg/ha/yr and 600 kg/ha/yr in 12 equal monthly instalments. Supplementary feeds like ground nut oil cake and rice bran in 1:1 ratio were also provided daily @ 2% of the body wt. of fishes.

During the first three months *C. chanos* showed an average monthly growth of 125 gms. But during subsequent months growth rate showed a decreasing tendency. So the crop was harvested after a period of 4½ months.

Net production from the pond worked out to 1136 kg/ha/4½ months. Survival rate of *C. chanos* and *E. suratensis* were 95.3% and 100% respectively. Based on the inputs alone the net profit works out to Rs. 15,035ha/ 4½ months.

Biculture of Penaeus indicus and C. chanos

A pond having an area of 0.37 ha was suitably prepared and stocked with hatchery bred *P. indicus* seed with an average initial size of 20 mm—39 mg @ 40,000/ha. After one month *C. chanos* juveniles were also stocked in the pond @ 500/ha.

After 100 days rearing the crop was harvested. Net production to the tune of 225.8 kg/ha/100 days was obtained from the pond. *P. indicus* had grown to size of 119 mm—12 gm. from 20 mm—39 mg in 100 days with a survival of 40%. Based on the inputs alone net production from the pond works out to Rs. 6806/ha/100 days.

Biculture of P. monodon and C. chanos

A pond having 0.1 ha area after preparation was stocked with hatchery bred *P. monodon* post larval @ 25,000/ha. The average initial size of prawn seed was 16 mm—23 mg. One month after stocking of the prawn *C. chanos* juveniles were also introduced into the pond @ 500/ha. During rearing period supplementary feed was not provided.

The crop when harvested after 108 days, a total quantity of 50.3 kg *P. monodon* and 6 kg. other prawns were caught. The final size of *P. monodon* was 153 mm—30 gm. and survival was 67%. The prawn production works out to 563 kg/ha/108 days.

The current market rate for the size of prawn obtained from the above experiment is about Rs. 125/kg. Suppose, the commodity is sold @ Rs. 100/kg the net profit from the whole operation will work out to Rs. 48,000/ha/108 days. The economics of the system is outstanding and need wide publicity to attract more fish culturists to take up tiger prawn culture.

Experiments in progress

Polyculture of brackish water fishes

In a pond having 0.4 ha area, fingerlings of *E. suratensis*, *C. chanos* and *Liza parsia* were stocked in a ratio of 1:2:7 @ 5000/ha during July 1985. Manuring with cowdung and mussoriphos are being done @ 7500 kg/ha/yr and 600 kg/ha/yr respectively. The standing crop in the pond works out to 795 kg/ha/10 months.

Biculture of E. suratensis and C. chanos with manuring alone

A biculture experiment was initiated in a pond having 0.14 ha area with *E. suratensis* and *C. chanos* in 1:1 ratio @ 4000/ha. Cowdung and mussoriphos are being applied in the pond @ 7500 kg/ha/yr and 600 kg/ha/yr in 12 equal monthly instalments. The standing crop in the pond work out to 656 kg/ha/7 months.

Monoculture of E. suratensis

In a 0.15 ha pond, a monoculture of *E. suratensis* has been initiated. Fingerlings were stocked @ 4000/ha. Manuring with mussoriphos and cowdung @ 600 kg/ha/yr and 7500 kg/ha/yr are being done in the pond. The standing crop in the pond works out to 180 kg/ha/4 months.

The results of the two sets of monoculture of *C. chanos* show that manuring plays an important role in fish production from brackish water culture systems. The net production obtained from the manuring ponds: 1138 kg/ha/yr and 1565 kg/ha/yr are very high when compared to the control ponds.

The result of biculture of *P. monodon* and *C. chanos* show that post larvae of the prawn could be directly stocked in the well prepared culture pond. It seems that survival is not affected by the direct introduction of post larvae.

The results of the feeding experiments points out the possibility of enhancing fish production from brackish water ponds by providing supplementary feed. However the role of artificial feed in fish production from brackish water systems can only be ascertained after conducting few more experiments.

Polyculture of fresh and brackish water fishes in brackish water ponds

The aim of the project is to increase the total fish production from brackish water ponds by culturing fresh and brackish water fishes during the low saline phase.

The pond when harvested after 5 months, fish production to the tune of 960 kg/ha/5 months was achieved from the pond with an overall survival of 69% of fishes. Based on inputs alone the net profit worked out to Rs. 6560/ha/5 months.

During low saline phase of brackishwater areas, if carps cultured along with chanos would increase the fish production from such ponds.

Prawn culture in pokkali field after harvest of paddy

The project envisages to study the ways and means to improve the prawn filtration practice by inducting scientific methods. It also aim to conduct selective stocking of fast growing species of prawns for comparing the economics of both systems.

Traditional method of prawn culture was undertaken in pokkali field having 0.5 ha area. After usual preparation of field stocking of prawn was done every day during night by allowing the tidal water to flow into the field. During day time water was drained out through a screen which prevent the escape of prawn and fish that have entered in the field. This process was continued through out the season.

After a period of 66 days the field when harvested 66.2 kg prawn and 35.5 kg of fish were caught. The prawn production from the field amounted to 132.5 kg/ha/66 days.

Low prawn production from the selective stocking field can be attributed to the short rearing period. Moreover the condition in the field was not congenial due to heavy algal bloom, weed growth, high temperature and low water depth. Hence this cannot be considered as a regular phenomenon nor can any conclusions be drawn.

Observational trial on the fish culture in homestead ponds along the sandy coastal belt of Kerala

The study is intended to find out the feasibility of fish culture in homestead ponds. It is also proposed to find out suitable species for culture; taking in to consideration the physico-chemical and biological limitation in such ponds.

During the period under report 6 homestead ponds having 80-160 sq. m. area were selected in the vicinity of the Unit for undertaking the experiment. All the ponds were prepared and stocked with *Catla catla*, *Labeo rohita*, *Cirrhinus mrigala* and *Cyprinus carpio* in 1:2:2:2 ratio @ 5000/ha.

The result points out the great scope for fish culture in homestead ponds if suitable species are stocked and managed scientifically. The result is very important in the context of Kerala condition, especially when there are thousands of small tanks, ponds, pools etc. which covers an area of 3 to 3500 ha. If these ponds are also brought under scientific fish farming, inland fish production of Kerala could be enhanced considerably.

As a part of the All India Co-ordinated Agronomic Research Projects on cropping system research a trial on paddy-cum-fish culture was undertaken.

In the three treatments rice was sown during the first week of June and transplanted in the second week of July 1985. The crop was harvested in the second week of October. Average yield of rice was to the tune of 1850 kg/ha.

In the treatment 2 fish culture was taken up along with rice. The field after necessary preparation was stocked with *Catla catla*, *Labeo rohita*, *Cirrhinus mrigala* and *Cyprinus carpio* in 1:2:2:2 ratio @ 6000/ha. The crop when harvested fish production to the tune of 138 kg/ha/5 months was obtained from the field.

Prawn culture was done in two fields as T₂ & T₃ - Rabi. In T₂ - Rabi *Penaeus indicus* when stocked @ 40,000/ha prawn yield of 110.6 kg/ha/64 days was obtained. While in T₃ - Rabi prawn production amounted to 132.5 kg/ha/66 days.

Other matters

The new Laboratory building constructed under NARP was inaugurated Sri. A. L. Jacob, Hon' Minister for Agriculture on 15th June 1985. An exhibition, Farmers day and Agricultural Seminar were also conducted on the day in which Minister, M.P., M.L.A., Vice Chancellor and other officials participated. A large number of farmers also attended the functions.

The construction of one type V quarter was initiated during the year under report.

Highlights

A new rice variety—Vytila 3—has been released from this station during the year 85–86. It is a hybrid rice variety evolved in the station from the hybridization between Pokkali \times T(N) 1. The variety has a duration of 115 days (seed to seed) with tall plant type (160 cm height) and red rice. The cooking quality of the grain is good with 7.8% protein content. The new variety—Vytila 3—was released by the Hon. Minister for Agriculture on 15th June '85 for general cultivation in Pokkali area.

It was found that manuring is very essential for the good production of fish in brackish water fish ponds. The fish production can be increased three times by the application of mussoriphos and cowdung @ 600 kg/ha and 7500 kg/ha/yr in 12 monthly instalments.

The culture of tiger prawn (*Penaeus monodon*) along with milk fish (*Chanos chanos*) in well prepared interior brackish water ponds gave a prawn production of 500 kg/ha/3½ months. Based on the present market rate of Rs. 100/-/kg a profit of Rs. 30,000 to 35,000/ha in 3½ months can be achieved.

During monsoon season salinity in the interior brackish water area remains very low and this low saline phase can suitably be utilized for raising a crop of fresh water carps along with brackish water species. The results of the experiments conducted during 1983 to '86 period have shown that fish production ranging from 400 to 900 kg/ha/5 months can be achieved.

At present the perennial homestead ponds in the area are not being used for fish culture. The results of the culture trials in various homestead ponds have shown that fresh water major carps are suitable for culturing in these ponds. With proper management fish production to the tune of 1.8 to 2.5 tonnes/ha can be achieved from these ponds.

Visitors

1. S. S. Laberman, World Bank representative, visited the station on 8th April 1985.

3. Dr. V. R. Carangal, Co-ordinator, Asian Farming System Net work, IRRI, Manila visited the station on 16th July '85 with Dr. K. G. Pillai, Project Co-ordinator (Agronomy).
3. Sri. G. R. Gølgali, World Bank, New Delhi visited the station on 28th November '85 with Senior Extension Officer, Government of India, New Delhi.
4. Sri. K. R. Kulkarni, Project Co-ordinator (Agronomy), U A S, Bangalore visited the station on 22nd March 1985.

1.15 AROMATIC & MEDICINAL PLANTS RESEARCH STATION, ODAKKALI

This station is working under the Kerala Agricultural University since 1972.

The objective of the station is to conduct investigation on the agronomic, botanic, post-harvest and bio-chemical aspects of aromatic and medicinal plants in order to develop the cultivation of these group of plants in the State.

Total area of the station is 12.4 ha., with Lemongrass 5.90 ha., Palmarosa 2.45 ha., Coconut 1.25 ha., Cashew 0.40 ha., Lemongrass Germplasm 0.40 ha., Catharanthus roseus 0.20 ha., Banana 0.10 ha., other crops such as Dioscorea, Colocasia, Pineapple, Pepper, Solanum and other medicinal plants 0.60 ha., and roads, buildings etc. 1.10 ha.

Sri. E. V. G. Nair, Professor continued to be in charge of the station during the year.

New posts

The designation of the head of Office was changed to Professor consequent on his nomination to that cadre.

The post of Boiler Attender was abolished with effect from 26-3-86.

Sri. K. M. Varghese, Farm Assistant Grade I has been granted study leave for 2 years from 19-12-83 to 18-12-85 and leave for study purposes for 2 years from 19-12-85 to 18-12-87 for undergoing B.Sc. (Ag) course in the KAU.

A Kissan Mela and Farmers' Training was organised on 17-9-1985 under Lab-to-Land and Village Adoption Programme in which topics like Crop Management, Plant Protection, Animal Husbandry and Management etc. were dealt with.

One week training programme (training of hazards of food adulteration and arising consumer consciousness and training on the need for cleanliness in an around the houses) to develop skill for women folk was organised during the first week of March, 1986.

A Kissan Mela and Farmers' Training was organised on 21-3-1986 in which topics like vegetable cultivation, its pests and disease management, animal husbandry etc. were dealt with.

Sri. E. V. G. Nair, Professor and Sri. K. P. Kuriakose, Junior Assistant Professor attended the one month training programme given to the tribal youths in the identification and scientific collection of medicinal plants at Attappady during March, April, 1985 as the State Level Faculty Member and Resource Personnel respectively.

The Regional Interdisciplinary Advisory Committee meeting held at Cardamom Research Station, Pampadumpara on 3-5-1985 was attended by Sri. E. V. G. Nair, Professor and Sri. K. P. Kuriakose, Junior Assistant Professor.

The orientation class for tutors on flower gardening held at Communication Centre, Mannuthy was attended by Sri. K. P. Kuriakose during the first fortnight of June 1985.

Sri. E. V. G. Nair, Professor and Sri. K. P. Kuriakose, Junior Assistant Professor attended the meeting of the interdisciplinary team of Lab-to-Land Programme held at Sugarcane Research Station, Thiruvalla on 12-7-85.

Sri. K. P. Kuriakose, Junior Assistant Professor, attended the farm training for the Implementing Officers of Lab-to-Lab Programme conducted at Kadukkankunnu.

Sri. E. V. G. Nair, Professor participated in the IVth ICAR Workshop on Aromatic & Medicinal Plants held at University of Agricultural Sciences, Hebbal from 22nd to 25th December, 1985.

Research Projects

Agronomy

Foliar application with urea to increase the production of foliage on *Cinnamomum zeylanicum*. Studies on the time of distillation of vetiver roots.

Botany

Viability period of lemongrass and palmarosa seeds. Studies on the performance of selections of *Solanum viarum*.

Chemistry

Studies in the properties of lemongrass oil under prolonged storage condition.

1.16 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, Botanical, Entomological and phytopathological problems

of cardamom cultivation. The station is situated in the high range of Kerala in the Pampadumpara village, Udumbanchola Taluk of the Idukki District 35 Kms. from Kumily in the Kumily-Munnar road. The All India Co-ordinated Spices and Cashewnut Improvement Project of ICAR was initiated at the station during 1972.

The total area of the farm is 46.44 ha.

Crop coverage under cardamom 37 ha with 17 ha under yielding and 20 ha with young seedlings, 2 ha. is under pepper and 5 ha under coffee and 2.44 ha. is occupied with building and roads.

Dr. P. Karunakaran, Professor (Pl. path) continued as Head of the Station.

The scientists participated in the monthly workshop under T & V programmes of Idukki as Chairman and resource personnel.

Dr. P. Karunakaran, Associate Professor & Head and Sri. P. G. Sadankumar, Junior Assistant Professor (Hort.) attended the VIIth workshop of AICS & CIP held at Trivandrum from 6-11-1985 to 9-11-1985. Dr. P. Karunakaran attended the 3rd Zonal Workshop under NARP (High range region) at RARS, Ambalavayal.

No. of Research projects as on 31-3-1986 was 20.

Report of each project

Concluded project

Testing the efficacy of Agrofen 20% EC (Fenvalerate) against cardamom thrips

The results of the trial showed that the treatment spraying Agrofen 0.1% was found to be superior for control of thrips, which was on par with all other treatments.

Testing the efficacy of Quinalphos against cardamom thrips

The result showed that spraying Quinalphos 0.03% and Fenthion 0.03% (Check) were found to be statistically significant, in controlling cardamom thrips.

Testing the efficacy of Dusan against cardamom thrips

The results showed that dusting Dusan @ 15 gm and 20 gm plant and dusting Carbaryl (Check) @ 15 gm and 20 gm/plant were found to be superior to control with regard to the control of cardamom thrips.

Ongoing projects

Crop management

N. P. K. fertilizer experiment for cardamom

Object is to find out a suitable manurial schedule for cardamom.

The trial was laid out during 1984 as per the technical programme approved in the AICS & CIP Workshop. Observations are being recorded on the no. of suckers, height of suckers, no. of leaves, no. of panicles, yield/plant etc.

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 for cardamom. An average yield of 1 kg. of dried cardamom/plant/year is expected.

Effect of soil stirring and leaf mulching in cardamom

Object 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 technical programme 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.

Germplasm collection in cardamom

Objective is to collect and describe different varieties and types of cardamom and to maintain a germplasm collection.

A high yielding type of cardamom viz. PV1, a selection from Malabar, has been identified from the various selections of cardamom available in the Station. This variety is being multiplied on a large scale. This superior genotype identified at this Station has been supplied to all other Cardamom Research Centres in India to study their performance at different locations.

Irradiation of cardamom seeds

Objective is to find whether variation can be induced in cardamom by irradiation for characters like tolerance to drought, precocity in bearing, resistance to Katte virus and tolerance to thrips infestation.

The seedlings raised from the irradiated seeds were inoculated with viruliferous aphids. The seedlings which escaped infection from Katte virus, after repeated inoculations, will be planted in the mainfield during 1985 to study the characters and basis of resistance.

Screening for yield and drought tolerance

The germination percentage of irradiated seeds was fairly high. Albinos was not observed on the seedlings. The seedlings were planted in the mainfield to study the yield potential. The growth rate is found to be better.

Hybridisation in cardamom

Objective is to evaluate the clonal types by comparing the performance of progenies.

The seedling progenies got by hybridization with the selected Vazhukka types against improved selections viz. PV1 (Malabar) and PR-107 (Mysore) were maintained in the field. Planting of the seedlings was done during the year 1985. The performance of the progenies will be evaluated as per the programme.

Selection of high yielding plants from the existing plant population

Objective is to select superior genotypes of Malabar, Mysore and Vazhukka varieties from the existing plant population.

Superior genotypes of Malabar, Mysore and Vazhukka (50 nos. each in each variety) selected from the bulk crop, based on their yield performance, were planted in a composite block during 1983 for further screening. The plants started bearing and the yield data are being recorded.

Field survival, plant growth and productivity in cardamom as influenced by number of suckers of secondary nursery

Objective is to ascertain the optimum size of planting material for transplanting to the mainfield.

It was found that the survival percentage was higher in planting materials having two suckers and above. However, tillering ability was found to be higher in planting materials having four suckers and above.

Multilocational trial in cardamom

Objective is to lay out a multilocational trial with the superior genotypes identified at Appangala, Mudigere and Pampadumpara and to study their comparative performance.

The trial was laid out during July 1984. The growth of the plants are satisfactory. It was observed that tillering was more in control (local variety), followed by CL-37 (Appangala selection) and PV1 (Pampadumpara selection). The plants started bearing and the yield data are being recorded.

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 aphids/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 & Vazhukka from 28-45 days of inoculations. The percentage of the infection was found to be higher with the 1st inoculation when the seedlings were at the 3rd leaf stage and decreased in subsequent inoculations.

Evaluation of fungicides against Phytophthora so causing Azhukal disease of cardamom (ICAR)

Objective is to find out the efficacy of selected fungicides in controlling Azhukal disease of cardamom.

The trial was conducted during the year 1984-85 and 1985-86. The results of the trial are furnished here under.

All the treatments were significantly superior to control with regard to the control of shoot infection.

Epidemiology of Azhukal disease of cardamom

Objective is to study the incidence of Azhukal disease in relation to climatic factors.

Four locations viz. Pampadumpara, Udumbanchola, Santhanpara and Kallar-Vattayar were selected for the studies. Observations on the inoculation potential of *Phytophthora* propagules in the soil, plant, water and collateral hosts are being recorded at Pampadumpara Centre. Studies in other centres will be undertaken during 1986-87 season.

Etiological studies of Clump rot/Azhukal disease of cardamom (ICAR)

Objective is to study the diseases 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 C. M. I., 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%.

Observational trial with Carbofuran against nematode infection in cardamom

Objective is to test the efficacy of Carbofuran in controlling nematodes infection in cardamom.

The trial was laid out during 1985-86 and the application of Carbofuran in two split doses at two months intervals were carried out. The harvest of capsules was done after 40 days of application of the second split dose of nematicide and the samples of cured cardamom capsules collected from the individual clump was sent to the Professor of Entomology, College of Agriculture, Vellayani for residue analysis of Carbofuran.

The trial will be continued for two more years.

Testing the efficacy of MIT-505 (Ethion 50% EC) against cardamom thrips and borer

Objective is to test the efficacy of MIT-505 to control cardamom thrips.

Application of the chemical as per the schedule was conducted and observations were recorded at the time of harvest of capsules. The result showed that (Ethion 2.5 lit/ha) was found to be superior for the control of thrips which was on par with all others except control. Quinalphos 2.5 lit/ha was found to be superior for the control of borer, which was on par with all others except control.

Testing the efficacy of Aureofungin Sol against Azhukal disease of cardamom

Objective is to test the efficacy of Aureofungin Sol in controlling Azhukal disease of cardamom.

The trial was conducted during the year 1985. The results showed that Bordeaux mixture application at 30 days interval was found to be significantly superior for the control of shoot infection. Application of Aureofungin Sol at 200 ppm at 15 day interval was on par with the best. The results also showed that this treatment was found to be significantly superior for the control of panicle infection.

1.17 REGIONAL AGRICULTURAL RESEARCH STATION, KUMARAKOM

The Coconut Research Station, established in 1947 by the Indian Coconut Committee was taken over by the State Department of Agriculture in 1958. From 1972 onwards 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 culture underlying the principle of organic recycling to maximise agricultural production in the area was started and is being continued. During 1980-81, a scheme for investigation on the malady of coconut root (wilt) disease was implemented at this station. The Station was upgraded and recognised under the National Agricultural Research Project (N. A. R. P) as a Regional Agricultural Research Station for the regions of the problem areas of Kerala in 1982 with Rice Research Station, Moncompu, Rice Research Station Kayamkulam, Rice Research Station, Vyttila, and the Kole region Research unit at Agricultural Research Station, Mannuthy as sub stations.

The area of this farm was originally 23.23 ha. An additional area of 21.49 ha. of wet land was taken over by the University from the Department of Agriculture in July 1980 making the total area of the station to 44.72 ha. out of which about 18 ha. are channels and water ways. The uplands are occupied by coconuts, bananas and cocoa. The low lands are under paddy. Water channels are used for fish farming.

The main objective of the station was originally to conduct research on coconut and coconut based farming systems with special reference to coconut root (wilt) disease. Consequent on the implementation of the N. A. R. P., the broad objective of the station is to conduct problem oriented location specific research on all crops in the problem region of Kerala.

Sri. U. Mohammed Kunju, Professor of Agronomy continued to be in charge of the Station, the root (wilt) scheme, N. A. R. P and other schemes attached to the station during the period under report.

Smt. Lila Mathew K., Asst. Professor (Hort) was granted study leave for undergoing Ph. D during the period under report.

Sri. N. Saifudeen, Asst. Professor (Ag. Chemistry) continued to be on leave for study purpose during the period.

Smt. Alice Antony, Jr. Asst. Professor was awarded the "Travancore Sugar and Chemicals Prize 1983" by the Kerala University.

The Seventh NARP/KAEP Zonal workshop for the problem areas was conducted at the RARS Kumarakom on 17th and 18th February, 1985 for identifying yield problems. The T&V monthly workshops of Kottayam District were conducted at this station.

Sri. U. Mohamed Kunju, Professor attended the zonal advisory committee Lab to Land programme at C. P. C. R. I. Regional Station, Kayamkulam and State Level Technical Committee meeting at Trivandrum during April, 1985.

Dr. J. Rajasekaran Nair, Jr. Asst. Professor (Aqua) attended the workshop on Educational patterns for the KAU 2000 AD at the Kerala Agricultural University Headquarters, Vellanikkara during May, 1985.

Sri. U. Mohamed Kunju, Dr. James Mathew and Sri. D. Joseph Professors attended the follow up workshop on Advanced workshop held at College of Agriculture, Vellayani during August, 1985.

Dr. James Mathew, Professor, Sri. G. Mathai, Assoc. Professor and Dr. P. Sivaprasad, Asst. Professor attended the meeting of the Plant Pathology discipline at the College of Agriculture, Vellayani during October 1985.

Sri. K. A. Inasi and Smt. Alice Antony attended the National Symposium on production and utilisation of tropical tuber crops at the C. T. C. R. I., Trivandrum during November, 1985.

Sri. U. Mohamed Kunju, Professor attended the workshop on N. A. R. P. management held at Rahuri, Maharashtra in November 1985.

He also attended the State Level Technical Committee on T&V at Trivandrum during March, 1985.

Research

No. of Research projects as on 31-3-86 was 55.

Research Highlights

COCONUT

1 Control of leaf rot disease by using newer fungicides—Multilocal trial.

Of the six chemicals, Bordeaux mixture 1% gave the best control of leaf rot when compared to control and other treatments.

Ongoing projects

2 Effect of growing and incorporation of different green manure crops and its influence on diseased and apparently healthy palms.

In this study there was increasing trend in the yield of coconut in all this treated palms. The disease intensity also showed a decreasing trend. In the case of yield of green manure sesbania ranked first.

3 Effect of intercropping fodder legumes and grasses in coconut gardens on the incidence and intensity of root (wilt) disease.

The result of this study is that intercropping fodder legumes and grasses will not improve the yield or reduce the disease intensity of coconut palms.

4 Response of diseased and apparently healthy coconut palms to fertilizer levels and organic manuring.

In this experiment also though there is no statistically significant difference in yield due to treatments there is a general increase in yield of all the palms over the pretreatment yield in laterite and alluvial soils. The disease intensity also showed a decreasing trend. The experiment is in progress.

5 Effect of mixed cropping coconut gardens.

The trial is in its initial stages. No conclusions can be drawn at present.

6 Intercropping trials of tree spices in coconut grown under bund system.

The plots intercropped with cocoa recorded the maximum coconut yield and those with cinnamon there was a reduction in yield of coconut when compared with the control.

7 Effect of Boron on leaf rot disease of coconut palms which are affected by root (wilt) and leaf rot disease.

Application of Boron by different methods did not have any effect on root (wilt) and leaf rot.

8 Evaluation of different attractants for the control of red palm weevil *R. ferrugineus*.

It was found that coconut stump overlaiden with disc and fermented cocoa pulp attracted the maximum number of weevils.

9 Chemical control of Red palm weevil, *R. ferrugineus* using stem injection technique.

Application of 75-100 ml. of Nuvacron through oldest roots was found effective in controlling the red palm weevil infestation in young palms.

10 Control of rodents infesting coconut gardens.

Moncompu type traps were found to be very effective in trapping rats.

Rice

1 Optimisation of doses and timing of 2, 4-D application in rice to reduce phytotoxic effects.

2, 4-D application 10th day after sowing is harmful to rice crop. Plant height and tiller count was unaffected. 2, 4, D application at 0.25 kg/ha, 0.50 kg/ha or 0.75 kg/ha was equally effective as 1.00 kg/ha in controlling weeds when applied on 15th, 20th and 25th days after sowing if sprayed properly.

2 Yield trial of AICRIP cultures of paddy under adverse soil conditions.

Cul. 304 has found better than the three checks under adverse soil conditions.

3 Yield trial of medium duration semitall cultures under adverse soil conditions.

Cul. 153-1 has found well under the stress conditions including acidity.

Pulses and Oil seeds

COWPEA

1 Varietal evaluation of grain type cowpea under partially shaded conditions in the reclaimed soils of Kuttanad.

Out of the 16 varieties tried Ptb-2 recorded the highest yield.

2 Evaluation of vegetable type cowpea for intercropping in the coconut gardens of Kuttanad.

Results from the 2 CYT indicated that Manjeri Red Plain, recorded the highest yield.

3 Varietal evaluation of groundnut under partially shaded conditions of Kuttanad.

Seventeen varieties have been selected for the CYT.

4 Effect of date of sowing on germination, flowering pod set and pod yield of groundnut variety TMV-2.

August was found to be the best month for sowing groundnut in the uplands of Kuttanad.

Vegetables and Tubercrops

BHINDI

1 Effect of different levels of fertilizers on the growth and yield of Bhindi as an inter crop in coconut gardens.

Maximum yield was recorded in the treatment combination N₁₂₀ P₁₀₀ K₁₀₀.

2 Varietal trial in Bhindi (RARS Kumarakom)

The variety 'Punjab Padmini' recorded the highest yield among the varieties tested.

TAPIOCA

1 Evaluation of short duration tapioca cultures for reclaimed soils. Among the seven cultures cul. 3/84 was found to be the top yielder (22,000 tonnes). The study is being continued.

Miscellaneous crops

Millets

1 Exploring possibility of introducing finger millet as a pure crop and as an intercrop in Kuttanad (RARS, Kumarakom.)

Out of the 17 cultures tried cul. No. 711 gave the maximum yield (2083.34 kg/ha).

2 Induced breeding of major carps

Induced breeding was successful during the season and over 80000 numbers of fish seed was distributed among local farmers.

3 Paddy-cum-fish culture.

The third series of experiments are in progress. The trend indicates promising response.

4 Culture of Gaint fresh water prawn *Macrobrachium rosenbergii*

The results of the study are encouraging. The studies are in progress.

Highlights

COCONUT

Coconut stumps overlaiden with coconut disc along with fermented cocoa pulp was found to be very effective in attracting the red palm weevils.

Application of 75-100 ml of Nuvacron through the oldest roots (brown) was found to be very effective in controlling the Red palm weevil infestation in young coconut palms.

RICE

In a study on the microbial control of Rice leaf roller *Cnaphalocrosis medinalis* a promising viral pathogen granulosis virus and a bacterial pathogen *Bacillus* spp. were isolated.

FISHERIES

Studies on fish culture in paddy fields after paddy revealed that fish production of 537.82 kg/ha can be achieved in 6 months. The yield realised is higher than that reported elsewhere in India.

Culture of giant fresh water prawn in coconut garden conditions showed an yield of 312.5 kg/ha/6 months with financial returns of Rs. 9250/-per ha per 8 months.

By induced breeding major carp seeds were provided at the Station and a total of 1 lakh fingerlings were sold and utilised for experimental stocking of the station ponds.

An experiment on the utilisation of HCH (derived from pregnant woman's urine) as an alternate to pituitary gland was tried for induced breeding during the previous season. HCH in combination with pituitary was found to be efficacious in inducing carp breeding.

Visitors

Sri. R. E. Epworth, Dr. V. Sadhamate and Sri. P. S. D. Nair, World Bank Consultants visited the station during June, 1985 to attend the T & V Monthly Workshop conducted here.

Sri. P. Suseelan, Director of Agriculture, Trivandrum visited the station along with the World Bank Consultants to attend the T&V Monthly Workshop during June 1985.

Dr. G. Rengaswamy, K.A.U. Commission visited the Station to evaluate the working of the Station during October, 1985.

Dr. K. Gopalakrishnan, Co-ordinator, AICARP, U.A.S., Bangalore visited the station during November 1985.

Mr. Daleltahu, Farmer from Canada visited the station during January, 1986.

Dr. Karangal, Co-ordinator, IRRI visited the station during March, 1986.

Dr. Kulkarni, Co-ordinator I.C.A.R. also visited the station during March, 1986.

1.18 RICE RESEARCH STATION, MONCOMPU

Rice Research Station, Moncompu was established in the year 1940. In 1963 it become a full fledged Regional Station to handle Plant Breeding and problems connected with Agronomy, Science, Agricultural Entomology and Plant Pathology.

Rice Research Station, Moncompu is located in Champakulam Village of Kuttanadu Taluk in Alleppey District. The station is equidistant from Alleppey and Changanacherry being 12 kms. both ways and is located on the northern side of the road from Changanacherry to Alleppey. The total area of the farm is 8.7 ha. of which 2 ha. comprises garden land and the remaining area constitute double crop paddy lands.

Dr. C. A. Joseph, Professor (Pl. Br) continued as the Officer-in-charge of the Station.

Sri. S. Bhaskaran, Assistant Professor (Extn) has been granted leave for study purpose for undergoing Ph. D Programme at Tamil Nadu Agricultural University, Coimbatore with effect from 16-12-1985.

Sri. Jim Thomas, Assistant Professor (Ent) has been granted study leave for study purpose for undergoing Ph.D Programme at IARI, New Delhi from 14-9-1984.

Sri. Babu George, J.A.P. is on study leave for Ph.D. Course from 23-12-1983 at College of Agriculture, Vellayani.

Smt. D.S. Radha Devi, Assistant Professor is on study leave for Ph.D. Programme from 30-12-1984 at College of Agriculture, Vellayani.

Details of Seminars-Symposium/Extension Lectures/Training Programmes/Correspondance Course etc. conducted.

- 1 One day training on Fish Culture for farmers—30 participants.
- 2 State Level Training on Rice Production Technology—duration 4 days, number of participants 30 (Agricultural Officers of the Department of Agriculture).
- 3 T & V Monthly Workshop of Alleppey Dist is conducted at this Station/at the District Agricultural Farm, Mavelikkara. In addition to this the Scientists of the Station participated in the T & V Workshops of Kottayam, Quilon and Pathanamthitta Districts.
- 4 Two Seminars viz., one on Lab-to Land Programme and another-Rice Day and Karshika Mela were conducted during this year.

Research

Number of Research Projects as on 31-3-1985 was 52.

Research Highlights

The following research findings were included in the Package of Practices, 1986.

Karthika (MO.7) recently released high yielding rice variety from Moncompu has been recommended for Palliyals, Double Crop Wet lands, Kole lands and Onattukara.

Seed rate for Kuttanad enhanced from 80 to 100 kgs. to 125kgs. provided the excess plants are removed while gap filling to maintain ideal plant population.

Paddy seed soaking in CuSO_4 (0.25%) and ZnSO_4 (1%) solution for 24 hrs. before sprouting for higher grain yield.

The dose of Carbaryl and Quinalphos for the control of paddy pests have been reduced from 2.5 kg. of 50 WP to 2 Kg. of 50 WP and 1000ml. of 25 EC to 750 ml. of 25 EC respectively as a bio-rational dose.

Cultures 93, 120, 126 and 168 which are resistant to BPH were advanced to Minikit Trials and Culture 93 has obtained wide acceptance especially in Kuttanad.

Among the semitall cultures evolved at this station, Culture 153-1 200 and 204 were advanced to multilocation trials. Culture 153-1 was found to give high yields and showed tolerance to BPH under All India Co-ordinated Trials.

For medium duration paddy application of Nitrogen in three equal splits as basal, 35 and 55 DAS respectively was found best for obtaining maximum grain yield.

Concluded projects:

RICE

Crop improvement

Adaptive Trials with Cultures-KAU 1727

Cul. KAU 1727 was tried along with Jaya, Pavizhom and Bharathy during the Additional Crop, 1985 and the Culture KAU 1727 out yielded all the check varieties (5238 kg/ha) and was superior to Pavizhom (4145 kg/ha) and Jaya (4708 kg/ha).

Crop management

Effect of pre-soaking of seeds in solutions of Zn and Cu on the growth and yield of rice

The object is to arrive at an optimum concentration of Zn and Cu for presoaking paddy seeds to increase rice yield. The treatments did not produce statistically significant difference on pooled analysis of the grain and straw yield of four seasons.

However the combination of 1% Zn SO₄ and 0.25% CuSO₄ produced a difference in grain yield of 1290 kg/ha. over control and recorded the maximum net profit per hectare with Rs. 3,179/-over control.

Effect of application of lime on economising the use of inorganic nitrogen to rice

The project has been conducted for four seasons from additional crop 1984. The treatments include application of lime 600 kg/ha. as CaOH and skipping the basal application of N to the extent ranging from 0.100%.

Pooled analysis of the grain and straw yield of the four seasons gave no significant variation between the different treatments. Application of 600 kg. lime/ha. and full basal N gave the highest grain yield of 1871 Kg/ha.

Effect of top dressing of complex fertilizers on the yield of rice

The project was aimed at to find out whether the farmers' practice of applying complex fertilizers as top-dressing has any scientific base. The experiment was conducted for three seasons. The treatments include the application of complex fertilizer as full dose and in splits at different time interval.

On pooled analysis, the treatments did not produce statistically significant difference for grain yield and significant difference was obtained for straw yield. The grain yield was highest for the application of complex fertilizer full dose 50 days after sowing (3256 kg/ha) which was 24% increase over the control (2635 kg/ha). The straw yield was highest for the application of complex fertilizer full dose 40 days after sowing (6902 kg/ha) which was significantly superior to all the other treatments.

Utilisation of applied phosphorus by rice in Kuttanad soil

The experiment was conducted during punja 1985-86. There was two sub experiments, one termed tagged ammophos experiment. The other tagged and untagged Ammophos experiment. Ammophos tagged with P 32 was used.

Trends observed: Plant sample analysis and uptake studies are being carried out at the Radio Tracer Laboratory, College of Horticulture Vellanikkara. In the tagged Ammophos experiment application of Ammophos $\frac{1}{2}$ dose 20 DAT and $\frac{1}{2}$ dose 40 DAT gave the highest grain yield, of 2699 kg/ha. In the tagged and untagged Ammophos experiment, application of untagged ammophos as basal gave the highest grain yield of 2026 kg/ha. The treatments did not produce statistically significant difference.

PLANT PROTECTION

Chemical control in nursery

The trial aims at utilising dipping of sprouted seeds in Chlorpyrifos solution for insect control against conventional application of granules by broadcasting in standing water and also placement during puddling.

The result indicate that dipping sprouted seeds in 0.2% Chlorpyrifos solution for three hours and sowing will check gall midge incidence by about 20% over control and also incidence of thrips.

Ongoing projects

Breeding for rice varieties resistant to Brown Plant Hopper

Minikit trials were conducted using two short duration (93 and 170) and two medium duration (126 and 168) cultures. Stability analysis of these cultures were carried out using the data from district trials. The average yield for Culture 93, 170, 126 and 168 are 6000, 5500, 6000 and 6000 kg./ha. respectively.

Culture 93 and 126 were found to be giving consistently good yield and both these cultures were stable during both additional crop and pancha season.

Evolving a short duration semitall variety of rice

District trials were conducted with three cultures viz. 153-1, 200 and 204 in different locations. The cultures were also screened for BPH resistance. The average yield for culture 153-1, 200 and 204 are 6000, 5500 and 6200 kg/ha respectively.

Culture 153-1 was found to be giving good yield and possessing tolerance to BPH.

Evolution of blast resistant varieties of rice

Single plant selections were made from the F5 and F6 populations of 7 crosses based on resistance.

Developing male sterile lines adapted to local conditions

Fresh crosses were made with male sterile progenies and high yielding as well as local varieties to identify maintainer and resorter lines.

Breeding for high yielding varieties of rice with multiple resistance to major pests and diseases of Kuttanad

Single plant selections were made from the F2 and F3 population of different crosses based on duration plant and panicle characters and resistance to major pests and diseases.

Breeding for high yielding varieties of rice suitable for the kari lands of Kuttanad

Hybridization was carried out between popular varieties of the Thurvanoor kari area and high yielding varieties of the station and subsequent generation raised.

Breeding for high yielding varieties of rice specifically suited to the additional crop season of Kuttanad

Single plant selections were made from the F3 and F4 generation of different crosses based on duration, desirable agronomic characters and dormancy.

Evolution of gall midge resistant varieties of rice suitable for Kuttanad

Crosses were made using gall midge resistant varieties (Kakathiya, Surekha, Pothana etc.) as donors and high yielding varieties of the Station (MO. 4, MO. 5, MO. 6 and MO. 7). Single plant selections were made from the F2 population based on resistance to gall midge and desirable agronomic characters.

Improving the yield, quality and plant type of rice varieties by induced mutation

Single plant selections were made from the M4 and M5 generations of 3 varieties (MO. 1, MO. 5, and MO. 6) based on plant type, resistance to pests and diseases and panicle characters.

Development technologies suited for "Kottumundakan Cultivation"

15 varietal combinations were tried in the Kottumundakan area using 4 first crop varieties (MO 6, H4, Vyttila-2 and Ptb. 9) and 4 second crop varieties (Kottarakkara I, Local Mundakan, Ptb. 20 and Lakshmi)

Performance of MO 6 was poor whereas other three first crop varieties (H4, Vyttila-2 and Ptb. 9) performed well. Among the second crop varieties, Lakshmi was most acceptable. Kottarakkara I also showed good performance

Uniform Variety Trial-2

Twenty four entries were tried to evaluate the performance of early duration varieties. All the entries showed tolerance to pests and diseases. Entry No. 211 showed highest yield 5669 kg/ha.

Uniform Variety Trial-3 (AICRIP)

Twenty medium duration varieties were laid out to study the comparative performance. All the entries showed tolerance to sheath blight. Entry No. 301 gave maximum yield i.e. 5793 kg/ha.

Gall midge resistant Variety Trial

Seventy two entries received from AICRIP were planted to evaluate the comparative performance of gall midge resistant varieties. Almost all the entries have shown tolerance to gall midge. Entry No. 1171 recorded maximum yield i.e. 5994 kg/ha.

Sheath blight resistant Variety Trial

Fourty four entries were planted to evaluate the performance of sheath blight resistant varieties. All the entries have shown tolerance to sheath blight and sheath rot for both the seasons.

Crop management

Studies on the nutritional requirement of pre-release cultures

Object of the experiment is to find out the optimum dose of fertilizers for paddy cultures 93, 126 and 170. This experiment was conducted during additional crop 1985, and punja crop 1985-86.

The result of analysis of data shows that culture 93 produced the maximum grain yields of 4783 kg and 3700 kg per ha, during additional and punja crops respectively at the fertilizer level of 90:45:45 kg NPK/ha.

Culture 126 produced maximum grain yield 5793 kg/ha at the fertilizer level of 110:55:55 kg NPK/ha. for additional crop and 5733 at the level of 50:25:25 during punja.

Culture 170 produced maximum at the fertilizer level of 70:35:35 kg NPK/ha. (5167 kg/ha).

Studies on the incidence of disease show that culture 126 is moderately resistant to sheath blight.

Nitrogen management in direct sown short duration rice

This experiment was conducted with a view to find out a suitable schedule for nitrogen application for direct sown short duration rice in Kuttanad under puddled condition.

Though the effect of treatment is not significant application of nitrogen in two equal splits during tillering and panicle initiation stages produced maximum grain yield of 4017 kg/ha. during additional crop season. But application of nitrogen in three splits ($\frac{1}{3}$ as basal, $\frac{1}{3}$ on 35th day, $\frac{1}{3}$ on 47th day) produced maximum yield of 2834 kg/ha during punja season.

The same trend was noticed during the previous season also.

Nitrogen management in direct sown medium duration rice

This experiment was conducted during additional crop and punja season 1985-86. Application of nitrogen in three equal splits (33% as basal, 34% as 35 DAS, 33% as 55 DAS) produced maximum grain yield (4067 kg/ha).

In the previous year also application of nitrogen in three equal splits was found to be the best.

Weed control trial in direct sown rice under puddled condition

The experiment was conducted during the additional crop 1985 and punja season 1985-86. Among the chemicals tried Arisolo (2.0 kg ai/ha) found to be the best to control weeds and thereby increase the yield (2567 kg/ha.)

In the previous "Machete" @ 1 kg.ai/ha. was found to be the best.

Weed control trial in transplanted rice

This experiment was conducted at the Rice Research Station, Moncompu during additional crop 1985. Among the chemicals tested Arisolo at the rate of 1.5 kg ai/ha. was found to be the best. (6350 kg./ha).

In the previous year, 2-4-D.EE at the rate of 1.0 kg.ai/ha was the best in controlling weeds and thereby increasing the yield. (6074 kg./ha)

Economics of weed control in wet sown rice

This trial was conducted during additional crop 1985 and punja 1985-86 to find out the economics of weed control in wet sown rice in Kuttanad.

In this trial application of 2-4 D EE at the rate of 0.8 kg.ai/ha. on 6th DAS followed by one hand weeding is found to be the most economic.

Observational trial with "PARAS"

The result of the observational trial shows that the grain yield is increased by 12% over control by spraying Paras.

Observational trial with 'Pachila Mark' Magnesium Sulphate

Application of Magnesium Sulphate at the rate of 30 kg/ha. increased the yield by 11% over control yield 3000 kg/ha. but no additional effect was noticed when the dose was raised from 30 kg. to 50 kg/ha.

Fertilizer trial in Koottumundakan paddy Sherthalai region

The object of this trial is to assess the fertilizer requirement of Koottumundakan type of paddy cultivation. The result of analysis of data shows that the treatment with highest dose of fertilizer (Virippu-60:30:33 and Mundakan 60:0:30 kg NPK/ha) was superior.

Evaluation of Mussoorie Rock Phosphate in Acid soils as a source of P to low land rice

The experiment was conducted during the additional crop 1985. Treatments in which 60 kg. of P_2O_5 as rock phosphate with pyrite 1:1 W/W was applied as basal gave the highest grain yield of 3610 kg/ha. which showed 15% increase over the control (No. P). The treatment effects were not statistically significant.

Nitrogen management for low land rice in pest and disease endemic areas

The experiment was conducted during additional crop 1985. The treatments were control, prilled urea in 3 splits, neem coated urea basally incorporated and coal/tar coated urea basally incorporated. In addition to the usual biometric observations, BPH count and scoring for the diseases BLB and sheath blight were conducted at periodic intervals.

In the case of both grain and straw yield there was statistically significant variation due to treatments. All the three nitrogen application treatments were on par and superior to control. Application of prilled urea in 3 splits recorded the highest grain yield of 3730 kg/ha. while neem coated urea basally incorporated recorded the highest straw yield of 7380 kg/ha. There was no incidence of BLB and Sheath Blight and Brown Plant Hopper count was not significant.

Evaluation of mussoorie Phos. coated urea for 'N' efficiency in low land rice

The experiment was conducted during additional crop 1985. The treatments include application of 'N' @ 30 kg/ha., 60 kg/ha., 90 kg/ha. and 60 kg/ha. in 2 splits (basal+tillering) as Mussoorie Phos-coated urea, Gypsum coated urea, Neem coated urea and prilled urea.

The treatment effects were not statistically significant for any of the characters studied. Application of 90 kg N/ha. as Mussoorie Phos-coated urea, basal gave the highest grain yield of 4130 kg/ha. which was 39% increase over control (No. 'N').

Tolerance (Screening) studies on high yielding varieties of rice for acidity, salinity, iron, aluminium and manganese under Kuttanad conditions

The seeds of IR-8, Rohini, PTB. 26, Culture 25315, Culture 25331 and Vyttila 45 were multiplied during additional crop 1985 and Punja 1985-86 for further field trial in problem areas during Punja 1986-87.

Effect of seed soaking with oxidising agents on germination, establishment and yield of rice under flooded conditions

The treatments include dipping the seeds in water, 1% and 2% H_2O_2 and 1% and 2% $KMnO_4$ for 12 hours, draining and keeping for sprouting.

During additional crop 1985 seed soaking with 2% H_2O_2 gave the highest grain as well as straw yield 4380 kg/ha. and 8650 kg/ha. respectively while during punja 1985-86 seed soaking with 1% $KMnO_4$ gave the highest grain yield of 3840 kg/ha. and seed soaking with 2% H_2O_2 gave the highest straw yield of 10.625 kg/ha.

Split application of potash to rice

The object of this experiment is to compare the package of practice recommendations of two split application of potash with three split application synchronising with the nitrogen application. Two levels of potash 45 kg/ha. were tried.

The treatments did not produce statistically significant difference on the vegetative and productive characters. During additional crop 1985 application of 55 kg of Potash, 25% as basal, 25% at tillering and 50% as P. I stage gave the highest grain as well as straw yield. While during punja 1985-86 application of 55 kg. of Potash 50% at tillering and 50% at P. I. stage gave the highest grain yield of 2285 kg/ha. and application of 45 kg of Potash 50% as basal and 50% at P. I. stage gave the highest straw yield of 7835 kg/ha.

Crop protection

New Insecticide Trial

Oncol Chlorpyrifos, Mocap, Quinalphos and Padan as granules @ 1.5 kg ai/ha and Chlorpyrifos and Nexagan @ 0.75 kg ai/ha. sprays were evaluated against checks Furadan G. 1.0kg ai/ha. and Monocrotophos @ 0.5 kg ai/ha spray on rice pest complex.

Padan exerted nearly 65% and Mocap 63% control of gall midge. Padan brought about 54% control of stem borer and was also effective against leaf roller. During additional crop season 23% and during puncha season 61% more yield were produced by application of Padan @ 1.5 kg ai/ha i.e. 5583 and 5800 kg/ha while in control it was 4583 and 3400 kg/ha respectively.

Gall midge screening trial

115 entries including breeding lines and donor parents were screened under field conditions for gall midge resistance. Silver shoot incidence was practically nil in Aganni, Phodum, W. 1263, Titiang, Nagrasal, Phalguna, ARC 5951, ARC 10847, S. 2204 and in 39 entries derived from 21 crosses to 13.09% in T (N) 1, the susceptible check.

Multiple resistance variety trial

62 entries were planted in the field to assess their resistance to major pests. There was moderate incidence of gall midge and the 6 entries free or with low incidence of silver shoots are (1) RP 2068-18-35 (2), IM2-5 (3), CR-319-644 (4), CR-317-166 (5) Wgl. 47969 (6) Wgl. 47970.

Leaf folder screening trial

50 entries were screened for leaf roller resistance under field condition. 15 entries exhibited tolerance to leaf roller. These lines are tested under high insect pressure for confirmation.

Brown plant hopper screening and bio-type studies

Under two experiments 350 entries were planted in the field, 100 under Brown Plant Hopper Screening Trial and 250 under International Rice-Brown Plant Hopper Nursery, to study the reaction of these entries to Brown Plant Hopper since the population was very low, no results could be obtained.

Testing of resistance under Screen-house condition will also be done in future.

Evaluation of insecticides

In the trial on Asataf, two doses of Asataf i.e. @ 350 gms. and 500 gms ai/ha were evaluated against Monocrotophos and untreated check. Application of Asataf @ 500gms ai/ha was effective in controlling leaf roller, green leaf hopper and stem borer and producing higher yields.

In the trial on Coroban, two doses @ 625 ml. and 1000 ml/ha. was tried against Fenitrothion, Quinalphos and untreated check. Application of Coroban @ 1000 ml/ha. effectively controlled green leaf hopper, leaf hopper and stem borer and produced high yields upto 4320 kg/ha.

In the observational trial with Basudin, @ 1.25 and 1.15 kg ai/ha. were effective in controlling stem borer and gave higher yields of 4500 and 4600 kg/ha. respectively.

In the observational trial with Kinalux, two doses were tried @ 750 and 1000 ml/ha. against Ekalux @ 750 ml/ha. and untreated check. Kinalux at 750 ml/ha. was equally effective as Ekalux.

Operational Research Project on Integrated Control of rice pests in Kuttanad

This project was implemented jointly by the Kerala Agricultural University and the Kerala Agriculture Department. University Staff and Department Staff implemented the projects jointly, as per the programmes finalised by the Scientific Consortium.

The programmes implemented include adaptive research programmes pest surveillance, agroclinics, training programmes etc.

Determination of field doses of Carbofuran in relation to Plant Population for insect control

This trial was to find out the optimum dose of Carbofuran using four different doses, in four spacings of planting.

Result indicate that under all spacings application of Carbofuran @ 0.75 kg ai/ha is the optimum to get best control of leaf roller. Maximum grain yield was recorded in treatment with a spacing 10x20 and application of Carbaryl @ 1.25 and Quinalphos @ 0.20 kg ai/ha will be effective in reducing leaf roller and stem borer incidence.

Multi-disciplinary project on pests and diseases of rice

The project aims at studying the population dynamic of crop pests and incidence of diseases in relation to weather factors.

Observations were taken in a bulk plot left unsprayed. Occurrence of sheath blight synchronised with maximum temperature of 33.0°C and light rainfall of 66.8 mm.

Epidemiological studies on important rice diseases

During additional crop three series of planting and for Punja four series of planting were done at fortnightly interval using four varieties viz. Jyothi, Jaya, Bhadra and T (N) 1. In both the seasons Jyothi was found to be more susceptible to sheath blight followed by T (N) 1; and sheath rot incidence was more in T (N) 1 followed by Jyothi. Results on incidence of brown spot and stack burn diseases was inconsistent in the varieties in the two seasons. Pooled analysis of the data from 1982-84 showed that in the case of almost all varieties sheath blight incidence is inversely correlated with rainfall. High humidity and high temperature significantly contribute incidence of sheath blight in general. The experiment is continuing.

Screening rice varieties against important diseases

During additional crop, significant difference was obtained for all observations taken except for sheath blight viz. incidence of sheath rot, brown spot and stack burn diseases (both leaf and grain infections) and grain yield in the 16 varieties tried.

During Punja, the disease incidence was comparatively low and significant difference between the treatments was obtained in the case of

brown spot grain infection, stack burn leaf infection and grain yield only. However the grain yield was not seen influenced by the disease incidence in both the seasons.

Best yielding varieties coined with pest and disease tolerance will be transferred to the hybridization programme of the Station.

Evaluation of common fungicides for the control of stackburn disease of rice

During additional crop season, Hinosan (1 ml/lit) when applied at 60 DAS gave lowest leaf infection and the same chemical when applied at 80 DAS gave lowest grain infection.

During Punja, Vitavax (1g/lit) when applied at 40 DAS gave lowest grain infection followed by Fytolan (3g/lit) when applied at 80 DAS. Lowest leaf infection was recorded in Dithane M-45 (4 g/lit) applied plot at 80 DAS. Disease incidence was not seen reflected on grain yield in both the seasons.

Screening rice varieties against false smut and stack burn diseases

During additional crop, 48 entries were screened against stack burn and false smut diseases. Out of these 33 entries were found free from false smut incidence and none were found completely tolerant to stack burn disease.

Chemical control of sheath blight

In both the seasons Validacin (2 ml/lit) was found to be the best fungicide in checking the sheath blight incidence.

In the previous seasons also, Validacin was found to be the superior fungicide against sheath blight disease.

National Screening Nursery-1

The trial was conducted only for additional crop 1985. Out of the 659 entries tested 28 entries showed complete tolerance to sheath blight and 69 entries to sheath rot. None of them was completely tolerant to brown spot disease.

Observational trial on control of Brown spot of rice

Lowest leaf infection was noted in seedling dip with $MnSO_4$ (2%) and lowest grain infection in Dithane M 45 (4.18/Lit) sprayed plots for both the season.

Adaptive trial on control of Rice blast

An adaptive trial was taken up in the cultivators' field against blast disease of rice during Punja 1985-86. Among the 6 fungicides tried Kitazin (1ml/lit) was the best followed by Dithane M 45 (4.8/lit) in checking the disease.

Special disease and pest research survey

Survey work was done in the Kuttanad and Onattukara regions and noted the incidence of rice pests and diseases. In both upper and lower

Kuttanad areas the additional crop has suffered heavy damage by flood and the survived crop was seen severely affected by BPH. For Punja crop, in the early stages there was moderate to heavy incidence of thrips, case worm, leaf roller and stem borer. Diseases noted were sheath blight in both seasons along with BLB and leaf scald in additional crop and blast in the Punja Crop. In the Koottumundakan area brown spot, sheath blight and leaf roller were seen in a mild form. Pests noted were thrips, case worm, stem borer and leaf roller and diseases sheath blight and blast. Yellowing of rice due to disease of viral origin was observed in the Karuvatta region in a severe form.

Social Sciences

Agricultural Statistics

Study of Interdependence of climatological factors and grain yield of paddy with reference to the additional and punja crop in Kuttanad

An interdependence analysis was carried out using ten weather variable along with corresponding grain yield during additional and punja crop season in Kuttanad using principal component method. The study revealed all the weather variables were found to be positively correlated with grain yield. Principal component study indicated that certain linear combinations of the variables were contributing positively and certain other combinations of the variables were contributing negatively to yield variations during punja season.

During additional crop, variables like total rainfall, average relative humidity etc. were found to be affecting inversely the grain production. Average maximum temperature was found to have significant positive influence on the grain yield. Most of the linear combination of those variables were found to have inverse effect even though it is not of significant level.

Hence it is concluded that weather variable in additional crop season influence the grain yield production individually rather than in combination. But in punja, the combination of weather variables are contributing to yield variations.

Agricultural Extension

Training

Two training camps were organised and 30 farmers and 30 Departmental officers were given training.

Lab-to-Land programme

Seeds, fertilizers and poultry and goats were distributed to selected farmers under this programme. Under this 2 seminars were conducted. 360 farmers participated.

Monthly Workshops for T & V personnels and diagnostic team visits to the problem areas conducted.

Agro-farm clinics

Agro-farm clinics service was functioning at 4 centres.

Visitors

Dr. R. L. Rajak, Plant Protection Advisor, Government of India; Dr. Vellaichami, Director (Rice Development), Government of India; Dr. K. Manibhushan Rao, C. A. S. in Botany, University of Madras; Dr. B. Gopalakrishna Hebbar, Head (M & E), Karnataka-Consultant on the role of Middle Level Management in T & V system and Dr. R. Gopalakrishnan, Head, Education and Extension, CWRDM, Calicut were visited the Station during the year.

1.19 ALL INDIA CO-ORDINATED RESEARCH PROJECT ON AGRICULTURAL DRAINAGE UNDER ACTUAL FARMING CONDITIONS ON WATERSHED BASIS (ICAR)

Regional Centre : Karumady

Formation

With the authority of the order of the Kerala Agricultural University No. R (2) 29764/80 dt. 19-6-1981 this scheme was officially taken up with 75% assistance of Indian Council of Agricultural Research and 25% of share of KAU. The scheme was formally started at Karumady with the appointment of a Junior Assistant Professor on 1-12-81 and put into active functioning from March 1982 with the posting of an Assistant Professor as in charge of the scheme.

Major objectives

To comprehend the effect of surface and sub surface drainage system on the movement of soil liquids.

To study the pattern of hydrological cycle occurring in the watershed area and its importance and influence on the drainage.

To develop a feasible technology for the layout of sub surface drainage suitable to peat and muck soils.

To develop criteria for design parameters of surface drainage

To develop a drainage pattern required for different crops to optimize yield and income.

To evaluate the feasibility of the return flow for irrigation in relation to water quality ratings.

To evaluate the socio-economic benefits occurred from the drainage projects.

Location of project area

The project area is "Kavil Thekkumpuram Padasekharam" a typical representative tract of Kari land, with a watershed area of 88 919 ha and paddy field of 75.238 ha. The project area lies 4 km east of Ambalapuzha

Junction at NH 47 and towards the Southern side of Ambalapuzha-Thakazhy Road. The office, laboratory and store are housed in rented buildings at Karumady.

Developments during the year

- 1 The monitoring of surface and sub-surface water level variations was continued
- 2 Variation in quality of water both surface and subsurface was continued to be recorded at weekly intervals
- 3 Paddy crop was raised in the project area where 875 m of tile drain have been laid
- 4 Observations on hydraulic properties of soil and growth attributes of paddy under tile drainage were taken
- 5 Observations to monitor the quality changes of the soil were recorded

Sri. E.K. Mathew, Assistant Professor (Agrl. Engg) was deputed for attending the "Training on Irrigation and water management in Rice production" at BARI, Dhaka from February 2nd to March 3rd, 1986.

Sri. E.K. Mathew, Assistant Professor (Agrl. Engg) and Sri. T.D. Raju, Junior Assistant Professor (Agrl. Engg) attended the Annual Workshop of the schema at KAU Vellanikkara during October 8 to 10th 1985.

Research

No. of Research Projects as on 31-3-1986 is six.

Survey and characterisation of the quality of water in the project area

The water samples drawn at weekly intervals both from surface and sub-surface water and its salinity and acidity levels were estimated. Interpretation of the data exposed the following observations.

No definite relation could be evolved between the pH of the drained water from the field and the observed water level in the project area. However, a slight increase in the pH was noticed as the water level in the project area increased. The pH always remained in the acidic level. The acidity and total soluble content of water in the drainage channel was found always higher than that in the nearby waterways.

Preparation of water contour map and hydrological map of the project area

Ground water table fluctuations were observed at weekly intervals from 24 numbers of observation wells installed in the field. Water level variations in the waterways were recorded from four different points.

From April 85 to September 85 the field was flooded, hence, no observation was possible during that period. However, the readings were recorded from October 1985 to February 1986. From this we can see that the surface water level in the project area was always lower by

0.5 m to 1 m than that in the water bodies outside the project area during the cropping season. The upward movement of water in the soil due to the hydrostatic pressure exerted by high water level in the outside water bodies could not be quantified because of intermittent flooding and dewatering of the field practiced by the farmers for washing their field during crop season. Hence, a definite pattern of sub-surface water movement in the project area could not be traced.

Evaluation of drainage pumpsets

Object is studied on the efficiency of drainage pumpsets in the Kuttanad area.

No further study on this project was possible because of the pre-occupation of the project "Development of a suitable technology for the sub-surface drainage system in the Kari lands of Kuttanad and for favourable seasons. However a brief resume is presented below on the work so far done.

For padasekharams below 100 acre, the HP installed per acre were 0.568 and 0.549 for pancha and additional crop. The mean energy consumption per acre were 150 and 181 KWH respectively for pancha and additional crop.

The installed HP was very high for padasekharams having area less than 100 acres, since the minimum size of motor used was 5 HP and the most common size was 10 HP. The ideal requirement of motor HP would be within the range of 0.307 to 0.322 per acre for large padasekharams. Regarding the energy consumption, the requirement was very high during the additional cropping season, which is the rainy season. On an average pancha crop consumes 128 units/acre where as the additional crop consumes 178 units/acre.

The experiment conducted by the station revealed that overall efficiency of petty and para is very low and is nearly 27 per cent.

Development of a suitable technology for sub-surface drainage system in the Kari lands of Kuttanad

Nine lines of lateral drains with a total length of 775 m has been laid in the project area out of which five lines are at 15 m apart and four lines at 30 m apart. The tiles are of 110 mm dia and 60 cms long and is made of clay. They are laid at a slope of 0.2% at an average depth of 0.775 m. The drains are provided with an envelope of river sand with an average thickness 10-15 cm all around the drain. All these 9 lateral drain lines are connected to a PVC collector drain through a collection drum. The collector drain opens into a drainage sump from where the drained water is pumped out by a 5 HP electric motor pumpset. This experiment cover an area 2.5 ha where series of observation wells (122 nos) are installed. All the observations have been taken during the cropping season and are being analysed.

Development of a suitable technology for the sub-surface drainage system in the Kari lands of Kuttanad

The essential lay out of the experiment is as given in project No.4. The observations taken from the project no.4 will suffice to find out the relative performance of drain with or without envelope. Since the data is still under processing the result on the effectiveness of the envelope materials used can only be reported at a later stage.

A remarkable improvement on the growth and yield of paddy crop and also on the fertility of root zone has been revealed from the pilot study conducted during 1983-84 on sub-surface drainage system. The essential lay out of the experiment is as given in project No.4 except the type of observations.

Paddy was raised in the field laid with lateral drains in the whole experimental area (2.5 ha). The standing crop was divided into different strips of 5 m width along the drain line. The first strip T_1 was 2.5 m either to the centre of the line. The second strip T_2 was in between 2.5 m and 5 m from the drain line on either sides and the T_3 between 5 m and 7.5 m from the drain line from either sides. Hence the lateral drains of 15 m spacing having three treatments T_1 , T_2 , T_3 and four replications (four experimental lines).

Drain line with 30 m spacing was having six treatments (T_1 - T_6) with two replications. The different attributes of growth and yield of paddy was recorded and the analysis of this data is not completed. Soil samples were taken from the experiment area to find out the qualities of soil during pre and post cropping season.

Highlights

Based on the observations and experiments conducted by the centre the following points are highlighted.

The farmers practice of intermittent leaching during the cropping season is found to be very useful in controlling the acidity.

A visual observation of the crop raised in the project area revealed that sub-surface tile drainage system is very effective in leaching toxic salts from the root zone area of the paddy crop in the Kari lands.

The water quality studies in the project area showed the necessity of exploitation of other possible sources for good quality irrigation water.

Drying the field and thereby allowing free aeration should be avoided as far as possible during cropping period to prevent production of free acid.

1.20 SUGARCANE RESEARCH STATION, THIRUVALLA

Sugarcane research under the Kerala Agricultural University was started in 1977 at Thiruvalla, transferred to the University in December

1975 from the Pamba River Factory. Research work initially commenced with total assistance from ICAR under the All India Co-ordinated Research Project on Sugarcane. Research Station is located at 9.6° North latitude, 75.5° longitude at an elevation of 25.14 m above MSL.

Subsequently, in 1978, the Kerala Agricultural University started supplementing the research effort on this crop under a scheme for intensification of Sugarcane Research. Again in 1983 a new scheme on "Survey Appraisal and Control of Major Diseases of Sugarcane" with financial assistance from ICAR commenced functioning.

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. The area is benefitted from both the monsoons and during periods of south west monsoon the farm is prone to inundation from the adjoining river.

In 1985 the small unit of sugarcane research in the vicinity of Co-operative Sugars, Chittoor was brought under the technical and administrative control of this station.

Sri. S. Sukumaran Nair, Associate Professor continued to be in charge of the station.

Sri. A. V. Mathew, Assistant Professor of Plant Pathology joined Ph D Programme in the University of Agricultural Sciences, Bangalore and Smt. Suman Susan Varghese, Junior Assistant Professor, Soil Science and Agri. Chemistry joined Ph. D programme in the Tamil Nadu Agricultural University.

Two B.Sc (Agriculture) final year students were given training for a period of two weeks on planning and execution of research programmes.

A seminar on optimum utilization of available resources was conducted for the benefit of small farmers. The research station also participated in the Agri-Horti exhibition of Pathanamthitta district held at Tiruvalla during January 1985.

The institute also conducted three demonstrations on planting sugarcane setts by the Semi Automatic Sugarcane Planter at Thiruvalla, Pandalam and Punthala.

Dr N Neelakantan potty attended the 13th All India Workshop on Sugarcane held at Waltair during October 1985.

Research

Total number of Research Projects as on 31-3-1985 is twenty.

Research Highlights

Crop improvement

Observations on the performance of hybrid clones in the progeny row trial have helped in identifying five clones yielding more than 100 tonnes/ha in areas prone to monsoonic waterlogging and river water inundations. The currently available varieties yield only less than 70 tonnes/ha under these conditions.

The results obtained in the zonal varietal trial indicated that Co-7405 yields as high as Co-62175 and gives a better sugar recovery in the order of 2 per cent. Unlike Co-62175 which is moderately susceptible to red rot Co-7405 is resistant to red rot.

Studies on the performance of some Lucknow varieties have shown that LG 7305 gives a significantly higher pol. percentage (12 per cent) and out yields Co-62175 by 1.12 MT/ha. This has also been advanced to the multi-locational trial in farmers fields.

Crop management

The results of the experiment "Fertilizer and gap filling needs of ratoon crop" of two varieties have confirmed that for realising high yield, ratoon crop requires at least 25% of the extra dose of the normal level of fertilization of the plant crop. This additional dose gives an yield increase of the order of 4 tonnes/ha which was 7.4 per cent higher over the normal dose of fertilizers.

Results of the experiment "Variety x Plant population interaction" in sugarcane showed that higher yields of the order of 9 MT/ha can be obtained by reducing the inter row spacing from 90 cm to 75 cm.

Experiment to study the effect of time and mode of fertilizer application for sugarcane under rainfed conditions have further confirmed that yield of rainfed sugarcane can be further increased to the order of 7.65 t/ha (69.17 MT/ha) by applying fertilizer in two equal instalments-basally (full P) and in April-May with the receipt of summer showers instead of applying on 45th and 90th day.

Use of 2,4-D (1 kg ai/ha) + gramaxone (0.5 kg ai/ha) on 20 and 40th day after planting will reduce weed infestation and increase the yield by 7.08 MT/ha of cane/ha over hand weeded control. Compared to hand weeding, though chemical control was found inferior in terms of realised yield, was superior in terms of economics. The net profit advantage was found to be of the order Rs. 1565/- per ha.

Concluded projects

Crop management

Zonal Varietal Trial Series-I, SRS Thiruvalla

The experiment was conducted during 1983-86 in one plant and one first ratoon and one second ratoon crop. The results of the experiment showed that Co-7405 with its marginally higher brix percentage and

matching yield over Co-62175 and resistance to red rot, shall be a viable substitute for the highly susceptible Co-997 and moderately susceptible Co-62175.

Zonal varietal trial Series-II

The experiment was conducted in 1984-85 and 1985-86. The results of the trial showed that among the varieties Co-7405 was superior to all other varieties including Co-62175. Co-7405 and Co-7506 also out yielded Co-997 the most popular variety and Co-7704 the red rot resistant variety while out yielding all other varieties and matched Co-997 in quality characteristics also.

Fertilizer and gap filling needs of ratoon of two sugarcane varieties

The results showed that gap filling is an inevitable operation in ratoon crops and helps to increase the yield by 6.45 tonnes/ha.

Variety and plant population interaction in sugarcane

The experiment was started during 1984 and the ratoon was studied during the year. The treatments of the experiment constituted combinations of two varieties and three spacings. The results of the experiment showed that between the varieties (Co-62175 and Co-785) Co-62175 was better and gave an additional yield of 17.51 tonnes/ha. Inter row spacing of 75 cm gave an additional yield of 9 tonnes of cane over the presently recommended spacing of 90 cm. and 4.54 tonnes over 60 cm spacing.

Report on the herbicidal control of weeds in sugarcane

The experiment was started in 1984 and the effect of the weedicide on the ratoon crop was studied during the year. The results showed that any weedicide application could not match hand weeding in the yield of the crop. The normal practice of hand weeding gave a per ha. yield of 72.17 MT as against the 65.09 MT/ha where 2,4-D @ 1.00 kg ai/ha + gramaxone at 0.50 kg ai/ha was applied on 20th and 40th day after planting.

Time and mode of application of fertilizers under rainfed conditions in sugarcane

The treatment effect on the second ratoon crop was studied during the year. The results of the experiment showed an additional yield of 7.65 MT/ha cane from unirrigated crop can be obtained by manuring the crop in two equal instalments i.e. at the time of planting (full P) and in April-May with the receipt of summer showers. The increase in yield of 7.65 MT/ha worked out to 12.43 per cent increase over the present practice of manuring cane on 45th and 90th day.

Observational trial on maximising sugar production by changing pattern in sugarcane

The objective of the experiment was to find out the possibility of increasing yield of sugarcane per unit area by taking three crops of sugarcane in a period of two years.

The results made it unmistakably clear that the per hectare productivity of sugarcane can be increased by taking three short duration crops in the same area in two years instead of the conventional practice of taking 2 crops in two years.

Zonal varietal Trial-Series II

The project has been taken up as suggested by the ICAR to spot out the best variety suitable for the region. Second ratoon is being studied during the year. The results obtained in the first ratoon crop showed that Co-7405 recorded the highest mean per ha yield of 105.76 MT/ha and this was 6.4 MT more than the yield of Co-62175-the highest yielding variety in the region.

Fluff exchange programme

The objective of this project is to evolve suitable varieties of the peculiar agro-climatic conditions of this area through the process of selection from seedling stage.

Fluff obtained from 7 selected crosses have been sown in the nurseries.

47 clones selected from among the seedlings obtained from the 1985-86 crosses are planted in this trial.

45 clones selected from the progeny row trial of 1985-86 (hybridization year 1984) are planted.

The ratooning potential is being evaluated during the year, 22 selections made from the plant crop of this trial has been planted in a comparative yield trial.

Twenty two clonal selections have been planted.

Crop improvement

Evolution of new varieties suitable for the different sugarcane tracts of Kerala

The project is to evolve varieties suitable for the different agro-climatic zones of Kerala with special requirement of each tract through hybridisation and selection. The project has a number of experiments like seedling studies, Progeny Row Trial, Initial Evaluation Trial (plant crop), Initial Evaluation Trial (ratoon crop) Comparative Yield Trial, Varietal Series III and multilocational trial in farmers fields.

Seedling Studies

Fluff belonging to two crosses viz. Co-7704 x Co-776 and Co-7704 x Co-1148 received from Sugarcane Breeding Institute, Coimbatore were sown in the pots. The seedlings will be transplanted in the main field for individual evaluation.

Progeny Row Trial

The progeny row trial of the year consisted of 332 clones. Based on the performance in the trial 49 clones have been selected for further evaluation in initial evaluation trial.

Initial Evaluation Trial

This trial consisted of 158 clones selected from the crosses made in 1982-83. Based on the performance in the initial evaluation trial 47 promising clones have been selected and planted in a comparative yield trial for further evaluation of performance and stability.

Ratoon performance of the clones is also being evaluated.

Varietal Trial Series—II

Six clones selected from the comparative yield trial are being evaluated in this trial. Clone 117 was found significantly superior to Co 997 in this year's study.

Varietal Trial Series—III

The experiment consisted of 8 clones and two local check varieties. Among the clones No.81 gave the highest yield of 78.63 tonnes which was 15 tonnes more than that of Co-62175.

Multilocational Trial

Multilocational trial consisting eight genotypes found promising under our conditions have been laid out during December 1985 in farmers fields at Kadapra and Omalloor.

Crop management

Experiment to find out the optimum level of P and K for sugarcane

The experiment was started during 1984 and the first ratoon was studied during the year. The results of the experiment showed that sugarcane responds significantly to phosphorus application up to 100 kg/ha and the yield increase over 50 kg/ha level was 8.46 MT/ha. In the case of potash the crop did not respond beyond 50.00 kg level/ha.

Effect of water stress on yield and quality of sugarcane

The experiment was started during 1983 and the second ratoon was studied during the year. The results obtained during the year indicated that irrigation to a depth of 4 cm. at an interval of 10 days increased the yield of cane by 27.68 tonnes over no irrigation and 7.79 MT/ha over that of 13 days interval. The yield in control plot was only 94.44 tonnes.

Survey, appraisal and control of major diseases of Sugarcane

The scheme was started in 1983 and the period under report is the third year of the scheme. During the period reconnaissance survey for the incidence of red rot disease was conducted in the Pamba River Factory Eramalikkaranadu, Pandanadu, Valanjavattom and Kallunkal areas. Unexpectedly sugarcane grown in the Vallamkulam areas situated upstream of Manimala river was also found affected by the disease.

Closer observations indicated primary and secondary infection. The wide spread occurrence of the disease well before the commencement of the monsoon as against the case elsewhere, in the country indicated the possibility of the strain of the fungus being more virulent.

205 clones in the initial evaluation trials were inoculated by punch method to find out the reaction of the clones. Among the clones 23 were found resistant, 93 were found moderately resistant, 42 were moderately susceptible, 24 susceptible and 18 were found highly susceptible.

Most Hot Air Therapy Unit sanctioned under the scheme is being fabricated at Kerala Agro Industries Corporation, Thiruvalla.

OBSERVATIONAL TRIALS

Studies on the comparative performance of some Lucknow varieties of sugarcane

The experiment was started in October 1983 and the first ratoon crop was studied during the year under report. The experiment consisted of six test varieties and two check varieties i.e. Co-997 and Co-62175.

The results of the trial has shown that from among all varieties tried LG 7305 was promising combining in itself the higher productivity of Co-62175 and superior quality characteristics of Co-997 for giving high yield and quality and red rot control.

Trial on Mussorie Phosphate

The experiment consisted of 4 treatments i.e., no 'P' application, entire P application through Mussorie Phos, through super phosphate and through Mussorie Phos+Super Phosphate (50% P each). The first ratoon crop was studied during the year under report.

The data of the experiment showed that the entire dose of P as Mussorie Phos gave the highest per ha millable cane count (123700) and yield (87.05 MT) as well as highest girth (6.8 cm). The yield increase by application of entire P through Mussorie Phos was 32.80 per cent over control, 4.38 per cent over super phosphate, and 3.63 per cent over application of P through Mussorie Phos+Super phosphate.

Trial on Microsakthi

The experiment envisages spraying microsakthi on the crop on 25th and 90th day after planting at the rate of 2.5 litres in 250 litres of water/ha and the corresponding control plot was given equivalent water sprays. The trial was initiated in January 1983 and the second ratoon crop was studied during the year under report. The varieties tried were Co-997, Co-449 and Co-62175.

The results showed that response to microsakthi is a varietal function and the varieties tried in the trial do not respond to microsakthi in terms of yield though with respect to Co-62175 and Co-997 considerable

increase in millable cane count was noted at the expense of girth. Except in Co-449, microsakthi resulted in an improvement of brix and polarity percentage.

Trial on Bhusakthi

This trial was initiated in January 1984 and the first ratoon crop was studied during the year under report. There was one treated and one untreated plot. In the treated plot Bhusakthi was applied @ 500 kg/ha.

The results showed that application of Bhusakthi resulted in an increased yield of 4.78 MT/ha over control and the mean yield under this treatment was 115.00 MT/ha. Bhusakthi did not have any positive influence on quality and nominal reduction in quality was noticed with the application of Bhusakthi.

1.21 RICE RESEARCH STATION, KAYAMKULAM

The Rice Research Station, Kayamkulam was established during 1937 under the University of Travancore. It was taken over by the Department of Agriculture, Kerala in 1957. With the formation of the Kerala Agricultural University, this station was transferred to the University and now it functions as a constituent unit of the Kerala Agricultural University.

In 1981, this station has been declared as a sub centre for conducting research on Root (wilt) Diseases of Coconut. Besides, in 1982- this station has become a part of NARP to tackle problems peculiar to Onattukara region.

During 1985, ICAR has sanctioned a scheme for this station for the rapid improvement of Sesamum, Groundnut and Pulses and has consented to finance the scheme for 3 years.

Objective :

- a) Evolving high yielding varieties of Paddy, Sesamum, Groundnut and Pulses suitable to the Onattukara region and similar regions of the State.
- b) Formulating improved agronomic practices and plant protection measures for the cultivation of Paddy, Sesamum, Groundnut and Pulses.
- c) Tackling problems peculiar to Onattukara region in the cultivation of Coconut, Banana and other important crops.
- d) Conducting training to the farmers and officials of the Department of Agriculture in cultivation of rice, pulses and oilseed crops.
- e) Organising demonstrations of improved cultural techniques and research results in cultivation fields.
- f) Conducting experiments and adaptive trials in cultivation fields.

The station is situated 1 km east of Kayamkulam town on the northern side of Kayamkulam-Punalur road.

Sri. K. Balakrishna Pillai, Professor of Entomology continued to be in charge of the station during the period under report.

No. of Research Projects as on 31-3-85 is 24.

Research highlights

Crop improvement

1. *Evolution of high yielding photosensitive varieties of Rice suited to different agroclimatic zones*

Three pre-release cultures namely, 1336-3, 1358-2, 1423-5 were put to farm trials in two locations in Quilon District and one in the station itself with PTB 20 as control.

Culture 1352-2 was found to be highest yielding in two locations and on par with PTB-20 in one location. The farm trial is being repeated during the 1986 season also.

2. *Breeding varieties resistant/tolerant to salinity and flood for Orumundakan Area*

During the period under report, a germplasm of 23 varieties/cultures known to be resistant/tolerant to flood and salinity were collected from CRRRI, Cuttack and sample seeds were raised in the field for multiplication of seed. The screening of the varieties could be undertaken only during the next season.

3. *Collection and Evaluation of germplasm of local rice varieties*

Ten new accessions were made during the period under report and they are being multiplied for further works.

Sesamum & Groundnut

1. *Varietal trials on Sesamum and All India Co-ordinated Research Programme on Oilseeds*

The project envisages the evaluation of different strains of Sesamum evolved from various research stations under the co-ordinated programme in Onattukara conditions.

Three Trials were conducted.

a) *Initial Evaluation Trial*

30 strains were subjected to evaluation. Kayamkulam-1 recorded the highest yield followed by VS-27.

b) *Co-ordinated Varietal Trial*

21 strains were evaluated and the highest yield was recorded by Kayamkulam-1 followed by AT-14.

c) *Comparative Yield Trial of selected sesamum varieties*
Seven varieties were evaluated and the highest yield was obtained from C-7 followed by AT-6 and Kayamkulam-1.

2. *Development of improved varieties of sesamum and groundnut suited to rice fallows in the Onattukara region*

The project envisages crop improvement programmes for sesamum and groundnut to evolve varieties suited to the rice fallows of Onattukara region. During the period under report, 373 varieties of Groundnut were collected and preliminary evaluation and grouping based on the date of flowering and maturity, branching pattern and number of pods/plant were done. The F2 generation of various cross combinations were grown during the summer season of 1985-86 and plants with early maturity and other desirable traits were selected.

One hundred and ninety five sesamum varieties collected from various sources were maintained.

3. *AICRPO Trials in Groundnut*

Under the All India Co-ordinated Research Project on Oilseeds, three trials were laid out and varieties were evaluated.

PULSES

Cowpea

Screening of cowpea varieties suitable for summer rice fallows and coconut gardens of Onattukara

The object of the experiment is to select suitable cowpea varieties for the low and upland conditions of Onattukara. During the period under report, an initial evaluation trial was conducted using 50 cowpea varieties. Ten promising types were selected for further trials.

Blackgram

To identify blackgram genotypes suitable for (i) Summer rice fallows and (ii) Coconut gardens of Onattukara Region

The object of the project is to identify high yielding semi-tall short duration blackgram varieties suitable for the rice fallows and coconut gardens of Onattukara tract. During the period under report, 50 varieties were collected and conducted an initial evaluation trial from which two superior types were identified for further trials.

Agronomy—Rice

1. *Permanent manurial trial*

This project started in 1964. The effect of continuous application of nitrogen both as organic and inorganic as well as phosphorus and potash on the soil fertility and yield of rice are studied during both the seasons.

The results indicate that as far as yield is concerned, maximum yield was recorded by plots that received 80 kg N/ha as cattle manure alone followed by (60 kg N/ha as ammonium sulphate + 20 kg N/ha as cattle manure) + 40 kg each of P_2O_5 and K_2O as super phosphate and muriate of potash. In the second crop season, the plot that received 80 kg N, 40 kg P_2O_5 , 40 kg K_2O (all fertilizers) per hectare also gave an yield equal to that given by the aforementioned doses. Similarly, the results also indicate that continuous application of nitrogenous fertilizers without phosphate or potassic fertilizers is deleterious for rice growth and the application of P_2O_5 and K_2O in soil is found essential for higher yields.

Similar trend was observed during the previous year also.

2. *Potassium nutritio-periodism in high yielding dwarf indica rice*

This experiment was taken up to find out the most efficient period of utilization of potassium by rice for increasing grain yield. Maximum yield was obtained when full dose of potassium i.e., 45 kg K/ha was applied in 3 splits. During the previous year, maximum yield was recorded when half the recommended dose of K was applied in 3 splits., i.e., $\frac{1}{8}$ basal + $\frac{1}{8}$ A. T. stage + $\frac{1}{8}$ at P. I. stage.

3. *Response of two pre-release Kayamkulam cultures, 26-1-1 and 5233-6 to different fertilizer doses*

Culture 26-1-1 (Bhagya) and culture 52-3-6 (Onam) are two new varieties released for the 1st crop season of Onattukara. To derive at the most optimum level of NPK doses for the two cultures this experiment was started.

Here maximum grain and straw yield was obtained for the NPK dose 80:40:60 followed by 80:60:60 kg/ha for both the varieties. This will be repeated during the next season also.

Crop—Sesamum

1. *Effect of soil dusting on leaves, on the growth and yield of sesamum*

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. How far this statement is true is studied in this project.

The results revealed that maximum yield was obtained in plots treated with Urea spray on this was on par with dusting on alternate days at 6 am and 8 am and with dusting once in 3 days at 8 am.

Similar trend was noticed last year also. Again it has to be repeated for one more season.

2. *Studies on the drying requirement of sesamum*

The object of the experiment is to find out the optimum drying requirement for sesamum seeds for getting uniform germination of

sasamum, Kayamkulam-1 and Thilothama were tried. Daily moisture content of the seeds after drying was recorded. In the evening for 7 days, It was observed that there is no reduction in weight of the sample after the 3rd day of sun drying.

Monthly germination count for a period of one year was recorded. It was found that the percentage germination falls down after 7 or 8 months of storage. But, a fairly good germination (above 90%) could be had when the seeds were dried for 3 days and more even after one year.

3. Weedicidal Trial in Sesamum

Pre-emergent weedicides, Alachlor, Stomp and Fluchloralin were tried to study their efficiency in controlling weeds in Sesamum crop.

No statistically significant yield difference between treatments was observed. Eventhough, maximum yield was obtained from (Alachlor + one hoeing), maximum profit was from (Fluchloralin @ 1 kg ai/ha).

CROP-SOYBEAN

Multilocal trial on comparative performance of Soybean varieties

This is multilocal trial with five soybean varieties., EC-26691, Bragg, Improved Pelican, Monetta and EC-63298, to study their comparative performance. Results show that there is no significant difference in grain yield between the five varieties.

Plant Protection

Projects under root (wilt) scheme

Control of leaf rot disease of coconut using newer fungicides

The object of this project is to evaluate the efficacy of some new systemic and non-systemic fungicides against leaf rot disease of coconut. Among the five new fungicides tried, none was found superior to Bordeaux mixture. The second best was Manzeb. Similar results were obtained in the previous year also.

Response of diseased and apparently healthy coconut palms to fertilizer levels and organic manuring

The objective of this experiment is to compare the application of NPK as chemicals v/s organic matter in various combinations in their effects on root wilt disease intensity and nut yield. The treatment effects were found to be statistically non-significant. In both diseased as well as healthy palms, the maximum increase in yield was obtained when NPK @ 0.5, 0.32, 1.2 kg/palm was applied in chemical and organic form in equal dose. Maximum reduction in disease intensity was shown by palms which received 0.5 N, 0.32 P₂O₅ and 1.2 K₂O (kg/palm) in 75% fertilizer form and 25% organic form.

Effect of intercropping fodder legumes and grasses in coconut garden on the incidence and intensity of the root (wilt) disease

The effect of growing different fodder legumes and grasses in the root (wilt) disease of coconut was observed. Treatment effects were not statistically significant. But, maximum yield increase was obtained where guinea grass was grown as intercrop followed by stylosanthes.

Effect of growing and incorporating different green manure crops and its influence on diseased and apparently healthy coconut palms

Green manure crops like Cowpea, Sesbania, Daincha, Sunnhemp and Kalingi were tried. But treatment effects were not significant statistically. Maximum increase in yield was obtained when Daincha was grown followed by Sesbania. Maximum reduction of disease intensity was also noted in these treatments.

Groundnut

Chemical control of seed rot and collar rot of groundnut

Chemical control of seed rot and collar rot caused by *Aspergillus niger* was attempted using six fungicides such as Thiram 0.5%, Emisan 0.1%, Dithane M-45 0.3%, P. C. N. B. 0.1% and Bavistin 0.2% against control, both as seed treatment as well as soil drenching.

In the case of seed treatment, minimum seed rot was in Emisan treated plots, minimum seedlings rot was in Bavistin treated plots and maximum yield in Thiram.

In soil drenching, maximum yield was from Bavistin treated plots and minimum seed rot and seedling rot in P. C. N. B. and Bavistin treated plots respectively.

Sesamum

Evaluation of fungicides for the control of leaf spot and pod blight disease of sesamum

Two sprayings were given at 20 days intervals from the time of appearance of disease symptoms using fungicides such as Thiram 0.3%, Dithane M-45 0.2%, Difolatan 0.2% and Bordeaux Mixture 1% and their combinations. Spraying Thiram 0.3% + Bordeaux Mixture 1% gave the maximum yield of 495 kg/ha and disease intensity was minimum in plots sprayed with Bordeaux Mixture 1% alone.

1.22 CROPPING SYSTEMS RESEARCH CENTRE, KARAMANA

The station is situated at Nedumcaud, Karamana 3 k. m. South East of Trivandrum Central Railway Station.

History of Development

This centre named previously as the Model Agronomic Research Station was established in the year 1955 with the main objective to conduct a simple fertilizer urea and soil fertility project. New schemes

and experiments were started from 1968 onwards under the All India Co-ordinated Agronomic Research Project. From October 1983 onwards this station has been upgraded as the Headquarters of AICARP Scheme in Kerala. Karamana is also functioning as the headquarters of the scheme of experiments on cultivators field in Quilon and Palghat district. Dr. E. Tajuddin continued to be in charge of the station.

Area

A total of 7.65 ha is the area of the farm comprising of 7.25 ha D. C. wet lands and 0.40 ha garden land.

Changes in person by new Appointments/Transfer/Retirements etc.

Sri Sam T. Kurumthottical has been transferred to Kumarakom with effect from 10-7-85. Mr. A. Sasidharan and M. Nesamony, Farm Assistants has been transferred during November 1985 and September 1985. Mr. David Dharmakumar, Mohandas and K. Justin were joined duty in this office during the year under report.

Details of posts shifted/abolished : NIL

The posts of Assistant Professor, (Agronomy), Junior Assistant Professor (Agronomy), Junior Assistant Professor (Chemistry), and Lab Assistant are vacant during the year.

Sri P. Yageen Thomas, Assistant Professor Agricultural Statistics was granted study leave for one year to undergo M. Phil course at Kariavattom.

Details of seminars conducted by the station

Agricultural seminar at Vellanadu

In connection with the Golden Jubilee celebration of ICAR on Agricultural Seminar was organised on 29th October 1985 conducted jointly by the CSRC and KVK Vellanadu as a part of the lab to land programme of Kerala Agricultural University.

Research

No. of research projects as on 31.3.86 is twenty six.

Economics of crop sequences and their effect on soil fertility and crop productivity over years

Objectives are to study the economics of high intensity crop sequences and their effect on soil fertility and crop productivity over years. It is a long term experiment to be completed in 1989-90. The experiment has commenced during this year.

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 judicious combination of organic manure by effective

recycling techniques without detriments to long term soil fertility and by improving crop productivity.

Treatments

During kharif 50% as FYM recorded the highest grain yield where in rabi fertilizers alone had the maximum yield plots which received no fertilizer during rabi had the lowest grain and straw yield.

Crop technology for optimum production under resource constraints

Object is to find out suitable package of practices for rationalisation of inputs usage for higher return in crop sequence.

Long range effect of continuous cropping and manuring on soil fertility and yield stability

Object is to study the long range effect of selected crop sequences with high yielding varieties at 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.

B. P. L. 480 SCHEME PROJECTS

Fate and efficiency of urea based fertilizer nitrogen for rice

Object is to find out the fate and efficiency of urea based fertilizer nitrogen for rice.

The experiment was started during kharif 1985-86 and the kharif crop was taken up as per technical programme. After that a residual study was conducted during rabi giving 50% of the recommended dose of nitrogen.

Nitrogen levels, i.e., 112.5 kg. recorded the maximum yield and is significantly superior to 37.5 kg. and 75 kg N/ha and no level and N4 level are on par with N5. Among the subplot treatments, sulphur coated urea recorded the highest yield, and is significantly superior to others.

EXPERIMENTS ON CULTIVATORS FIELD

Two ECF units were functioning under AICARP scheme of Kerala State, one at Palghat stationed at Regional Agricultural Research Station, Pattambi and other at Quilon. Out of these, Pattambi unit was wound up by the end of March 1986.

Experiment Type N1

Studies on rationalisation of input in crop production under assured rain fall

Altogether 24 N₁ trials were conducted in Quilon and 19 in Palghat district during both kharif and rabi seasons, 1985-86.

Experiment Type N,

Testing of rock phosphate in acid soils in rice based crop sequences

24 trials of N2 type were conducted at Quilon and 21 trials in Palghat during Kharif season. During rabi in Palghat the trial number was restricted to 15.

Experiment Type D,

Fertiliser requirement of legumes in dry lands—To test the nutritional requirement of legumes under rainfed conditions.

Fertiliser requirement of oil seed (sesamum) under dryland conditions.

The object is to test the nutritional requirement of oilseeds under rainfed conditions.

KAU PROJECT

Multi locational trial with culture 1727 evolved at Pattambi along with other medium duration varieties like Jaya, Bharathy and Pavizhom.

During Kharif Jaya recorded the highest yield where as during Rabi culture 1727 recorded the maximum yield followed by Pavizhom.

1.23 AICARP-E.C.F. UNIT, QUILON

This scheme experiment on cultivators fields under AICARP (ICAR) started in Quilon District during 1984-85. The office started functioning at Quilon during June 1984.

Major objectives

The Co-ordinated Agronomic Research Project seeks to develop, continuously update and test on cultivators fields, the technology for various crop based farming systems. For this purpose cropping patterns best suited for different agro-ecological zones will be identified and or evolved for different emerging farming situations and package of practices developed to realise their production potential. Recognising that fertilizer is an important component of modern agricultural technology, the project aims at defining/delineating all aspects of its use, including choice of materials, maximising its efficiency and exploring all possibilities of economising in its use through recycling of agricultural wastes or employment of microbial aids. It provides facilities for testing of new varieties at their pre release stage and evolving solutions to technological problems emerging from time to time.

Sri. G. K. Balachandran Nair, Associate Professor continued to be in charge of the unit.

The experiments type N-1 and N-2 were tried both in Kharif and Rabi and D-1 and E during summer seasons of 1985-'86.

Research

No. of Research Projects as on 31-3-'85 is four.

Ongoing projects:

- 1 Studies on rationalisation of inputs in crop production under irrigated condition.
- 2 Testing of rock phosphate in acid soils in rice based crop sequences.
- 3 Fertiliser requirement of legumes (Black gram) in dry lands.
- 4 Fertiliser requirements of oil seeds (Sesamum) under dry land conditions.

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 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 for the high ranges and the problem areas (such as the coastal saline tracts, Onattukara sandy soils and the problem soils of Kuttanad) for which a separate NARP sub project has been sanctioned. Although this project was sanctioned with effect from 1-9-1981, its actual implementation is from 8-2-1982 only. The establishment of a sub station at Kottarakkara to tackle the specific field problems of homestead farming is also envisaged.

Major objectives

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 is the major objective of this sub project.

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 of the Regional Station at Vellayani and the special station at Kottarakkara, respectively.
- ii) to supervise and co-ordinate research work at the Regional Station and the Special Station.
- iii) 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.
- iv) To adopt two or three villages so that the Scientists themselves can work with the farmers, study the constraints and find out remedial measures to overcome the constraints

- v) 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.
- vi) 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
- vii) to take part in the training of the extension personnel working in the T&V system of Agricultural Extension.

Dr. N. Mohanakumaran, Associate Director continued to be the charge of the programme.

Development during the year

The seventh Zonal Workshop of the Southern Region was held at Vellayani on the 14th and 15th February, 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.

Procurement of equipments

Two argon cylinders, two refrigerators (165 litre capacity) and one ultra centrifugal mill were purchased during the period under report.

Civil works

Remodelling work of the different laboratories progressed.

The estimates for the "development of additional garden land for experiments was pending approval. The works under "reclamation of kayal land" were tendered.

Changes in personnel by new appointments, transfer, retirement etc.

Sri. P. R. Ramasubramonian, Sri. Abdul Hameed, Dr. P. Manikantan Nair and Sri. M. K. Mammen were promoted as Professors during the period under report.

Sri. A. P. Lawrence, Administrative Officer, NARP (SR) retired from Kerala Agricultural University service on superannuation on 30-4-85 A. N. Sri. P. C. Raveendran Pillai joined the project on 16-9-85 as the Administrative Officer.

Smt. M. S. Sheela, Assistant Professor of Nematology entered on study leave for undergoing Ph. D. from 6-5-1985. The post was vacant from 7-5-1985 onwards.

Workshops conducted

The VIIth zonal workshop of the southern region was conducted at Vellayani on 14th & 15th February, 1986.

The T & V pre-co-ordination meetings and 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.

Dr. N. Mohanakumaran, Associate Director organised the VII workshop of the All India Co-ordinated Projects on coconut, arecanut, cashew & spices at Kanakakkunnu Palace from the 6th to 9th November, 1985. Scientists/Officials working in the project and in the departments of the college helped the Associate Director in the successful organisation of the workshop.

Seminars Workshops attended

The scientists under the NARP (SR) participated in the VII zonal workshop held at Vellayani on 14th & 15th February, 1986 and presented the progress reports of the projects handled by them.

Dr. N. Mohanakumaran, Associate Director attended the "Advanced workshop on monthly workshops" held at Mannuthy on 10th & 11th April 1985.

Sri Abdul Hameed, Professor of Soil Science & Agrl. Chemistry and Dr. N. Mohanakumaran, Associate Director participated in the "Workshop on system of education towards Kerala Agricultural University 2000 A. D." conducted at Vellanikkara on 28th and 29th May 1985.

Dr. N. Mohanakumaran, Associate Director and Sri R. Balakrishnan Asan Assistant Professor of Statistics attended the State Level Workshop on "Package of Practices" held at Vellanikkara on 13th and 14th June 85.

The Associate Director also attended the "Fruit Research Workshop" held between the 9th and 11th September, 1985 at Vellanikkara.

Dr. N. Mohanakumaran, Associate Director participated in the "Agricultural Seminar" organised at Sadanandapuram by the National Demonstration Scheme on 26-10-1985.

Dr. (Mrs.) P. Saraswathy, Associate Professor attended the meeting of the "Scientific consortium" of the O. R. P. on integrated control of rice pests in Kuttanad on 16-10-85.

Smt. K. K. Sulochana, Assistant Professor of Plant Pathology, attended the "National Symposium on Tuber crops" held at the CTCRI, Sreekaryam from 27th to 29th of November 1985.

Dr. N. Mohanakumaran, Associate Director attended the zonal workshop of the central region held at the Regional Agricultural Research Station, Pattambi on 22nd and 23rd January, 1986.

Dr. N. Mohanakumar, Associate Director inaugurated the Agricultural Seminar organised under the auspices of the CSRC, Karamana at Peringamala on 12-3-1986.

The Associate Director attended the farmers day organised by the Coconut Research Station, Balaramapuram on 26-3-86. Professor P. R. Ramasubramonian (Soil Science & Agrl Chemistry) led the discussions in the Seminar.

Summer institute attended

Smt. K. K. Sulochana, Assistant Professor (Plant Pathology) attended the Summer Institute on "Biological control of Plant diseases" organised by the Tamil Nadu Agricultural University, Coimbatore from 7-4-1985 to 30-4-1985.

Training attended

Sri. P. R. Ramasubramonian, Professor of Soil Science and Agricultural Chemistry and Dr. (Mrs.) P. Saraswathy, Associate Professor of Statistics underwent a training in management offered by Dr. N. S. Ramaswamy, Director, Institute of Management, Bangalore on 12th and 13th February, 1986.

Extension lectures/special lectures/endorowment lectures organised

<i>Topic</i>	<i>Lecturer</i>	<i>Date</i>	<i>Venue</i>
"Changing Scenario in Indian Agriculture"	Dr. K. G. Pillai	18-10-85	College of Agriculture, Vellayani
"Tissue culture"	Dr. (Mrs) Susan Eapen	6-1-86	"
"Aspects of management in KAU"	Prof. N. S. Ramaswamy, Management Expert	17-1-86	"
"Integrated pest management"	Dr. (Mrs.) Matteson, F. A. O. Expert	20-1-86	"
"Cropping systems Research"	Dr. V. R. Carangal, Head of Rice farming systems and Co-ordinator of Asian Rice farming systems network	25-3-86	"

Academic

Teaching: The scientists engaged classes for the different courses in P. G. and U. G. Programme offered in the College of Agriculture, Vellayani.

The senior scientists guided the P. G. students in their disciplines and served as Chairman/Member in the Advisory Committee of P. G. students.

The Staff of the NARP have also handled classes for the various short term training courses organised by the KAU at Vellayani for the T&V Agricultural Demonstrator trainees, Officers of the Department of tourism, Pre-degree students undergoing vocational training in Agriculture" etc.

Research

Number of research projects as on 31-3-1986 was 60 and 3 ICAR Adhoc schemes are also handled.

Research Highlights

An intervarietal hybridisation programme, followed by selection of elite plants and field testing resulted in the evolution of three promising cultures viz. Culture 57, Culture 47 and Culture 33. These three cultures were recommended by the Zonal Workshop for farm trial. First set of farm trials were vitiated and a second series of farm trial was conducted during the period under report at eleven locations in Neyyattinkara, Attingal, Nedumangad, Adoor, Kottarakkara and Quilon Agricultural Sub divisions

The culture AEI of bhindi maintained consistency in yield in three seasons. It registered an overall increase of 31.72% in fruit yield over the standard, Pusa Sawani.

In brinjal, the selection SM-15 gave the highest yield, followed by SM-17 and SM-18.

In an experiment on the use of organic wastes and green leaves for the control of nematodes associated with banana, a farm trial was suggested with the two effective treatments viz., Panal leaves and clerodendron leaves at a dose of 20 kg per plant for the control of nematodes associated with banana.

A trial conducted in the farmer's field indicated Carbofuran at 0.05 kg ai/ha or Phorate at 1 kg ai/ha along with need-based application of Carbaryl 0.2%, Ekalux 0.05% or Malathion 0.1% to be equally effective in controlling the major pests of bhindi and brinjal.

A survey was conducted in different parts of the State and 39 species of mushrooms were identified. Attempts to cultivate *Volvariella volvacea* on banana leaf sheath and paddy straw at a proportion of 3:1 were successful. A new strain of *Pleurotus flabellatus* was isolated from oil palm bunch waste. Trials were also carried out to standardise suitable technique for the cultivation of *Pleurotus sajoor caju* which is gaining importance as a commercial variety in many parts of India. Poly-bag method of cultivation was found to be suitable for our Station.

Studies were carried out for the improvement of bee keeping practices in homestead. As a lean season management practice, the bees were artificially fed with sugar syrup. The natural queen rearing in three selected colonies were exploited with success.

Attempts for the mass multiplication of mycorrhizal fungi from the roots of cassava varieties continued. Efforts made to observe the presence of mycorrhiza on the outer skin of the variety, Pannivella were successful.

Out of 26 rice varieties and cultures screened for tolerance/resistance to BPH, sheath blight and yield potential, low incidence was recorded in the case of Triveni, Cul-169, Jyothi and M-102. Incidence of Sheath blight was low in Karthika, Cul-1954, Jaya, Cul-1907 and IR-50. Sheath rot incidence was low in Cul-4-4, Cul-1907 and Cul-25331. The growth duration was shortest in Cul- 52-3-6 and Cul. 43-1-4 (109 days). The variety Jyothi recorded the highest grain yield (3194 kg/ha).

Nitrogen management studies in rice variety 'Lakshmi' showed that grain yield was highest at the nitrogen level of N_3 (60 kg N/ha). The same nitrogen level recorded the highest straw yield also. With regard to time of application, giving nitrogen in three splits (half basal, one fourth at tillering and one fourth at panicle initiation) has been found to give the highest grain and straw yields during both the years.

In the study on mass culture of blue green algal culture, four cultures viz. *Anabaena* sp (Vellayani), *A. oryzae* (Vellayani), *Microcystis* (Moncompu) and *A. ambigua* (Moncompu) were selected as promising.

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 varieties differed significantly in respect of stem borer incidence. The highest incidence was recorded by cul. 4-4 (20.38%) and TKM-9 (20.09%). The lowest incidence was in Triveni (5.00%), Cul. 169 (5.13%), Jyothi (5.55%) and M. 102 (5.86%). The entries showed significant differences in respect of sheath blight, sheath rot and duration. The sheath score was highest in Cul. 43-1-4 (0.800) and Cul. 26-1-1 (0.743). The low incidences was recorded by Karthika (0.121), Cul. 1954 (0.130), Jaya (0.175) and Cul. 1907 (0.179). Sheath rot incidence score was high in Cul. 23332. (2.227), M. 210 (1.983) and Cul. 25337 (1.913). Low sheath rot score was recorded in Cul. 4-4 (0.053), Cul. 1907 (0.227) and Cul. 25331 (0.310). The cultures 43-1-4 and 52-3-6 matured earliest (109 days).

For grain yield, the varieties did not show any significant difference. The highest yield was recorded by Jyothi (3194 kg/ha) followed by Cul. 1907 (3185 kg/ha). The pre-release cultures Mo 4, 126, 169 also recorded high yields. No BPH incidence was noticed.

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 (iii) working out the economics of each treatment.

It was found that single superphosphate could bring about significantly higher cowpea grain yield over the rock phosphate treatments. In a study to assess 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 superphosphate. Among the rock phosphates, Mussoorie 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 superphosphate which was helpful in increasing the yield of paddy. Economics worked out for the different treatment for cowpea plus rice crop indicated that Mussoorie phosphate was a better source of P-fertilizer than the other forms of phosphorus studied.

Phosphorus management in a rice based cropping system

The project aims at determining whether phosphorus can be avoided in anyone of the rice seasons in a rice legume/non-legume rotation and at finding out whether there is any residual effect of phosphorus in a third crop of legume/non-legume in a rice-rice-legume/non-legume rotation. The experiment proposes raising seven crops which includes two rice crops followed by a legume/non-legume during the first year and the same sequence during the second year. The seventh crop is rice raised after the second year.

The two rice crops, followed by the legume/non-legume for the first year were raised during 1984-85. The first crop was planted in June 1984. The first rice crop of the second year's rotation was planted in June, 1985 and harvested in September, 1985. The fifth crop was planted in October, 1985.

Adaptability of the rice culture 24-20 for the Southern Region

To test the adaptability of the rice culture 24-20 for the southern region, the seeds were wet sown in puddled soil in the Instructional farm wet land on 3-3-1986, and in a farmer's field in the Vellayani Kayal on 24-2-86.

Nitrogen management in rice variety "Lakshmi" (KYLM-1)

The objectives of this experiment are to find out a suitable nitrogen management schedule and time of application of fertilizers for rice variety Lakshmi and to study the economics of the new nitrogen management schedule.

The trial was first undertaken during rabi, 1983-84 and was repeated during rabi 1984-85. Data regenerated by both the experiments revealed that plant height increased with increasing nitrogen levels, the maximum being recorded at 80 kg N/ha. Grain yield was highest at the nitrogen level of N₃ (60 kg N/ha). With regard to time of application, giving nitrogen in three splits as half basal, one fourth at tillering and one fourth at panicle initiation has been found to give the highest grain and straw yields during both the years.

Chemical control of rice stem borer in endemic areas

This project was designed to find out a suitable insecticidal schedule for stemborer infestation in endemic areas.

The experiment was conducted first during the Mundakan season of 1984 at the Rice Research Station, Kayamkulam. The treatments Furadan 3 G @ 1 kg ai/ha applied 15 days after transplanting + one need based spray of Nuvacron 0.05% and Ekalux 5g @ 1 kg ai/ha + need-based spray of Lebaycid at 0.05% were found to be the most effective in controlling stemborer.

Fertilizer management for upland rice varieties grown in coconut gardens in Quilon district

The objective is to find out the suitability of high yielding rice varieties for cultivation in uplands under partial shade conditions and to develop a fertilizer schedule for rice grown under partial shade. The results of the first trial showed that higher yield was obtained in Cul. 1907 when fertilized with 20 kg N, 20 kg P₂O₅ and 20 kg K₂O along with the local practice of mixing the seed with FYM and wood ash in the ratio of 1:10.

The same experiment was repeated during rabi 1985 with the varieties Cul. 1907 and Parapulappan. However, due to absence of rains during the grain filling stage, the yield was very poor. The experiment shall be repeated during rabi, 1986.

Coconut, Arecanut & Oil palm

Control of rhinoceros beetle in homesteads

The objective is to evaluate the extent to which application of insecticides at the bottom of the manure pits will control the pest.

The experiment was laid out at three locations viz. Chirayinkil, Vellayani and Peroorkada (Kodappanakunnu) using HCH (50%) @ 0.06 kg ai/m³ and Aldrin (30 EM) @ 0.12 kg ai/m³. There was a control with no insecticides. Cowdung was heaped over the treated soil and grubs were released. Afterwards, the pits were covered with wirenets. The experimental plots were observed periodically and the mortality was recorded. The data were analysed statistically. Aldrin gave highly significant results with 99.6 to 100% control of the grubs, compared to 6.7 to 31.7% control in the HCH treatment.

Investigations on the etiology of root (wilt) 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 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 Tetra-cycline and Penicillin for assessing their effect on the disease. Preliminary experiments of PAGE (Polyacryl Amide 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 clear cut indication has been obtained so far.

Fruit crops and Floriculture

Studies on Red Banana Expt. 1. Flower initiation and fruit development studies in Red Banana

The project was formulated on the basis of the suggestions of the first Regional Workshop held on 1-3-'82. The objective of this project is to find out the actual time of flower initiation in Red Banana for developing any effective manurial schedule for this particular cultivar.

Firt suckers of Red Banana were planted on 9-2-'84 at the instructional farm, Vellayani. Starting from the fifth month after planting, four plants were uprooted at random every 15 days and dissected to locate the apical meristem. The meristems were preserved in fixative agent before taking sections using microtome. Different staining techniques were tried and a standard procedure has been developed. The stained slides were examined. The trial has been laid out again for standardising the different steps involved in microtomy, with the basic information, obtained earlier and with suckers of known age.

Studies on the control of bunchy top disease of banana with cross protection with mild strains of the virus

The objectives are to identify a mild strains of the bunchy top virus from disease affected areas for use in cross protection studies and to induce the production of mild strains of bunchy top virus by gamma irradiation.

An extensive survey was conducted for finding out the presence of mild strains of bunchy top virus on the basis of observation of disease symptoms. However, no positive result could be obtained.

Small diseased suckers irradiated with gamma rays at 1 kr, 2 kr, 3 kr, 4 kr & 5 kr for inducing mild strains of the virus, were kept under

observation. All the irradiated suckers produced severe symptoms of bunchy top disease and none showed mild symptoms. Bunchy top affected plant parts were irradiated with gamma rays at 130 kr, 170 kr, 210 kr and 250 kr after which the banana aphid, *Pentalonia nigronervosa* was allowed to acquire the virus from the irradiated material. The same vectors were transferred to healthy plants for inoculation and feeding. The plants were observed for mild symptoms. However, all plants produced severe symptoms.

In another study, viruliferous (infective) aphids were irradiated with gamma rays in groups at 90 kr, 120 kr and 150 kr and then released into healthy plants for inoculation feeding for one day. On observing the plants, it was found that all developed severe symptoms.

Thus, mild strains of the bunchy top virus could not be located in the banana growing tracts nor could they be induced artificially. Under such a circumstance, it was decided by the Annual meeting of the Pathologists of the Kerala Agricultural University held on 29th and 30th, October, 1985 to conclude the project.

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.

Multilocational trials were carried out at Maruthoor, Alathur and Kittianikkadu to fix the interval of application of insecticides by treating the plants, giving the insecticides once in two, three, four and five months. The observations on bunchy top incidence were recorded four months after planting and 10 month after planting. 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.

VEGETABLES & 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 farmer's 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.

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.

The experiment was laid out and the data on yield of vegetable pods showed that sel. 7 and sel. 16 were on par with regard to the length of pod. Sel. 7 had the maximum pod length and was significantly superior to the other varieties in length.

Based on yield and yield attributes, 13 selected from the 20 entries were put under a replicated trial during summer 1985-86.

Genetic improvement of vegetable crops cultivated in the southern districts of Kerala

The project envisages varietal improvement of popular vegetables such as bhindi, brinjal, chillies and cucurbits, so that their yield potential, adaptability and tolerance to pests and diseases are enhanced.

Bhindi: The yield data relating to the trials conducted during three seasons showed that the selection AE-1 maintained consistently higher yield. The selection has been recommended for farm trial by the VII Zonal Workshop.

Bittergourd:- Germplasm of nine accessions were maintained.

Brinjal:- Germplasm of 22 accessions were maintained.

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.

An experiment to evaluate the performance and adaptability of watermelon was carried out during the period under report. Eight varieties (CI-36, Arka Manik, Edakkad local, Sugar Baby, Thaliparamba Pilicode local, Kanjhangad local and Ashaiyamato) were evaluated.

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 followed by H 4021 and Nadinjal chuvala.

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 khaif.

The experiment was laid out during Kharif 1985. Data on yield of tubers showed that the variety Chedi Vella gave the highest yield and was on par with Muttavella.

Fertilizer management of minor tuber crops under coconut based cropping system

The experiment aims at determining suitable varieties of tuber crops for growing in coconut gardens, fixing suitable fertilizer dose, studying the incidence of pest and diseases of minor tuber crops raised in shade conditions and working out the economics of production of minor tuber crops in coconut gardens. The trial involves twelve treatments.

The first experiment was planted in August, 1984 at the Coconut Research Station, Balaramapuram. Fertilizers were applied as per treatments and regular biometric observations taken and plant and soil samples collected for chemical analysis. This experiment was harvested in January, 1985. The second experiment was planted in 1985 at the College of Agriculture, Vellayani. This, in addition to the above mentioned objectives, involves treatments for analysing the performance of the different tuber crop varieties under varying shade intensities. Harvest commenced during the period under report.

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. The trial involves seven treatments. This was first conducted during 1983-84 at two locations viz., Neyyattinkara and Karunagappally and the results have been reported earlier. The experiment is being repeated at Parippally where the planting was done in May, 1985. The intercrops have been harvested. The population of the intercrops was low as the heavy showers at seedling stage caused damage. The main crop was still in the field.

Nutritional requirement of cassava (Adaptive trial)

The trial aims at determining the optimum dose of N&K for the variety M₄ under different agro-climatic conditions and at finding out the best time of split application for the variety, under three soil types (sandy, laterite and red). The experiment was first undertaken at three different locations during 1983-84. However, these did not yield satisfactory results and hence, they were repeated during rabi, 1985-86 at two locations, Kalliyoor and Kazhakkootam, representing laterite and sandy soil types, respectively. The experiment could not be undertaken in a red soil type.

Standardisation of technique for growing vegetables in pots

The objectives are to make recommendations on the size of pots needed for growing vegetables make recommendations on the potting mixture to be filled in the pots, to workout the fertilizer requirements as well as the number and time of application of for vegetables grown in pots.

The first set of experiments were conducted during June-September, 1984 and repeated during 1985, following the same technical programme, chilli was replaced by tomato in this trial.

The result showed that the height of brinjal plants was not significant in different levels of NPK. With regard to the number of fruits, F_1 (NPK-1.12, 1.12, 1.12 gm/plant) gave maximum number of fruits with an average of 13.56 fruits. The weight of fruit was not significant.

The height of tomato plants was not significant. With regard to the number of fruits F_2 gave maximum number (27.56 fruits/plant).

Production potential of cassava in coconut gardens

The objectives were to evaluate the production potential of cassava intercropped in coconut gardens at different levels of fertilizer application and at different plant densities as well as to assess the influence of certain growth regulators on tuberization, yield and quality of cassava intercropped in coconut gardens.

The first experiment planted in July, 1983 was harvested in April 84. A second experiment was planted during June-1984 and harvested in May 1985. The data pertaining to the two were subjected to statistical analysis.

PULSES AND OILSEEDS

Adaptive trial in dry land agriculture with (a) cowpea varieties and (b) blackgram varieties (c) adaptive trial

The object of this trial is to identify cowpea and blackgram varieties suitable to the southern region.

The trial with cowpea was conducted during rabi, 1982-83 at two locations with four cowpea varieties viz., V-59, V240, V26 and a local variety known as 'Arippayar'. The highest yield was given by the variety V59 at both the locations.

The trial with blackgram varieties was undertaken at two locations viz. Andoorkonam and Karyavatom (Trivandrum district), during summer 1985, with the varieties Co3, T91, KM-1, TMV-1 and a local. The sowing was done in February, 1985 and harvesting April, 1985. The variety Co-3 showed late maturity and the yield was low; but the vegetative growth was profuse. Harvest of Co-3 was done eighteen days after the harvest of the other varieties.

The yield at Karyavatom was very low owing to severe moisture stress during the crop growth period. There was no irrigation source nearby from which water could be diverted. However, at both the locations, the variety, TVM-1 gave the highest yield and Co3, the lowest.

The experiment is being repeated with the same blackgram varieties at four locations.

*Identification of suitable varieties of companion crops for tapioca
(Experiment with cowpea)*

The project envisages identification of cowpea varieties to suit the inter space of tapioca during the early growth phase of the latter.

The varieties used 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. The VII Zonal Workshop held at the college of Agriculture Vallayani on 14-2-86 and 15-2-86 approved the conduct of eight such trials with V-26 as companion crop of tapioca in Trivandrum district.

Varietal evaluation for groundnut under partially shaded conditions in coconut plantations

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.

The highest dry pod yield was recorded by TG-3 (1000kg/ha), followed by CGC-8 (922 kg/ha). The haulm yield was highest in BPG-512 (8333 kg/ha), followed by CGC-8. (7778 kg/ha).

Evaluation of the yield potential and adaptability of cowpea and blackgram 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 district of Kerala.

COWPEA

The variety Kazhakoottam-1 gave the highest yield (624 kg/ha), followed by C-152 (530 kg/ha) and BLR-379 (466 kg/ha.)

BLACKGRAM

The variety PDU-3 gave the highest yield (505 kg/ha) followed by KB 51 (451 kg/ha) and UH 28 (286 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.

Data on the grain yield showed that the variety LBG-20 gave the highest yield, followed by Adhoor-Konam 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 1985, two experiments were conducted. The data collected from the first experiment showed significant differences in respect of grain yield and haulm yield. The variety C-152 was significantly superior to all the other varieties in respect of grain and haulm yield (404 kg/ha grain and 6733 kg/ha haulms)

A second CYT was conducted including promising varieties received from AICRP. The varieties differed significantly in respect of grain and haulm yield. The variety V-118 (167 kg/ha) was significantly superior to all the other varieties in respect of grain yield. The variety V-105 was significantly superior to all the other varieties, except C-152. The variety V-118 was the earliest in maturity (67 days). The yield was low because of the absence of rainfall during early vegetative and flowering period and due to the untimely rains at the time of pod setting and pod maturity period.

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 inter crop in coconut plantations.

The experiment was laid out during kharif 1985 under partially shaded conditions in coconut plantations. Four cuttings were taken. Observations were recorded on grass yield the important yield attributes. The variety FR-600 gave the highest yield, followed by hamil and FR 559

FARM ECONOMICS, EXTENSION AND STATISTICS

Extent of adoption and constraints in the adoption of improved agricultural technologies

The objectives are (1) to study the extent of adoption of improved agricultural practices as recommended in the package of practice at the micro level with particular reference to the major crops grown in the area, (2) to identify the important constraints in the adoption and transfer of recommended technology and (3) to suggest ways and means to overcome these constraints.

The data collection was done with the help of a schedule during 1984 and 1985 in Trivandrum district by personal interview. The important crops selected for the study were paddy, coconut, tapioca, banana and pepper. The analysis of the data has been completed.

Utilisation pattern of farm information sources by the homestead farmers of NARP

The object of the project is to study the utilisation pattern of farm information source 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 commenced 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 farms and the net income of the farmers, especially the marginal and small farmers in the region.

A common proforma for all the NARP regions of Kerala and the *Modus operandi* of the survey were finalised after discussions among the Agricultural Scientists/Statisticians of the Kerala Agricultural University.

A pilot survey was conducted during March '83 among 20 homestead farmers (upto 1 acre) covering different localities in the region for pre-testing the questionnaire prepared for collection of the data for the basic survey and the questionnaire was revised accordingly.

The farming situations in NARP (SR) were identified as

1. Suburban (wet land & dry land)
2. Coastal (wet land & dry land)
3. Backwater
4. Midland (wet land & dry land) and
5. Mid upland (wet land, garden lands & dry lands)

While collecting the data for computing the cost of production of different crops, only the major crops (rice, coconut, tapioca, banana & pepper) were considered. The homestead was taken as a separate unit taking into consideration all the crops grown in the homestead.

The data collection was completed during the period.

Front line demonstration with gingelly variety, Thilothama during third crop season in paddy fields

The demonstration was conducted in thirty five plots each of size 10 cents, in the villages of Muttacaud and Kalliyoor. The plots were laid

out and the seeds sown during the second half of January, 1985. The farmers of the plots were given inputs at the rates detailed below:

Thilothama seed	—	200 g.	Urea	—	2.6 kg.
Super phosphate	—	3.3 kg.	MOP	—	2.0 kg.

A one-day seminar was conducted in both the villages and training was given to the farmers on gingelly cultivation. The farmers involved in the demonstration have now acquired interest in sesamum cultivation in the summer rice fallows.

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 rain fall in the southern districts of Kerala.

During the period under report, data on daily rainfall relating to the southern districts of Kerala (one rainguage station from each of the districts—Trivandrum, Quilon, Kottayam, Alleppey and Pathanamthitta) were collected. Tabulation and analysis of the data (already collected) commenced during October, 1985.

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 the R.A.R.S, Pilicode.

Among these 348 palms, 216 were subjected to a fertilizer treatment for four years from 1972 to 1975, with three levels each of N, P and K and two levels of Magnesium.

The remaining 132 palms received a uniform treatment (0.50 N, 0.32 P₂O₅, and 1.20 K₂O) during the above period. Since the effect of the fertilizer treatment manifests on coconut yield 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 post experimental period. This reduction in biennial bearing tendency may be attributed to 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 the 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.

A survey conducted during the period March-December, 1985 yielded 210 samples collected from the panchayats of Kalliyoor, Thiruvallam, Ulloor, Chettivilakam, Kazhakootam, Kadakkavoor, Pangode, Parassala, Aryancode, Madavoor, Vilappil and Kattakkada. The principal species collected from the garden land was identified as *Lampito mauritii*.

Chemical control of major pests of pulses in rice fallows

The project aims at evolving a pest control recommendation for pulses in rice fallows. The field experiments were conducted at the College of Agriculture and in a farmer's field during 1983-84, the results of which were not satisfactory.

The experiment was repeated during 1984-85 at Vellayani and in a farmer's field at Vandannoor. The results indicated that the application of Carbofuran (0.5 kg ai/ha) or Phorate (1 kg ai/ha) at seedling give protection to cowpea plants against stem fly and leaf miner attack. The application of Carbofuran at 0.5 kg ai/ha or phorate 1 kg ai/ha at seeding, spraying Phosphamidon on 0.03% or Quinalphos 0.03% on the 15th day after sowing controlled aphids for three months. Application of Phosphamidon 0.03% + Urea 2.5% was very effective in controlling the pod borers.

At Vellayani, the maximum yield was obtained from plots treated with Phorate 1 kg ai/ha. at seeding and one weed based spray of Quinalphos 0.03% six weeks after sowing.

Economics of the different treatments in pest control was worked out. At Vandannoor, the treatments Phorate 1 kg ai/ha at seeding + one need-based spray of Phosphamidon (0.03%) gave the highest additional income of Rs. 1598.82/ha. This was followed by the treatment with Phorate and and Quinalphos which fetched a return of Rs. 1345.88/ha.

*Studies on the Population build up of nematodes (*Meloidogyne incognita*, *Radopholus similis* and *Helicotylenchus* sp.) in homestead gardens of Trivandrum District*

The object 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, eight with laterite soil, seven with red soil and four with sandy soil. 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*, *Criconemoids* and *Hoplotylenchus* were present. The predominant genus found in the samples was *Tylenchorhynchus* sp.

Crop-loss estimation and economic threshold levels of root-knot nematode infesting vegetables.

The objective of the project is to study the extent of crop loss due to the root-knot nematode at various population levels and the economic injury level of the nematodes at various stages of the crop.

As the population of nematode increase in soil the yield is seen reduced in all the three crops. This reduction was highest in T₁ (Ten fold increase over field population). This reduction was 57.52% in bhindi, 62.83% in brinjal and 20.3% in bittergourd.

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 & 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.

Survey and control of pollu beetle of pepper

The object is to assess the extent of damage and reduction in yield caused by pollu beetle. The efficacy of insecticides in controlling the loss is also to be worked out.

The survey on the pest incidence carried out in six panchayats of Ranni (Pathanamthitta) in July 1985 indicated at percentage of spike damage to 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.

*Bionomics 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 coroid bug. The biology of the insect in guava was studied in detail. Life cycle was completed within 35 to 40 days. Eggmass of the pest was also observed in mango. The stage susceptibility studies in coconut indicated that nut 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, bi-monthly and tri-monthly intervals avoiding the periods of heavy rain.

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 the period under report, waiting periods were fixed for the following insecticides in bhindi and bittergourd.

In bhindi, the waiting period fixed for monocrotophos was seven days for unwashed sample and six days for washed sample. For Dimethoate it was three 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.

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 difference 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.

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 in 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 were artificially fed with sugar syrup. The natural green 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 is to be assessed.

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.

The field experiments were laid out, one using green leaves and another using organic wastes. The green leaves tried were those of Eupatorium, Clerodendron, Panal and Glyricidia. The leaves were applied at the rate of 5 kg at planting and 5 kg two months after planting. The organic wastes tried were sawdust, coir dust, paddy husk, and cashew shell powder. These were applied @ 2 kg/plant before planting. The variety used for the trial was Palayankodan.

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 four months interval. From the nematode lesion index and the grades of the bunches, it was observed that the plants supplied with 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 statistically significant difference.

Mass culture technique for the production of blue green algal cultures

Development of suitable technique for the mass production of Blue green Algae is aimed.

The *in vitro* nitrogen fixing capacity of eight cultures of Blue Green Algae was estimated in Fogg's medium, at a pH of 7.5. The extent of nitrogen fixed under *in vitro* condition ranged from 0.9 to 12.7 mg/g fresh weight. Based on the results obtained, the following culture—*Anabaena* sp (Vellayani), *Anabaena oryzae* (Vellayani) and *Micrychate* sp. (Moncompu) and *Anabaena* sp have been selected for mass production trial.

Studies on rhizobia—Isolation efficient strains of rhizobium

A preliminary field trial for screening the efficiency of *Rhizobium* cultures for blackgram was conducted at the Rice Research Station, Kayamkulam. This shall be repeated once again for confirming the results.

The 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 (30 kg and K_2O 10kg/ha), respectively) were uniformly applied. The results showed that a culture of *Rhizobium* originally isolated from *Mimosa pudica* was capable of nodulating subabul.

*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 an effective dosage of the insecticide for drenching.

The experiment was laid out in a farmer field at Kuzhoor (in rice fallow). Fenitrothion 0.05% and 0.1% was drenched on 70th, 80th, 90th and 100 days after planting. Observations on infestation of tubers were recorded at harvest. The infestation by sweet potato weevil was least (2.47%) in plant drenched with Fenitrothion 0.1% on the 80th day after planting, among the single drenching treatments. Among the treatments wherein Fenitrothion was drenched twice, infestation was least (2.4%) in the treatment given on 70 and 80 days. The treatment given on 100 DAP was on par with the control. Vines drenched with Fenitrothion on 90 DAP at both the doses tried were found significantly inferior to those of the treatment given on 70th & 80th day after planting.

Studies on mushroom flora of Kerala

The project aims at collection, identification and cataloguing of the mushrooms flora of the state. Promising local varieties of mushrooms will be studied in detail. The techniques for large scale cultivation of the selected mushrooms will be standardised.

Collections were made during South-West, North-East monsoon periods from selected localities in Trivandrum, Quilon and Alleppey districts. Out of forty species of mushrooms collected, five species viz. *Agaricus codolenis*, *Pleurotus opuntiae*, *Hygropus marzerols*, *Clitopilus orcellus* and *Stropharia coronilla* were found to be the first records for the country.

The cultures of paddy straw mushroom and oyster mushrooms were maintained spawn preparation of these two species was also done.

An experiment was laid out to find out the efficiency of sporophase formation in different species of *Pleurotus*.

Investigation 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.

A survey was conducted in Trivandrum & Quilon districts for the collection of root samples of different cassava varieties. The specimens were then stained and examined for the presence of mycorrhiza. Root samples of eight varieties were thus examined, all of which showed the presence of mycorrhiza.

Three species of *Glomus* viz. *G. mossae*, *G. etunicatum* and *G. fasciculatus* were transferred to sudan grass and Dinanath grass for mass multiplication. After getting established in these, the mycorrhizae were transferred to cassava plants. This process is being continued.

Survey conducted during 1985 in the same districts as before, resulted in the collection of root samples of nine local varieties which were stained with Trypan blue by the standard method and examined for mycorrhizal presence. The results obtained were compared with the occurrence of VAM in M_4 , a variety which is popular in both the districts.

The maximum index of VAM was observed in M_4 with an index of 3.8 and 3.5, respectively for Trivandrum and Quilon districts. Two of the locally cultivated varieties from Trivandrum district (Noorumuttan and Adukkumuttan) had an identical index of 3.8. The incidence of VAM was higher in varieties like Mankozhunthan and Kariyilapothian. Varieties such as Anakomban and Rubbervella had a comparatively low incidence of VAM. The two local cultivars from Quilon (Block kattan and Kalikalan) had an infection index of 2.8 and 2.9, respectively.

Mass multiplication of the mycorrhizal fungi is being continued. Attempt to observe the presence of mycorrhiza on the outer skin of the variety Pannivella were successful.

Screening of cowpea varieties for resistance against collar rot and wet blight disease of cowpea

The object 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 the 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 isolate of *R. solani* did not infect any of the cowpea varieties tested.

ICAR ad hoc scheme on Cyst nematode, Heterodera oryzaicola infesting starting rice in Kerala.

The project started functioning on 25-5-85. A survey of the rice soils in Trivandrum district was counted. The results showed that cyst nematode is present in twenty three different locations of Trivandrum district with a range of 0 to 63 nematodes per 100 ml of soil. Cyst nematodes were extracted from eight root samples with a range of 0 to 107 nematodes per 5 g of root. The other parasitic nematodes present were *Hirschmaniella oryzae*, *Helicotylenchus* sp., *Tylenchorhynchus* sp., *Cyiconemoides* sp., and *Caloosia* sp.

Science & technology scheme on mycorrhizal association and forest ecosystems of Kerala

The project aims to study the eco-mycorrhizae of different forest trees of Kerala.

Preliminary survey of ecomycorrhizae was done in the forest regions of Palode and Konni. The samples are being examined for any ecomycorrhizal association. Following fungi such as *Boletus* and *Geastrum* were found associated with certain trees.

Science & technology scheme on mushroom flora of Kerala

The objectives are to study the natural mushroom flora of the State, to identify the edible species of mushrooms naturally occurring in the State, to understand the periodicity of the occurrence of the edible mushrooms and also to study their ecology.

During the year under report, sixty different collections were made. Out of this, forty two were identified properly and recorded. Majority of the species collected are known to be edible ones. Species of *Termitomyces* recorded in the present study occur abundantly in the forest soil and in the plain of the state during the post-monsoon periods. Among the different species of *pleurotus* collected, a few appears to be very promising ones suitable for cultivation.

New area acquired

Action progressed for the acquisition of 10.19 ha of land at Sadanandapuram near Kottarakkara for establishing the special station, sanctioned under NARP (SR).

Information Centre

An 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.

Visits of Dignitaries/Scientists/Officials/Experts

Dr. Gopal Swarup, Professor of Nematology, IARI, New Delhi visited the campus on 2nd May 1985.

Dr. I. C. Mahapatra, Chairman of the KAU Commission held discussions with the Dean, Director CETS, Associate Director and Head of the Departments on 24-8-85.

Dr. N. S. Randhawa, Director General, ICAR visited the CSRC Karamana on 8-9-85.

Dr. U. C. Upadhaya and Dr. Sankarlal, Assistant Directors General, ICAR visited the region on the 7th and 8th September, 1985.

Dr. K. G. Pillai, Project Co-ordinator AICARP, Bangalore visited the station on 18-10-85.

Dr. Pillai, addressed the Scientists and students on "changing scenario in Indian Agriculture".

Dr. G. Rangaswamy, Hon. Member of the KAU Commission visited the CRS, Balaramapuram and the C. S. R. C. Karamana on 1-11-85. He visited the campus on 2-11-85 and inspected the Central Instrument Laboratory.

Smt. Susan Eapen visited the campus on 6-1-1986 and delivered a guest lecture on "Tissue culture".

Prof. N. S. Ramaswamy, Management Expert visited the College of 17th January 1986.

Dr. (Mrs.) Mattesen, F. A. O. Expert visited the campus on 20-1-86 and delivered a guest lecture on "Integrated pest management".

On 7-2-86, Dr. Aravindan, A. D. G., ICAR visited the campus and the project.

Sri. A. Balasubramonian, Senior Scientist (NARP), ICAR visited the project on 13-2-1986.

Dr. J. S. Gill, Co-ordinator, All India Co-ordinated Project on Nematode Pests visited the Nematology laboratory and the experimental plots on 18-2-86.

1.25 COCONUT RESEARCH STATION, BALARAMAPURAM

The Station was established in the year 1963 located at Kattachalkuzhi, 4 km. south of Balaramapuram—on the Balaramapuram—Vizhinjam route.

The area of the farm is 14.13 ha, with an elevation of 90 m above MSL. The soil type is deep red loam, with a pH of 5.3. Average rainfall of the station is 1500 mm/year. 89 rainy days were obtained during the year. The average maximum and minimum temperature of the farm is 30.7° and 23.4° C.

The major objective of the station is to conduct research in coconut in typical red loam soil (Vellayani series) of South Kerala with peculiar emphasis on agronomic aspects and plant protections.

Sri. K. Sivasankara Pillai, Professor, continued to be in charge of the Station during the year.

Research

The total number of research projects as on 31-3-86 is five.

Ongoing projects

NPK Fertilizer trial starting from young seedlings

Object is to study the response of palms from seedling stage to application of NPK at different levels.

On analysis of the yield data the effect of N, K and NK interaction were found to be significant.

The number of nuts per palm was found to increase with an increase in the applied nitrogen. When N was applied at 340 gm per palm per year the yield was 1.1 times of that obtained from palms receiving no nitrogen and 1.4 times with an application of 680 nitrogen per palm per year.

The yield differences were not significant at the three levels of applied P.

Effect of potash on the yield of coconut was significant.

The NK interaction was significant. In the absence of K the yield differences were not significantly different at the three levels of applied N. The maximum number of nuts was recorded at the highest combination of N & K (N_3K_3). The yield differences were on par with N_0K_3 and N_1K_3 but significantly higher at N_2K_3 .

Spacing-cum-manurial experiment on coconut starting from seedling stage

Object is to study the effect of different levels of spacing and fertilizer on the growth and productivity of coconuts.

Yield has increased with an increase in fertilizer. Though the yield has significantly increased with spacing of 7.5 x 7.5 m and 10 x 10 m the rate of increase at 10 x 10 m was not significantly superior to that with 7.5 x 7.5 m spacing. 7.5 x 7.5 m was found to be the optimum spacing.

The yield was about 5.8 times with application of lower level of fertilizers and 6.9 times with an application of higher level of fertilizers as compared to that obtained from control palms. When M_1 and M_3 were compared the yield increase for M_2 was 1.2 times.

Effect of spacing x manuring interaction

There was significant interaction between spacing and manuring. Maximum yield was obtained with 10 x 10 m² with lower level of fertilizers which was on par 7.5 x 7.5 m² with highest level of fertilizers.

Progeny row trial with T x D and T x GB seedling

Objective is to make comparison in performance and yield between progenies of T x D and T x GB.

Maximum yield is obtained in T x D series with 172.8 nuts/tree where as in T x GB it is 119.8 Nuts/trees/year.

Maximum yield is obtained in T x D series with 172.8 nuts tree where as in T x GB it is 119.8 Nuts/tree/year.

Varietal-cum-fertilizer studies on pepper grown as an intercrop in coconut garden using coconut palm as standard

Object is to screen out the most suitable variety for intercropping in coconut garden and to workout the suitable fertilizer schedule for pepper grown as intercrop in coconut garden.

The yield was not set in uniformly. So the data was not analysed. The experiment is commenced only in 1980.

Screening of high yielding coconut varieties against pest and diseases

Object is to screen out high yielding varieties of coconuts which are tolerant or resistant to different pests and disease.

No incidence of pest and disease was noticed during the year.

Lab-to-Land programme

Phase III was implemented in this station.

2. FACULTY OF VETERINARY AND ANIMAL SCIENCES

2.1. COLLEGE OF VETERINARY AND ANIMAL SCIENCES

The College was established in 1955 at Mannuthy about 6 KM from Trichur on NH 47 towards Palghat. The College became a constituent unit of the Kerala Agricultural University in February, 1972. The College and the residential campus cover an area of 195 hectares.

Departments

Dr. M. Krishnan Nair continued as the Dean of the Faculty of Veterinary and Animal Sciences upto 30-9-85 the date on which he took charge as the Director, Veterinary Research and Education. Dr. K. Radhakrishnan, Professor, (Research Co-ordination) held the additional charge of the post of the Dean. 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 and Biochemistry, (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 Kokkalai, Trichur, along with the Livestock farm, Poultry farm, Pig breeding farm and A. I. Centre served as institutional units of the College. The details of the staff are furnished in the Appendix.

Changes in personnel

Dr. M. Krishnan Nair, Dean, College of Veterinary and Animal Sciences, relinquished charges as Dean and assumed charge as Director, Veterinary Education and Research. Dr. K. Radhakrishnan, Professor, (Research Co-ordination) functioned as the Dean in charge with effect from 1-10-85. Dr. K. Madhavan Pillai, Dr. U. T. Francis, Dr. K. T. Punnoose and Dr. K. P. Sadanandan were promoted as Professors in the Departments of Parasitology, Dairy Science, Microbiology and Physiology respectively. Dr. Santha E. George, Dr. George Mathan, Sri. Ismail and Sri. M. Nandakumar were promoted as Associate Professors in the Departments of Pharmacology, Nutrition, Physiology and Nutrition respectively. Dr. C. M. Aravindakashan, Dr. M. R. Subhadra, Dr. Stephen Mathew, Dr. Jose John Chungath, Dr. Kuttinarayanan were promoted as Assistant Professors in the Departments of Pharmacology, Extension, Genetics and Breeding, Anatomy and Veterinary Public Health respectively.

Faculty Improvement Programme

The following members of the staff were on deputation or on leave for higher studies

1. Dr. K. R. Harshan, Department of Anatomy.
2. Dr. K.V. Raghunandanan, Department of Animal Breeding & Genetics.
3. Dr. B. Nandakumar, Department of Animal Breeding and Genetics.
4. Dr. Jose John Chungath, Department of Anatomy.
5. Dr. K. Venugopal, Department of Preventive Medicine.
6. Dr. E. Nanu, Department of Veterinary Public Health.
7. Dr. P. Kuttynarayanan, Department of Veterinary Public Health.
8. Dr. J. A. Abraham, Department of Veterinary Public Health.
9. Dr. Sisillamma George, Department of Physiology & Biochemistry.
10. Dr. P. C. James, Department of Microbiology.
11. Dr. P. Madhusoodhanan Pillai, Department of Microbiology.
12. Dr. G. Krishnan Nair, Department of Microbiology.
13. Dr. Leo Joseph, Department of Poultry Science.
14. Dr. Manomohan, Department of Pathology.
15. Dr. K. Narayanankutty, Department of Poultry Science.

Dr. K. C. Raghavan was deputed to undergo a post doctoral training in Germany. Dr. Sosamma Iype underwent a short term training in Karyotyping at the University of Gulph (Canada); Dr. K. T. Punnoose has deputed to attend a short term training course on *E. coli* infection in pigs at the University of Gulph (Canada); Dr. George T Oommen, attended a short term course in assessment of microbial quality of feed at the CFTRI, Mysore from 23-9-85 to 4-10-1985; Dr. T. Sreekumaran attended a short term training programme in tissue culture at IVRI, Bangalore from 17-6-85 to 25-6-85; Dr. C. A. Rajagopala Raja was deputed for a training in blood groups at the National Dairy Research Institute, Karnal; Dr. P. I. Geevargheese underwent a training programme in cheese making at NDRI, Karnal from 9-7-85 to 23-7-85 and another training programme at CFTRI Mysore from 4-6-85 to 7-6-85.

Seminars, symposia, workshops attended by scientists:

Dr. M. Krishnan Nair attended the National Pathology Seminar at Bombay from 5th to 7th March, 1985. He also attended the symposium on Herpes infection at the Haryana Agricultural University, Hissar. Dr. S. Sulochana, Dr. K. T. Punnoose, Dr. P. C. James, Dr. D. Sudharma, Dr. M. V. Sukumaran, Dr. A. Rajan, Dr. K. I. Mariyamma, Dr. K. V. Valsala and Dr. T. Sreekumar, attended the National Symposium on Cancer immunology at Amala Cancer Research Institute, Trichur from 14-12-1985 to 16-12-1985. Dr. R. Padmanabha Iyer attended the national symposium at CFTRI Mysore on 17th and 18th January, 1986 on production and processing of meat and poultry products.

Dr. E. Sivaraman attended the National Seminar on "Use of radiation and radioisotope in Agriculture and Animal Science" at Srinagar from 22-25th May 1985 and he also attended the National Seminar on Use of Nuclear Techniques in Animal Health and Production at Izatnagar on 4th April, 1985.

Dr. P. Ramachandran attended the 13th All India workshop of AICRP on Agricultural by-products scheme held at Rajendranagar, Hyderabad from 21st to 23rd January, 1986.

Dr. M. S. Nair attended a farmer's seminar at Marangoly on 18-6-85, and a district level seminar in connection with Silver Jubilee celebration of Co-operative Society at Nilambur on 12-5-85. He attended a seminar conducted under the auspices of milk co-operative societies and departments of Animal Husbandry, Dairy Development and Milk Marketing Federation on 5-5-85.

Dr. P. C. Alex attended summer Institute on newer trends in Veterinary gastroenterology and hepatology at Madras Veterinary College from 3-6-85 to 22-6-85.

Dr. K. M. Alikutty attended the National Symposium on 'Recent advances in the control of disease of Dairy Animal' at Agricultural University, Ranchi from 7-10-85 and 9-10-85.

Dr. N. M. Aleyas attended the Animal husbandry Mela at Palayamparambu on 7-12-1985.

Dr. A. Rajan attended three district level animal disease committee meeting held at Quilon, Cannanore and Palode.

Dr. A. Rajan attended the State level animal disease committee meeting at Trichur on 19-4-1985. He also attended the National Seminar on pigs from 21st to 23rd May, 1985; also attended the seminar organised by the Animal husbandry department and Indian Medicinal Association at Manjeri on 23-2-1986.

Dr. E. P. Paily attended the state level disease committee meeting and Disease Committee meetings in different districts of Kerala State. Dr. M. A. Azeez attended the seminar on National symposium on 'Recent Advances on the control and prevention of diseases of Dairy animals'. He also attended symposium on care and management of Elephants at the Veterinary College, Mannuthy.

Dr. Jacob V. Cheeran attended the workshop on wild life health for Zoo Veterinarians at Dehradun, and the Asian Elephant specialist group meeting at Bandipur, Karnataka from 5-11-85 to 9-11-85. He also attended seminar on Elephant Management and Elephant control at Veterinary College, Mannuthy on 14-11-85 and conducted immobilisation training programme at Mysore from 9-2-86 to 15-2-86.

The Nilgiri Biosphere Research Programme and Scientific meeting at Bangalore on 7-3-86 and 8-3-86 was attended by him.

Dr. N. Gopakumar and V. R. Raghunandan attended the seminar on environmental pollution at Cochin on 27-10-85 and 28-10-85.

Dr. C. M. Aravindakshan attended the workshop on systems of Education in Kerala Agricultural University at Vellanikkara on 28-5-85 and 29-5-85.

Dr. P. O. George, Dr. K. N. M. Nair, Dr. A. M. Jalaluddin and Dr. C. Abraham Varkey attended the 9th Annual symposium and seminar organised by V. S. V. S. at College of Veterinary Sciences, Anand, from 10-1-86 to 12-1-86.

Dr. A. Rajan, Dr. T. Sreekumaran and Dr. N. Divakaran Nair attended the national pathology seminar from 5th to 7th March, 1986 at Bombay. Dr. A. Rajan attended the symposium on Herpes infections at the Haryana Agricultural University, Hissar.

Dr. A. Ramakrishnan attended the seminar organised by the Indian Veterinary Association (Kerala branch) at Kottayam on 26-6-85. He also attended the National Seminar on Avian diseases held at Madras from 22-24 January, 1985, the seminar on meat and poultry technology at CFTRI Mysore and the annual workshop on Poultry Breeding at Madras from 24th to 26th January, 1986.

Dr. D. Sudharma participated in a workshop on Biosafety systems in laboratories at IVRI Hebbal, Bangalore. Dr. V. Jayaprakasan participated in the summer institute on 'Isolation and Identification of mycoplasma from Animals, plants and human' held at U. P. from 27-10-85 to 10-11-85. In addition to these the faculty members have attended various seminars, mela, camps etc. organised by the Animal Husbandry Department and other bodies.

Seminars, workshops, training and exhibition conducted

A state level workshop on package of practices was conducted in December, 1985. A seminar on Elephant management and control was held at the Veterinary College, Mannuthy. A training programme was started in the Veterinary College for the Livestock Inspectors of the Animal Husbandry Department and University. A short term training in mastitis diagnosis was organised for field veterinarians from 5-7-85 to 10-7-85. A training programme to CPCRI scientist in chick embryo inoculation for mycoplasma cultivation was also organised. A seminar in connection with the centenary celebrations of the Trichur zoo was held. Another seminar was organised at Vilvattom in connection with village adoption programme. An Animal Husbandry Exhibition at Kanimangalam in connection with DRDA Kissan mela was held. Another exhibition was arranged at Kottayam on 25th and 26th June, 1985. A total of 17 films shows were conducted.

NSS Activities

The Volunteers participated in various leaders training camp, National Integration camp and non formal education training. Animal health camps at Mullakkara Harijan Colony, Velangannoor and Chirakkakode, beautification of NH 47, campus cleaning, Tekkinkad cleaning programme, prophylactic vaccination camp at Kalady, Marakkal and Velanganoor, Cattle shows at Payyalam Malaya colony, Blood group test camp at Veterinary College, painting and drawing competition for students of Trichur College, were some of the NSS activities done during the year.

Extra-curricular activities

The activities of the students union 1985-86 of the College of Veterinary and Animal Sciences was inaugurated by Sri. M. P. Gangadharan, the Minister for irrigation, Kerala on 20-7-1985. The Arts Club of the students union was inaugurated by Sri. Kalpetta Balakrishnan.

Rev. Bishop Poulouse Mar Poulouse and Dr. C. D. Joseph gave a guest lecture on two days on Liberation Theology and Radiotherapy respectively. The arts club conducted the inter class arts competition on 22-24 September, 1985. It also arranged various programmes for the College day, union inauguration, campus night and also participated in the Kerala Agricultural University Youth Festival. Dr. T. R. Bharathan Memorial All Kerala Intercollegiate drama competition was conducted on 15th and 16th February, 1986.

The planning forum conducted interclass quiz competition and 8th Dr. P. J. Philip memorial inter collegiate quiz competition on 10-2-1986. A painting exhibition on 14th February, 1986 and a photographic exhibition in January, 1986 were also organised.

Academic programme

The student strength is given below:

<i>1. U G. Course</i>	<i>Men</i>	<i>Women</i>	<i>Total</i>
I. B. V. Sc. & AH	86	29	115
II. " "	79	30	109
III. " "	44	11	55
IV. " "	51	13	64
V. " "	77	34	111
Pre professional make up	4	—	4
Total	341	117	458

No. of students from other States countries with details:

	<i>Men</i>	<i>Women</i>	<i>Total</i>
Jammu & Kashmir	8	—	8
Goa	6	2	8
Meghalaya	1	1	2
Delhi	2	1	3
Andhra Pradesh	1	—	1
Lakshadweep	15	—	15
Bhutan	4	—	4
Zimbabwe	1	—	1
Sudan	2	—	2
Malaysia	—	—	2
Uttar Pradesh	1	—	1
Arunachal Pradesh	1	—	1
Manipur	2	—	2
Total	44	5	49

No. of students obtained their degree during the year:

<i>Men</i>	<i>Women</i>	<i>Total</i>
48	12	60

2. *P. G. Courses (M. Sc. Ag. Stat/M. V. Sc /Ph. D.)*

	<i>Men</i>	<i>Women</i>	<i>Total</i>
I Year	14	5	19
II Year	3	3	6
Total	17	8	25

No. of students from outside the State with details:

	<i>Men</i>	<i>Women</i>	<i>Total</i>
Assam	2	—	2
Tripura	1	—	1
Total	3	—	3

No. of students who obtained degree:

M. V. Sc.	: 5
M. Sc. (Ag. Stat)	: 4
Ph. D. (Vety)	: 1
Total	10

Study Tour

Students of III and IV year B. V. Sc. & A. H. undertook South India and All India Study Tours respectively during the year.

Scholarships, Awards and Aids

ICAR Senior Fellowship	3
ICAR Junior Fellowship	5
KAU Senior Fellowship	—
KAU Junior Fellowship	—
ICAR Merit-cum means scholarship	13
National merit scholarship awarded through Director of Collegiate Education	14
National Foundation for Teachers Welfare Scholarship	—
Government of India National Loan Scholarship	—
Scholarships for service personnel	1
Labour Welfare Fund Board Scholarship	2
Educational Concession to SC/ST	58
Educational Concession to KPCR	84
Educational Concession to OBC	6
Commonwealth Fund by Technical Co-operation Scholarship	2
Backward class welfare Department Scholarship—Govt. of Andhra Pradesh	—
Educational Concession to students of Jammu & Kashmir	5
Loan by Jammu & Kashmir Bank	8
Educational concession to Lakshadweep students	12
Educational concession to Bhutanese students	—
Educational concession to Meghalaya students	1
Fund Board scholarship to students of Pondichery	—
Stipend to students from Goa	8

Important visitors to the College of Veterinary and Animal Sciences

- Dr. P. C. Ramakrishnan Nambiar, Director of Animal Husbandry
Dr. P. N. Bhat, Director of IVRI
Dr. V. Natarajan, Assistant Director General (Animal Health)
Dr. P. G. Nair, Joint Director, NDRI
Dr. C. R. Balakrishnan, Scientist NDRI
Dr. S. P. Arora, Professor of Eminence, NDRI, Karnal
Dr. Puthenbecker, Professor, Department of Nutrition, Bombay Veterinary College
Dr. M. L. Punj, Project Co-ordinator, Agri. By-products, Karnal
Dr. J. Asso and Dr. Luffan from the Laboratoires de petiti ruminant, France.
Dr. M. N. Menon, Member, KAU Commission.
Dr. Higlier, Cancer Research Institute, Amsterdam
Dr. Ajinkya, Professor of Eminence, Bombay Veterinary College
Mr. Peter Jackson, Member, Consultant of IUCN-Asian Elephant Specialist group.

Research Highlights

Cattle and Buffalo

In the serological survey on incidence of Brucellosis in domestic animals, 1469 serum samples and 291 milk samples were tested. Results indicated that 2.52% of the cattle in Kerala are affected with Brucellosis. Quantitative estimation of different components of milk proteins from normal as well as induced lactation was done. The total protein in induced milk was significantly higher than that of normal milk. The effective protein degradabilities of ground nut cake, gingelly cake, rubber seed cake, coconut cake, yellow maize and wheat bran at a ruminal outflow of 0.05/hr was found to be 66.7, 85.1, 68.6, 19.1, 22.8 and 77.0 percent respectively. Rumen degradability of oil cakes and their solubilities in different solvents were found to be correlated. A degradability value of 44.51 for protein in the ration of calves was found to be optimum for supporting growth in crossbred calves.

Growth studies in calves incorporating cocoa pods at 0 and 20% level in concentrate ration indicated that the experimental animals were having satisfactory growth rate, dry matter intake and feed efficiency.

In a study conducted with regard to the toxic effects of industrial effluents on animal it was noticed that the mercury and flourine content of blood and tissues of the animals from Industrial areas like Koratty and Eloor was significantly higher than in the animals from non industrial area.

Goat

The study on the bacteriological quality of goat milk revealed that from production to distribution of milk there is a very high increase in bacterial load especially in evening milk. The keeping quality of farm pooled samples was about 12 hours while that drawn aseptically was about 47 hours.

Animal diseases

- 1 Staphylococci isolated from cases of mastitis were subjected to bacteriophage typing. Most of the coagulase positive strains were lysed by group III phages. This indicated the possible role of human strains of Staphylococci in producing mastitis in cows.
- 2 Though lysostaphin sensitivity could be used as a method for differentiation of Staphylococci from Micrococci this test was not useful to differentiate between coagulase positive and negative strains of the former.
- 3 Rifampicin, Bacitracin, Neomycin, methicillin, gentamicin, cloxacillin, nitrofurantoin and chloramphenicol were found to be the drugs of choice for the treatment of mastitis caused by Staphylococci.

- 4 Transfer of drug resistance between strains of Staphylococci was established.
- 5 The mode of transfer of streptomycin resistant plasmid was established to be through conjugation.
- 6 Transfer of streptomycin resistant plasmid from coagulase negative staphylococci of animal origin to *S. aureus* (RN 450 RE) in mixed cultures was established through conjugation. This is a first report of this nature.
- 7 A new vaccine strain for New castle disease in birds was evolved from a naturally occurring mesogenic strain of the virus isolated from a mynah.
- 8 The field trial of vaccine prepared with this strain was found to give comparable immunogenicity to known vaccine strains.
- 9 There was no post vaccinal reactions and when reported in some lines of white leghorn chicken it was within the permissible level.
- 10 So far no outbreak of ND has been reported from block vaccinated with NDV-M as sometimes reported from with other vaccines.
- 11 Egg yolk has been found to be quite satisfactory in monitoring the immune status of birds in place of serum.
- 12 A safe, economical and easy method of collection (dried whole blood in filter paper strips) to evaluate the immune status of chicken to ND was detailed.
- 13 Use of filter paper strips for blood collection can be recommended to the field staff as this does not require the usual precautions while collecting, processing and despatching the serum samples by conventional method.
- 14 The above method can be used for collecting blood samples from small birds such as certain wild and pet birds also.
- 15 New castle disease virus strains isolated from outbreaks of the disease in different parts of the state did not show any antigenic variation by cross haemagglutination inhibition test, cross neutralization and cross immunization studies.
- 16 Outbreak of severe respiratory distress among ducklings below 8 weeks of age particularly during first three weeks of their life causing heavy mortality was diagnosed to be a case of influenza virus infections.
- 17 Influenza virus subtypes H9 N2 and H9 N3 were isolated from the above outbreaks.
- 18 Seroprevalence of Egg Drop Syndrome virus-76 was established in 61.9% of the duck and 4.1% of the chicken population screened.
- 19 The incubation period of *Corynebacterium pseudotuberculosis* infection in goats was established to be 4 weeks or more depending upon the route of infection.

- 20 *Corynebacterium pseudo tuberculosis* infection was found to stimulate both humoral and cellular immune responses of the host.
- 21 Humoral immune response was evidenced by increased specific antibody activity in serum, increased B-lymphocyte count in peripheral blood, follicular hypertrophy in reactive lymph nodes and increased gamma and beta globulins in the serum.
- 22 Cell mediated immune response was established by leukocyte migration inhibition test, delayed hypersensitivity reaction and marginal increase in T. lymphocytes.
- 23 Histopathological changes at the lymphoid tissues and skin sensitivity reaction sites were detailed.
- 24 Toxigenic property of *Escherichia coli* strains isolated from piglets showing diarrhoea and stunted growth was studied using ligated intestinal loop method.
- 25 The antibiogram of the above *E. coli* strains were also studied and all the isolates were found to be sensitive to Polymyxin B and nalidixic acid.
- 26 Resistance of *E. coli* strains to gentamicin and trimethoprim sulphadiazine could not be transferred to sensitive strains, suggesting that resistance to these drugs are not plasmid borne and not transmissible.
- 27 The normal microbial flora of the respiratory tract of Japanese quails were studied. The major bacterial species observed were Enterobacteria, Staphylococcus, Streptococcus, Actinobacillus, Necromonas, Pasteurella, Corynebacterium and Aeromonus.
- 28 The normal flora of the alimentary tract was as follows: *Escherichia coli*, *Shigella flexneri*, *Klebsiella ozaenae* and *Yersinia pseudotuberculosis*.
- 29 The pox virus isolated from cases of infectious otorrhoea in buffaloes was identified as buffalo pox virus by its physico chemical characteristics.
- 30 Ammonium sulphate 33% was found to be superior to sodium sulphate for separation and concentration of gamma globulins from duck whole serum.
- 31 Sepharose G 200 was quite satisfactory for the fractionation of duck gamma globulins.
- 32 Antigenic relationship could not be established between duck and chicken gamma globulin.
- 33 Duck bile revealed the presence of a globulin fraction possibly 1gA.
- 34 Parve virus infection among dogs in Kerala is established by haemagglutination and haemagglutination inhibition test with specific antisera.

- 35 Two batches of RDV-K and one batch of RDV-F from Veterinary Biological Institute, Palode were tested for potency and safety.
- 36 *Escherichia coli* serotype 061 was found to cause heavy mortality in love birds.
- 37 Mortality (1-2%) in broiler chicken was identified to be caused by *Escherichia coli* serotype 078.
- 38 *Staphylococcus aureus* was established to be one of the causative agents for early chick mortality.
- 39 Rinderpest like disease reported from different parts of Kerala were diagnosed as cases of rinderpest by counter immunoelectrophoresis.
- 40 Autovaccines prepared for wart cases in calves and dogs gave satisfactory results.
- 41 Growth of ethmoid carcinoma cells was established in homologous tumour bearing animals. Ethmoid carcinoma cells from goats were successfully cultured in culture media. By further studies it was demonstrated that cyclophosphamide was effective as a therapeutic agent in ethmoid cancer.
- 42 Dermatitis associated with hypersensitivity reactions was demonstrated to be common in cattle. It was clarified that spideral atrophy and derma collagenisation were features of bovine dermatoses.
- 43 Survey studies indicated that cases of no infectious subfertility and infertility in cattle could be due to hypothyroidism. Hypothyroidism was experimentally induced in calves and pig and it was demonstrated that it could lead to reduction in growth rate and significant pathological changes in the reproductive organs. It was concluded that this basic change would lead to subfertility and infertility.
- 44 The immunopathological response in kids affected with pneumonia was sequentially chartered within a specific time frame and it was shown that immunopathological response was playing a significant role in healing process in pneumonia.
- 45 Levamisole was clarified to have significant immuno-regulatory effect in side and it could be advantageously used in the therapy of pneumonia.
- 46 Aflatoxin was demonstrated to have immunosuppressive effect in pigs. Aflatoxin and ochratoxin were demonstrated to cause significant pathological effect in the testis of ducks and this could lead to infertility and poor hatchability of duck eggs.

Rabbit

Performance of Soviet chinchilla are found to be significantly better than Newzealand white, grey giant and non descriptive local rabbit.

Poultry

An experiment to establish the dietary requirements of calcium and phosphorus for caged layers was taken up using the strain cross chicken

IWN & IWP. The result revealed that the dietary requirement of calcium and phosphorus was 4.0% and 5.0% respectively for optimum egg production and egg quality.

Elephant and wild animals

Twenty seven rogue tusker were teathered successfully of which 16 numbers were controlled using tranquillizer darts. A combination of Fentanyl with droperidol was successfully tried for inducing tranquillization and anaesthesia in a lion tailed monkey.

INSTRUCTIONAL FARMS/HOSPITALS

2.1.1. University Livestock Farm, Mannuthy

This farm started in 1921 was transferred to the Kerala Agricultural University in 1972. The farm serves the needs of teaching, research and extension activities of the different departments of the College of Veterinary & Animal Sciences. The facilities available in the farms were utilised for imparting practical training to the students of the College as well as for the short term training programmes conducted by the departments of Animal Management, Animal Nutrition, Animal Genetics and Breeding, Animal Reproduction, Dairy Science etc.

The farm maintained a herd of cross-bred cattle of Jersey, Brown Swiss and Holstein. The total herd strength as on 31-3-1985 was 248 comprising of 98 milch cows, 111 dry cows, 62 dry and pregnant cows, 10 heifers, 18 female calves, 7 male calves and 4 bullocks. During the year 153 calves were born and 15 animals were culled. The total milk production for the year was 2,46,845.8 litre with an average of 676.29 litre per day.

2.1.2. Fodder Research and Development

The total area available for fodder production was 69 ha. A quantity of 3408.45 of fodder consisting of grass, leaves, maize and silage was produced and the value of this was estimated to be Rs. 7,81,189.50.

2.1.3. Pig Breeding Farm, Mannuthy

The Pig Breeding Farm, Mannuthy was started on 12-1-1965 with an area of 4.2 ha. The main objectives of the farm are to conduct research on various aspects of swine production, to serve as a demonstration unit for farmers interested in pig farming and to cater to the needs of students of the College of Veterinary and Animal Sciences as an instructional unit. The farm produces good quality piglets for distribution among the farmers.

A total of 592 piglets were produced and 615 distributed during the year as per the details given hereunder:

Public:60; Meat products of India: 522; and Research work: 33.

2.1.4 AICRP on Poultry for Eggs

All India Co-ordinated Research project on Poultry for eggs at Mannuthy Centre was sanctioned by the ICAR in November 1976 with the following objectives:

To evaluate germplasm of white Leghorn chicken allotted to the Centre for their productive performance.

To improve their genetic potential by adopting advanced breeding techniques, and

To study the feasibility of developing a commercial layer chick either by pure line selection or by strain crossing.

The centre started working with three strains of White Leghorn, namely IWN, IWP and IWO. The F strain of White Leghorn which was maintained in the University poultry farm was also added to the programme. However, subsequently due to the poor performance of IWO and for want of sufficient testing facilities work on IWO F strains was dropped. Thus currently the centre is working with IWN and IWP strains. These strains had undergone five generations of testing and selection. Strain crosses of IWN, IWP & F were also produced for assessing the strain cross performance.

During 1985-86, S6 generations of both IWN and IWP strains were raised and tested for their production performance. Reciprocal crosses making use of the two strains corresponding to S6 generation were also raised. IWN x IWP cross was exposed to testing at Anand testing centre of AICRP (poultry). The strain has exhibited excellent performance.

The preliminary scanning of the data indicate that S6 generation of IWN has improved its productivity of egg over S5 generation—there has been an overall improvement in most of the traits in S6 generation as a consequence of selection.

2.1.5 AICRP on Goats

The All India Co-ordinated Research Project on Goats for milk production was commissioned in the University in 1972 with an objective of evolving a milch breed of goat suitable for agro-climatic conditions of Kerala. It was envisaged to evolve such a breed by cross-breeding local Malabari breed with exotic breeds, Saanen and Alpina. A target of milk production is fixed as 200 kg in 120 days.

Dr. B. R. Krishnan Nair continued as Geneticist till 21-3-1986, when he expired. As an interim measure, Dr. G. Mukundan, the Head of Department of Genetics assumed charge of the office and continued till the end of the year.

The Geneticist attended the IXth Workshop of AICRP on Goats at Avikanagar, Rajasthan from 30th January to 1st February, 1986.

There were 18 Malabari and 127 Crossbred males in the farm as on 31-3-86 and correspondingly there were 45 Malabari and 425 crossbred females. During the year a total of 114 male and 155 female kids were born. The number of bucks distributed for breeding purpose was 91. The centre conducted a total of 1326 artificial inseminations during the year.

Two research projects viz. (1) Preliminary studies on feeding of Subabul (*Lucaena leucocephala*) on growing kids and *ad libitum* (2) Comparative evaluation of *ad libitum* green grass versus standard farm ration for maintenance of adult goats were in operation.

2.1.6 AICRP on Utilization of Agricultural by-products and Industrial Waste

The All India Co-ordinated Research Project for Investigation on Agricultural By-products and Industrial waste materials for evolving economic ration for livestock was started in 1967. The major objectives of this project are to identify new resources of livestock feed, enrichment of the existing feed resources by physical, chemical and biological means and to carry out trials on the palatability of by-products through feeding trials, digestibility studies and metabolism trials.

1. Tapioca leaf meal can replace part of oil cake in a concentrate ration for cattle and can be added upto 30% level.
2. Tapioca starch waste can be included in cattle ration at 25% level as an energy source.
3. Rubber seed cake can be used as a protein source at 20% level in cattle feed.
4. Coffee husk and Tea waste can be incorporated at 20 and 25% level respectively to reduce feed cost.
5. Frog meal, fish silage and prawn waste can be included in poultry ration.

The following projects were going on :

1. Growth studies in crossbred calves incorporating cocoa pods upto 20% in concentrate ration.
2. Urea treatment of coconut pith.
3. Nylon bag digestibility studies on agro industrial by-products.

2.1.7 Veterinary Hospital, Trichur

The Veterinary Hospital, Trichur, established about 60 years ago was taken to the College of Veterinary & Animal Sciences for giving periodical training to the students.

The hospital was providing all kinds of Veterinary aid to the animals in and around Trichur town. Protective vaccinations against infectious diseases were also given to the livestock and poultry. The most modern trends in the fields of diagnosis and treatment were practiced. Specialists from different clinical/paraclinical departments of the

College of Veterinary & Animal Sciences. Mannuthy were attending the hospital to impart practical training to the undergraduate and post-graduate students. A clinical laboratory and an artificial insemination unit were also functioning in the premises of the hospital.

A total of 21,240 out-patients were treated and the average daily attendance was 57. A total of 590 operations and 42 castrations were performed. The number of primitive vaccinations against rabies was 80 and 8667 birds were also vaccinated/treated.

2.2 LIVESTOCK RESEARCH STATION, THIRUVAZHAMKUNNU

The farm was established in 1949 by the Govt. of Madras. This was transferred to the Kerala Agricultural University in 1972. This was converted to Livestock Research Station with effect from 14-8-1978.

The farm is located in the Mannarghat Taluk of Palghat District, 17 km 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 major objective of this station is to conduct research work on scientific breeding of livestock and its management and fodder production.

During the year under report 4 ha. of land formerly under annual crops were brought under hybrid napier and another 4 ha. under Congo-signal grass.

1577 tons of green fodder, 470 tons of silage and 107 tons of hay were produced. In the dairy section 117.7 tons of milk was produced.

A Kisan Mela was conducted on 31-12-85.

2.3 CATTLE BREEDING FARM, THUMBURMUZHI

Cattle Breeding Farm, Thumburmuzhi which is only a calf-rearing station at present, is situated at about 15 km away from Chalakudy of Trichur district in the Sholayar route. The farm was started during 1-10-1957 by the Animal Husbandry Department of Kerala State. The area of the farm is 25.2 ha. out of which 18 ha. are under fodder cultivation. Guinea grass, Improved guinea, Napier grass, Hybrid napier, para grass etc. are being grown. Side by side coconut cultivation was also started and at present there are 460 fruit bearing trees and 152 trees are in various stages of growth.

The main objectives of the farm are:

1. Rearing weaned calves to stages of seven/eight months of pregnancy and subsequently distributing the pregnant heifers to the University Livestock Farm, Mannuthy.

2. Conducting basic and applied research on cross bred calves which are being the most important dairy animals of Kerala State.

This farm served as a unit to supply pregnant heifers to other farms under Kerala Agricultural University. Young female calves are brought from other farms and they are reared under the farm conditions. At maturity they are bred by artificial insemination and retained till the late pregnancy stage and then transferred to the different farms of the Kerala Agricultural University.

3. To extend the facilities of the veterinary aid, artificial insemination supply of improved variety of fodder slips etc. for the benefit of the animals and birds belonging to the farmers of the surrounding area of the farm.

The total No. of animals at the close of the year was 182; the farm supplied 7 animals to Livestock farm, Mannuthy and for the College. During the year 3,618,500 kg. milk was produced in the farm; the average milk per day was 9,914 kg. A total of 8.4 M. ton farm yard manure was produced and 1623 M. ton fodder grass also was produced. The value comes to Rs. 4,05,750 at the rate of Rs. 0.25/kg. of grass. 144 artificial inseminations, 4 castrations (Bull calves) 61 pregnancy cases and 98 general cases were attended to by the staff.

The Head of the Station was Dr. M. Mukundan, Assistant Professor.

2.4 CENTRE FOR ADVANCED STUDIES IN POULTRY SCIENCE

The Centre of Advanced studies in Poultry Science came into being on November 1985 with the major objective of co-ordinating the research and extension activities relating to the discipline of poultry. The ICAR adhoc research scheme entitled "Efficiency of white Pekin ducks, desi ducks and their crosses for meat production", was taken up for implementation under the centre. During period under report work was initiated to compile a bibliography on ducks.

2.5. CENTRE FOR ADVANCED STUDIES IN ANIMAL GENETICS AND BREEDING

The Centre for Advanced Studies in Animal Genetics was started on 31-10-1985. The centre was established with a view to intensify research in various branches of Animal Genetics and Breeding such as Immunogenetics, Cytogenetics, Population genetics, germplasm conservation and Environmental mutagenesis.

Dr. G. Mukundan assumed charge of the Director of the Centre on 31-10-1985 and continued in the post till the end of the year.

3. FACULTY OF FISHERIES

3.1. COLLEGE OF FISHERIES, PANANGAD

The College of Fisheries was started during the academic year 1979-80 at Mannuthy. On 25-5-81 it was shifted to Panagad. The College offers a four year degree programme leading to the degree of Bachelor of Fishery Science (B. F. Sc.), following the trimester system of teaching. The intake capacity is 30 students per year, of which 9 seats are reserved for the children of fishermen. The intake capacity has now been reduced to 20 per year. During the year 1984-85 post graduate course (M. F. Sc) was sanctioned under the faculty in the disciplines of Aquaculture and Fishery Biology, with a total intake capacity of 8 per year.

Departments:

Dr. M.J. Sebastian continued as the Dean (Fisheries). There were 7 departments viz., Department of Aquaculture, Fishery Biology, Fishery Hydrography, Fishing Technology, Fishery Engineering, Fish Processing Technology and Management Studies under the Faculty. The College has its instructional Farms at Panangad and Puduveypu.

The scientific staff consisted of the Dean, 4 Professors, 9 Associate Professors, 20 Assistant Professors and 14 Junior Assistant Professors. In addition 2 Research Fellows worked under the various research schemes.

Changes in personnel

Dr. Susaela Jose, Associate Professor joined the College on 1-4-85. Dr. K. Jayashree Vadhyar, Associate Professor joined the College on 16-4-85. Dr. S. Ritakumary, Assistant Professor (Ichthyology) resigned the post on 19-11-85. Mr. I. S. Bright Singh joined as Junior Assistant Professor (Microbiology) on 1-4-85.

Faculty Improvement programme

Kum. Elizabeth Joseph, Junior Asst. Professor (Genetics) returned from study leave on 12-4-85 on completion of her Ph. D. programme in Mariculture under centre for Advanced studies in Mariculture under centre for Advanced studies in Mariculture, CMFRI, Cochin.

Academic programmes

UG Course	Strength of students		
	Men	women	Total
	14	5	19
1985 batch	22	9	31
1984 batch	19	7	26
1983 batch	21	4	25
II year 1982 batch	17	9	26
III year 1981 batch	13	2	15
IV year 1980 batch	6	—	6
1979 batch			
Total	112	36	148

1	2	3	4
Students from outside the State Sri Lanka	1	—	1
No. of students who obtained their degrees during the year	10	—	10
PG course Admitted	2	3	5

Details of Seminars/Symposia/training programmes etc. conducted/participated.

An inservice Training Programme in paddy-cum fish culture for the personnel of the Department of Fisheries, Kerala was conducted at the College during the period 7th to 11th October 1985. Nine officers of the Department of Fisheries underwent the training.

A training cum demonstration on hygienic handling of shrimps in peeling sheds was conducted in collaboration with MPEDA, Cochin. About 85 participants representing various peeling sheds in Kerala's coastal villages attended the course which was completed in six weeks.

Seminars attended:

Dr. D.M Thampy, Professor of Aquaculture attended the seminar on Inland Fisheries Development organised by the 'MATSYAFED' on 18-5-85 and presented a paper on "The prospects of development of mixed farming of crop-livestock and fish in Kerala".

Dr. M.V. Mohan, Junior Asst. Professor (Aqua) was deputed for attending the training programme in hatchery production of oyster larvae, held at the Regional Station of Central Marine Fisheries Research institute Tuticorin from 17-2-86 to 28-2-86.

Dr. T.V. Anna Mercy, Junior Asst. Professor (Aqua) was deputed for a training in prawn hatchery operation at the Narakkal Laboratory of the Central Marine Fisheries Research Institute from 17-2-86 to 28-2-86.

Dr. B. Madhusoodhana Kurup, Jr. Asst. Professor attended the international saminar on training and education for Marine fisheries Management and Development at CIFNET, Cochin between January 28 and 30 Ith 1986.

Sri P Radhakrishnan Nair, Associate Professor, Fishing Technology attended the above seminar.

Study tour

The final year B. F. Sc. students were taken onboard the fishing vessels of CIFT during July-September, 1985 for onboard fishing experience under guidance of Mr V. C. George Scientist S3 of the CIFT.

Extra curricular activities

Activities of the students' union 1984-85 of the Fisheries College was formerly inaugurated by Dr P.S.B.R. James, Director, Central Marine Fisheries Research Institute on 19-12-85 in a function held in the College which was presided over by Sri S. Satheesh, Union President. The Arts Club and Planning Forum were inaugurated by Padmasree Kalamandalam Krishnan Nair, Veteran Kathakali Artist and Sri C. Ramakrishnan, Joint Director, Marine Products Export Development Authority respectively.

Seventy five students from the College of Fisheries participated in the 8th KAU Youth Festival held at the University Main Campus, Vellanikkara during the period 24th to 26th June, 1985. Participants from the College secured maximum points in the various dance items and the College Union received the Nandini Nandakumar rolling trophy. The Fisheries College Union stood third in the overall score position.

Under the auspices of the students' Union, an Arts Festival was conducted during the period 19-21 December, 1985 in which the 1984 batch bagged the maximum points.

The interclass athletic competition was held at Maharajas College Stadium on 4-5-1985. Seventy athletes participated in the meet. The College cricket team participated in the KAU Inter Collegiate hockey tournaments conducted at the College of Agriculture, Vellayani on 18th and 19th May, 1985 and entered the final by defeating the College of Agriculture team.

The College ball badminton (men and women) basket ball (men) and volley ball (men & women) teams participated in the KAU inter-collegiate tournaments held at Vellanikkara and Mannuthy during 11-13th October, 1985. The college women ball badminton team won the championship for the year 1985, while the volley ball (women) team was the runners up.

Thirty eight students from the College participated in the KAU athletics and other intercollegiate tournaments in football, shuttle badminton, table tennis and hockey held at Mannuthy during 11-14 December, 1985. The hockey (men) and shuttle (women) teams of the College were the runners up of the University for the year 1985. Mr Roy Mathew of the 1984 batch won the individual athletic championship. The College secured the second position in athletics among the constituent colleges.

Hostel

There were 96 men and 30 lady students residing the hostels as on 31-12-86. The lady students were accommodated in the YWCA Kedavanthara (20 nos) and the Athurashramam working Women's Hostel, Vyttila (10). Mr. Syed Ismail Koya, Assistant Professor continued as the Assistant Warden during the period.

3.2 FISHERIES STATION, PUDUVEYPU

The Fisheries Station started functioning on 16-7-1979. An area of 101 ha of land in survey No. 1761/1,2 of Puduveyppu village got transferred to Kerala Agricultural University from the Revenue Department of Kerala free of cost towards this purpose. There are at present 320 numbers of yielding coconut trees plus 155 coconut seedlings. Sri K. S. Purushan, Associate Professor was the head of the station during the period.

Practical training classes in brackishwater fish farming have been imparted to BFSc and MFSc students of the College of Fisheries as well as to the officer trainees who visited the station frequently under the auspices of MPEDA and Department of State fisheries.

Research

There were ten research projects approved by the Kerala Agri. University to be carried out from this station.

Research highlights

Some research projects concerned with brackishwater fish culture are being implemented from this station. Though none of these are concluded till date, some general observations could be drawn pertaining to fisheries research in this area.

1. The excessive turbidity of the water and the slurry mud prevailing in the bottom of fish culture ponds do not favour the growth of brackish water fishes.
2. The general trend of upwelling of slurry mud characteristic of this area creates problems of fish pond management.
3. The efforts of testation enabled to locate quality fish seed concentration centres during season.
4. The occurrence of seeds of *M. cephalus* and *Chanos chanos* though is purely seasonal by nature, their availability is getting dwindled year after year in this area for unknown factors. Nevertheless, the more obvious reason seems to be the degrading environmental conditions such as excessively high turbid and silt laden water prevailing in the medium throughout the year.
5. The availability of seeds of predatory culturable species of fish such as *L. calcarifer* and *Eleutheronema tetradactylum* remains unpredictable year by year.
6. In the controlled systems the growth of *M. cephalus* and *Chanos chanos* could be invigourated by use of required type of supplemental feeds.
7. Organic manuring with cowdung could promote growth of penaid prawn in this area.
8. The appreciable fish growth being a synergistic effect of water quality, plankton and benthos is yet to make a technical perfection suitable to this area through further experimentation.

In addition to meeting the internal requirement, station distributed during season the seeds of *Penaeus indicus* (20,000 Nos.), *Chanos* (21,000 Nos.) and mullets (30,000 Nos) to different institutions and individuals for fish culture purposes.

Other matters

Facilities for advanced research could be somewhat improved by procuring required items such as fish culture tanks, aerators, diesel engines sharp pump with accessories, microscopes, electric oven, electric balance, other electrical equipments and glasswares.

During the period under report, construction works of a type V quarters and 2 type I quarters were completed. Piling stage for a type IV quarters was also over during the period.

The farmers were appraised of the scientific technologies in agricultural practices, animal husbandry methods, fish culture, fish processing and curing. By giving a series of trainings they were also made aware of the importance of afforestation. With the co-operation of Social Forestry Department, Ernakulam, 86,995 Nos. of planting items could be distributed. From the station side 4.29 kg of vegetable seeds, 2.304 tonnes of fertilizers, 8 goats, 15,000 Nos. of prawn seeds, 14 smokeless choolas, 9 wooden farmers having 5 m² area each, farm implements such as manvetties and pickaxes and such other items could be distributed to the farmers. Inauguration of nutrition garden at Narakkal Govt. High School under the auspices of this station was accomplished by Sarvodayan Kurien and the news item was published in 'Mathrubhumi' daily dated 16-9-85.

4. KELAPPAJI COLLEGE OF AGRICULTURAL ENGINEERING AND TECHNOLOGY, TAVANUR

The College Campus is located in Tavanur Village on the southern bank of the Bharathapuzha in Malappuram district. It is situated 7 k. m. from Kuttippuram railway station and 12 k. m. from Ponnani. The Campus is the seat of former Rural institute at Tavanur. The Rural Institute was established in July, 1963 under a Government of India scheme, as a registered society under the Travancore-Cochin Literary and Charitable Act XXI of 1955. The Institute was taken over by Kerala Agricultural University on 12th December, 1975 under Section 59 of the KAU Act of 1971. The Institute was renamed as Institute of Agricultural Technology and it had been functioning as one of the campuses of the University since then. The University formally opened the Faculty of Agri. Engineering & Technology on 2nd October, 1985 and the Institute got upgraded and renamed as Kelappaji College of Agricultural Engineering & Technology as a constituent College of the new Faculty named after the famous Gandhian, Social

Worker and Sarvodaya leader (who initiated and established the Rural Institute) through a formal inauguration by the Chief Minister of Kerala State. The total area of the campus is about 40 hectares.

Sri. C. P. Muhamed, Professor (AE) was holding the charge of the post of Director till 2nd November, 1985, when Dr. P. Basak, BCE., M. Tech., Ph. D., F. I. E., formerly Head, Ground Water Division, C. W. R. D. M., Calicut and Honorary Visiting Professor and Consultant, KAU, took charge on 2nd November, 1985 as Adviser & Dean i/c. of the new Faculty.

A liaison office for the Faculty has been established at Mannuthy for better co-ordination of work with the headquarters.

Formation of different Departments:

Five following departments have been formed under the new Faculty:

- i) Department of Land & Water Resources Engineering.
- ii) Irrigation & Drainage Engineering.
- iii) Farm power, Machinery & Energy.
- iv) Agricultural Processing & Structures.
- v) Supportive and Allied Courses of Study.

Heads of Departments

Prof. C. P. Muhammed and Prof. K. John Thomas have respectively been appointed as Head, Department of farm power, Machinery & Energy and Department of Irrigation & Drainage Engineering (IRD) respectively. Professor C. P. Muhammed has also been appointed as Chairman, non-graduate Diploma Programme in the Faculty. The following working arrangements were also made until regular heads of departments are appointed:

Prof. John Thomas, Head, Department of Irrigation and Drainage Engineering is looking after the duties of Head, Department of Land and Water Resources.

Sri. Jobi. V. Paul, Assistant Professor is in charge of the Department of Agricultural Processing and Structures (APS)

Dr. P. C. Antony, Associate Professor is in charge of the Department of Supportive & Allied Courses of study.

Highlights for the projects in the Farm Power, Machinery and Energy Departments

1) Adhoc scheme on "Wind energy utilisation":

The project is fully financed by ICAR and is envisaged to study the feasibility of wind energy utilisation in Kerala after comparing the performance of various types and suitably modifying the best suited.

The work is in progress; the wind data are being collected and models are under fabrication.

2) "Design and fabrication of an improved manpowered pump".

A bicycle operated diaphragm pump has been designed and fabricated. On testing this give encouraging results, however, effort is now put to modify the design to increase out put and suction depth.

3) "Design and Development of an experimental solar engine".

The first prototype of this engine is being fabricated. The work is in progress.

4) "Design and development of an Improved Oven for rural and urban use".

With a view to increase the efficiency of domestic cooking work has been initiated incorporating various methods to conserve heat. A model was made and observational trial was done.

Action is being taken to procure instruments to evaluate the performance. The work is in progress.

Highlights for the projects in the Departments of Supportive & Allied Courses of Study

1) Demonstration trials to show the increased efficiency of urea mixing with soil

Urea mixing with soil can increase the efficiency of the fertilizer and decrease the losses from the soil.

2) Survey, collection and maintenance of germplasm of betelvine

A germplasm of different varieties of betelvine is being collected and maintained in the farm. About 7 types are so far collected and raised in the Instructional Farm, Tavanur.

3) Basic trial on the Manurial requirement of Betelvine

The experiment is in progress. The nutrients are supplied at 15 equal splits per annum. The harvesting of the crop is taken at monthly intervals. The experiment is to be continued for 2 years to draw any conclusion.

4) Evaluating promising hybrids and cultivars of coconut for planting in the alluvial soils of Malappuram district

The experiment has been laid out in 1983 in which 9 types of cultivars/hybrids with a population of 6 plants/plot, have been planted and treatments replicated thrice in R. B. D. Scientific management is given to the crop and growth characters are being evaluated.

5) Use of Mussorie Phosphate as a source of phosphorus to transplanted rice

The study started in February, 1986. The project envisages the possibility of utilising low cost rock phosphate as a source of phosphorus for rice; if applied to the proceeding crop of pulse and on to the rice crop itself at varying levels.

6) Design and development of economic and durable propping method for banana (Nendran)

The study with different types of propping methods is in progress.

7) Multilocational trial with Culture-1727

On statistical analysis of the yield and yield parameters it was found that the test variety Culture-1727 is the significantly lowest yielder with an yield of 1783 kg/ha. Highest yielders were Bharathy and Jaya with an yield of 3970 kg/ha, and 3689 kg/ha, respectively followed by Pavizham (3442 kg/ha).

8) Multilocational trial in Amaranthus

Out of the varieties tried for the multilocational trial Kannara local is found to be best. This selection (Kannara local) variety has got good yield and wide adaptability.

Details of seminars/symposia/extension lectures/training programmes/correspondence course etc., conducted by the institute:

An agricultural seminar for the benefit of the adopted farmers under Lab to Land Programme was conducted on 3-9-1985. It was conducted under the guidance of Dr. M. J. Thomas, Professor, Communication Centre, Mannuthy and seventy farmers around the Institute attended the seminar.

Two one-day training programmes were also conducted for the adopted families on 3rd September 1985 and on the 11th of February, 1986. The subjects of training included:

- i) Pulse crop in rice fallows.
- ii) Poultry keeping with special reference to broiler rearing. Seventy four farmers attended the training classes.

An inservice training of six months duration for the benefit of the Agricultural Demonstrators of the Department of Agriculture was conducted at the College from 16.9.1985 to 15.3.1986. They were imparted four months' theoretical and practical training at this campus and were later on sent to four research stations for field training. All the sixty eight trainees who have completed the course have come out successfully. A Trainees' Day was also organised on 14-3-1986.

Dr. P. Basak, Dean, KCAET, Tavanur inaugurated the first Faculty Seminar series on 12th March, 1986. The first topic entitled "effective presentation of a technical matter before an audience" was presented by Sri .P. Ahamed, Assistant Professor (Extn.).

An Agricultural Engineering Exhibition was organised as part of the inaugural function of the Faculty of Agrl. Engineering and Technology Tavanur on 2-10-1985. Sri. C. Haridas, M. P., opened the exhibition stall where a variety of improved agricultural implements and machineries were exhibited and a large number of people visited the stall.

Academic Programmes

Strength of students under each course:

(i) (a) U. G. Course	Men	Women	Total
I Year	18	16	34
II Year	—	—	—
III Year	—	—	—
IV Year	—	—	—

No. of outside students with details of state/country/programme etc.	Men	Women	Total
	3	—	3

Three Assam government nominees have joined for B. Tech.

(b) Diploma Courses:

(1) Diploma in Agrl. Sciences (DASc.,)

	Men	Women	Total
I Year	57	—	57
II Year	17	—	17

No. of outside students with details of State/country, programme etc. 2 men students from Union Territory of Lakshadweep.

(2) Diploma in Agrl. and Rural Engineering. (DARE)

	Men	Women	Total
I Year	12	—	12
II Year	14	—	14

No. of outside students with details of state/country/programme etc. 4 students (men) from Union Territory of Lakshadweep left the course during the period.

iv) Study tours: Details:

Sl. No.	Course/ Diploma	Duration	No. of Students	Place
1.	DARE	14.5.86 to 17.5.86	17	TNAU, Coimbatore, & Soil conservation Institute, Ooty.
2.	DARE	3.3.86 to 7.3.86	17	South Kerala
3.	DASc.,	May 1985	57	North Kerala
4.	DASc.,	18-12-85 to 23.12.85	57	CPCRI, Kasaragode, Pepper Res. Station, Panniyur, Coconut Res. Station, Pilicode & Spices Res. Station, Calicut.
5.	DASc.	18.10.85 to 19.10.85	57	Malampuzha, Nelliampathy & Parambikulam

Scholarships, awards and aids to students:

<i>Name of Scholarship/award/aid</i>	<i>No. of recipient</i>
(a) Total educational concessions to SC students	: 8
OBC students	: 3
ST students	: 3
(b) Total educational concessions under KPCR schemes	: 14
(c) Educational concessions to Lakshadweep students (from the Union Territories) (4 students discontinued in the middle of the course)	10
(d) KAU Merit scholarships (students were given the Merit scholarships for the academic year (1984-85))	11

(vi) Extra-curricular/curricular activities

The students' Union was inaugurated on 23rd October 1985 by Sri. Antony Cheriyan, Director, Cardamom Board. Arts Club was inaugurated by Sri. Nilambur Balan, Cine Artist at the same function. Felicitation given by Sri. Kunhandi, Cine Artist.

Tournaments

College team participated in the inter collegiate tournaments in cricket, football, volley ball, basket ball, table tennis, shuttle badminton and ball badminton in the KAU inter collegiate athletic meet. Mr. Tony M. Peter, Mr. K. M. Vijayan and Mr. Sureshkumar, T. S. won prizes in the athletic meet.

Hostel

Hostels are provided for B. Tech. Boys and girls and Diploma students. A total of 135 students are accommodated in the Hostels.

College/Institute Library

544 New Books were purchased and added to the library making the total as 15,309 at the end of the year. Subscription to eleven more journals are made and 57 journals are being subscribed.

Instructional farm/Livestock farm/Fish farm/Veterinary hospital etc

Total area of the farm is 29.65 hectares.

10.8 ha were cultivated with rice during first crop and second crop seasons and 0.6 ha was cultivated with vegetables during summer. In the garden lands 16.87 ha are under perennial crops. 0.20 ha was cultivated with Banana and 1.04 ha. was put under vegetables during first and second crop seasons.

50.013 tons of paddy was produced from bulk cultivation. 40.25 kg. cowpea seeds, 6.790 kg. of other vegetable seeds were also produced. 5.5 tons of green vegetables were produced during the year

3.712 tons of banana was produced and distributed. Average nut production from 1200 coconuts is 63 nuts/palm. Arecanuts were sold fetching Rs. 2002/-from the farm. Other farm produces were auctioned for Rs. 6177.

Altogether there are 52 animals of which 15 were milch animals. There were 12 pregnant animals. The average milk production is 75 litres/day. 427.5 kg. meat was sold during the year.

A total of 2,134 animals were treated in the Veterinary Hospital located in the College Campus. 39,458 eggs were produced from the poultry unit of the veterinary wing.

Visitors to the Institution

Sri. K. Karunakaran, Hon'ble Chief Minister of Kerala, Sri. M. P. Gangadharan, Minister for Irrigation, Kerala, Sri. C. Haridas, Ex. M. P. and the Executive Committee members of the University visited the College during the year.

CHAPTER III

Extension Education

All extension education programmes of the Kerala Agricultural University are planned, organised, conducted 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 the chairman.

Dr. A. G. G. Menon continued as the Director of Extension. Dr. G. R. Nair continued as the Associate Director of Extension.

The Directorate of Extension provides technical support to the field extension personnel of various development departments in the State, through first line extension programmes, disseminates scientific and technological information to the farmers through a variety of media and offers technical assistance to voluntary organisations and other institutions. The Directorate of Extension also designs and implements novel extension approaches for the transfer of technologies with the hope that these approaches could be intimated by the development Department on a large scale.

The Directorate of Extension has three major wings, namely Training Service Scheme, Farm Advisory Service and Communication Centre, Krishi Vigyan Kendra, National Demonstration Scheme, Tribal Area Research Centre and Scheduled Caste Area Research Centre are other transfer of technology units located outside the D. E. Campus. The Lab to Land programme and the Village Adoption Programme are implemented through various Educational Institutions/Research Stations under the University.

TRAINING PROGRAMMES

The following were the training programmes conducted in the various Research Stations and Educational Institutions under the KAU during the period under report

Sl. No	Name of Training	No. of batches	No. of persons trained	Venue	Date
1	2	3	4	5	6
1	Training in Extension Methods for JAO's of the State Department of Agriculture	2	30	Directorate of Extension, Mannuthy	
			28	College of Agriculture, Vellayani	15-7-85 to 20-7-85
2	Training in Extension Methods for Agricultural Demonstrators	1	36	Directorate of Extension	27-5-85 to 1-6-85
3	Training in pulses and oil seeds production for Agricultural Demonstrators	1	30	RARS, Pattambi	22-7-85 to 25-7-85
		2	30	RARS, Pattambi	29-7-85 to 1-8-85
4	Training in cashew apple processing for rural women and Housewives	1	45	College of Horticulture, Vellanikkara	22-4-85 to 27-4-85
5	Training programme in modern technology in agriculture for the rural development officers of the central bank of India	1	20	Directorate of Extension	19-8-85 to 24-8-85
6	Training in plant protection for Agricultural Demonstrators	1	30	College of Agriculture	15-7-85 to 20-7-85
		2	30	..	22-7-85 to 27-7-85

1	2	3
7	Six months In-service training for Agricultural Demonstrators	1
8	Training in writing information materials for subject matter specialists for Southern States	1
9	Rice production Technology for Agricultural Demonstrators (Kharif)	1 2
10	Training programme for the personnel of Dept. of Fisheries Paddy-cum-fish culture	1
11	Plant protection for JAO's of the State Depart. of Agriculture	3
12	Training in case studies for SMS of the State Department of Agriculture	1
13	Training in Poultry Management for Pre-release Defence personnel	1
14	Pre service training in T&V programme for Agricultural Demonstrators	1
15	Training in Dairying for the Pre-release Defence Personnel	1
16	Training in plant protection for Agricultural officers	1 2
17	Training in Audio-Visual methods for the trainees of the Sankshrit Vidhya Peeds, Guruvayoor	1

4	5	6
75	I.A.T. Tavanur	from 16-9-1985
25	Directorate of Extension	20-10-85 to 6-11-85
25	RARS, Pattambi	5-11-85 to 8-11-85
28	RRS, Moncompu	12-11-85 to 15-11-85
9	College of Fisheries, Panangad	7-10-85 to 11-10-85
90	College of Agriculture	28-10-85 to 2-11-85
14	Directorate of Extension	18-11-85 to 20-11-85
18	College of Vety & Animal Sciences, Mannuthy	2-12-85 to 31-12-85
68	College of Agriculture	5-8-85 to 4-2-86
15	College of Vety & Animal Sciences	1-2-86 to 28-2-86
30	College of Agriculture	17-2-86 to 22-2-86
29	..	10-3-86 to 15-3-86
1	Communication centre	3-2-86 to 3-3-86

1	2
18	Training in Agricultural subjects for supervisors of Kerala State Co-operative Agricultural Development Bank
19	Training in Agriculture and Animal Husbandry for the IRDP beneficiaries
20	Training in Agriculture for the vocation education teachers of the High Schools
21	Training in Animal Husbandry for the vocation education teachers of High Schools
22	Training in Agriculture and Allied subjects- Leadership development etc. for the tribal youth of Kerala
23	Three months pre service Training for Anganwadi workers
24	Training on hazards of food adultration for rural women
25	Training on better Infant Feeding and weaning practices
Total	

3	4	5	6
1	24	College of Agriculture	10-2-86 to 7-3-86
1	21	College of Horticulture	10-3-86 to 15-3-86
1	11	Communication centre	1-3-86 to 15-3-86
1	13	College of Veterinary & Animal Sciences	10-3-86 to 25-3-86
1	24	Communication centre	25-2-86 to 10-4-86
1	20	Dept. of Home Science, College of Agriculture, Vellayani	1-11-85 to 31-1-86
5	133	Dept. of Home Science, College of Agriculture, Vellayani	April-June-85
5	170	-do-	Aug-Sept.-85
40	1142		

COMMUNICATION CENTRE AND FARM ADVISORY SERVICE

The major objectives of the Communication Centre located at Mannuthy are 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. Feature articles, questions and answers, technical publications, radio and TV programmes, exhibitions, correspondence courses etc. constitute the information support programmes of the Centre. Collecting research results from other research stations in India and abroad and communicating to the departments concerned of the University is also one of the duties of the Communication Centre. The Communication Centre consists of the Information Unit and Exhibition and Graphic Service Unit and the Publication Unit. A review of work in the Communication Centre during 1985-86 is furnished below:

A) FARM NEWS SERVICE

a) News paper programmes

Under this programme, feature articles, tit bits, Agricultural news, question-answers and other similar news items were published in fifteen leading Malayalam and English Dailies. A total of 73 news features in Agriculture, Animal Husbandry, Fisheries etc. which were of topical interest were published during the period under report.

The list of news features

ഏലത്തൊട്ടത്തിലും വളമിടണം	എല്ലാ പത്രങ്ങളും
കാർഷിക സർവകലാശാലയിൽ നിന്ന് പുതിയ നെല്ലിനങ്ങൾ	..
Effect of a no cost technology in milking cows	The Hindu and Intensive Agriculture
വിരിപ്പു കൃഷിയിൽ ഗാളിച്ചയെ നിയന്ത്രിക്കുക	എല്ലാ പത്രങ്ങളും
നിലക്കടല കൃഷിയിലെ പ്രശ്നങ്ങൾ കൂടുതൽ നേഴ്സറിയിൽ റോഗ് നിയന്ത്രിക്കുക	..
വരമ്പുകൾക്കിടയിലെ ചെമ്മീൻകൃഷി	..
Liming for Soil Health	The Hindu
Characteristics of goat meat	..
നെല്ലിന് പോളചീയൽ ഇണികൃഷി തുടങ്ങാമായി	എല്ലാ പത്രങ്ങളും
വിരിപ്പു കൃഷി ഞാറടിയെ ശ്രദ്ധിക്കണം	..
പച്ചിലവളച്ചെടികൾ ഇപ്പോൾ വിതരണം	..
കരിമ്പിന് ചെമ്മീൻ റോഗ്	..
തെങ്ങിന് പുതിയ വളപ്രയോഗ നിർദ്ദേശം	..

വാഴക്കുമ്പുഴ പീണിയും നല്ല പച്ചക്കറികൾ കൃത്യമുള്ളകിലെ പൊള്ളുരോഗം. ഇങ്ങിനെയിനിയുടെ പരിചരണം. തെങ്ങുകൃഷി ബണ്ടുകളിലേക്കു കൂടിയാക്കാം.

മാതൃഭൂമി
എല്ലാ പത്രങ്ങൾക്കും

എണ്ണപ്പനയിൽനിന്നും കൂൺ മുണ്ടകൻ കൃഷിയിൽ കീടബാധ തടയുക കമുക" വളപ്രയോഗവും ജലസേചനവും ശാസ്ത്രീയ ചെമ്മീൻ കൃഷി എവിടെ? എങ്ങിനെ?

മാതൃഭൂമി
..
..
ദീപിക
മാതൃഭൂമി
എല്ലാ പത്രങ്ങൾക്കും

കോഴിയിറച്ചിയുടെയും മുട്ടയുടെയും പോഷകമൂല്യങ്ങൾ ആയിരംകൊച്ചി—ശ്രീധരനാഥൻ ഒരു തെങ്ങിനെ.

വിജ്ഞാന കൈരളി
..
എല്ലാ പത്രങ്ങൾക്കും

കേരളത്തിന് മോജിച്ച മാവിനങ്ങൾ ശാസ്ത്രീയമായ ചെമ്മീൻകൃഷി എങ്ങിനെ പുതിയ രീതിയിൽ തൃപ്തന മനസ്സോടെ സ്വീകരിച്ചാൽ

..
മാതൃഭൂമി
..

തെങ്ങിൽ തൊട്ടത്തിൽ ഇറപ്പും നില നിർത്താൻ

എല്ലാ പത്രങ്ങൾക്കും

തെയിലക്കൊതുക് കശുമാവിന്റെ ശത്രു മാപുക്കൾ വിനിയോഗങ്ങൾ ആനക്കാര്യം

..
..
മാതൃഭൂമി
എല്ലാ പത്രങ്ങൾക്കും

ഔഷധഗുണമുള്ള വാൽ മത്സ്യം ചേന നമ്പിച്ചു വളർത്തിയാൽ നല്ല വരുമാനം

..
Hindu, Indian Express

Honey bees increase yield തേനീച്ചയെ വളർത്തി ഏലം ഉൽപാദനം കൂട്ടാം

എല്ലാ മലയാള പത്രങ്ങൾക്കും

വിഷം കുറച്ചു വിള നേടുക വിത്തു തെങ്ങുകൾ ലക്ഷണക്കാരത തെങ്ങുകൾ

മലയാള മനോരമ
എല്ലാ മലയാള പത്രങ്ങൾക്കും

വളർത്തു മൃഗങ്ങളിലെ പൂപ്പൽ വിഷബാധ ഇങ്ങി വിളവെടുപ്പ് ഉടനെ

എല്ലാ പത്രങ്ങൾക്കും

കൈനച്ചക്ക നനച്ചാൽ വിളവ് ഇരട്ടിയാകും ചെമ്മീൻ വളർത്താൻ തെങ്ങിപ്പാട് എങ്ങിനെ ഒരുക്കണം

..
..
..

Horticultural therapy for the mentally retarded

Hindu

വാഴക്കുമ്പുഴി ഒടറപ്പിൽ മാവിൽനിന്നും മോപ്പൻ പ്രാണികളെ ഭീമാക്കാം

കേരള കർഷകൻ
എല്ലാ പത്രങ്ങൾക്കും

വേനൽക്കാലത്തെ ജലസേചനം വർഷം മുഴുവൻ ഫലം നേടുന്ന സമുച്ചിത തെങ്ങിൽ തൊപ്പിലെ ഇറപ്പ് സംരക്ഷണം വാഴക്കുമ്പുഴകളെ നശിപ്പിക്കുന്ന ആന്തക" നോസ് രോഗം

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..

വേനൽക്കാല പച്ചക്കറികളുടെ കീടങ്ങൾ

അടുക്കള മുറത്തെ കോഴി വളർത്തൽ	എല്ലാ പത്രങ്ങൾക്കും
നെല്ലിന്റെ പോളിമറാഗം. നിയന്ത്രിക്കുക	..
മൂത്ത, പുഞ്ചപ്പാടങ്ങളിലെ പ്രധാന കീടം	കേരള മുന്ദണം, വിക്ട്റിയം,
വർദ്ധനവയെ വെട്ടിച്ചുട്ടിയിൽ	എല്ലാ പത്രങ്ങൾക്കും
നന്ന ഇഞ്ചിക്കുപ്പി	..
നെല്ലിന്റെ കൃലവാട്ടം	..
ആയിരം കറച്ചിത്തക്കുറിച്ച്	മാതൃഭൂമി
മാതൃപു. വികസന സഹായത്തുള്ള കൃഷി	എല്ലാ പത്രങ്ങൾക്കും
അയിരുകൊത്തുക	കേരള കരമുടി
പൊട്ടൻ നെത്രവാഴക്ക് ചീമ്പണി	മാതൃഭൂമി
സിതാരം, ഷെട്ടിയും, ജപ്പാൻ കൃഷി തീതിയും	..
തിലപ്പിയം—കരിമിനിക്കനാശനീയൻ	എല്ലാ പത്രങ്ങൾക്കും
പുഞ്ചനെല്ലിന്റെ കീടങ്ങളും	മലയാള മനോരമ
നിയന്ത്രണവും	..
അടുക്കള മുറത്തെ പടവലം	..
വരളൻപുളി നട്ടുവളർത്തുക	എല്ലാ പത്രങ്ങൾക്കും
കുരുമുളകിന്റെ ദ്രുതവാട്ടം	..
ഹരിജനങ്ങൾക്കൊരു കാർഷിക പദ്ധതി	മാതൃഭൂമി
മുറത്തെത്താരു വേപ്പ്	എല്ലാ പത്രങ്ങൾക്കും
ഏലപ്പേൻ നിയന്ത്രിക്കുക	..
പാവൽകൃഷി ആദായകരം	..
Japanese quail can be raised	The Hindu
successfully	
കൊക്കോത്തൂടെ വിച്ചഡ്ബ്രൂം	എല്ലാ മലയാള പത്രങ്ങൾക്കും
കുരുമുളകു്—ഉൽപാദനവും വിപണനവും	..

b) Radio programmes

- i) In the Farm School on AIR programme on "Cooperation" conducted by AIR, Trichur, the University's experts participated by preparing and presenting lessons. Another Farm School on AIR programme on "Mixed Farming" was also broadcast through AIR, Calicut in collaboration with Kerala Agricultural University, Central Plantation Crops Research Institute, Coconut Board etc.

K. A. U. News

- ii) Under this programme, salient activities and latest developments in Kerala Agricultural University are broadcast on every friday from 6.45—6.50 A. M. This programme is covered in the broadcast through AIR at all stations at Trivandrum, Trichur, Calicut simultaneously. The scientists of the University were also reading the KAU News items at the AIR, Trichur at a specified time regularly which is continued.
- iii) Agricultural Quiz—Three Agricultural Quiz programmes were broadcast through AIR, Trichur during the period.

c) Television programmes

During the period under report five Television features were prepared and were telecast in collaboration with Doordarshan Kendra, Trivandrum.

d) Correspondence Courses

Two correspondence courses were undertaken during the period. The first one on "Flower Gardening" with 530 registered participants was completed during the period. The second one on "Infant Feeding Practices" with 500 participants is in progress. As a follow-up action contact classes were arranged in different Research Stations and Educational Institutions under Kerala Agricultural University. New correspondence courses on "Profitable Poultry Farming" and "Vegetable gardening" for urban housewives have been designed for implementation subsequently.

e) Educational technology support

Under this programme, Audio Visual aids including colour slides, charts, graphs, posters etc. were prepared to lend educational technology support to Educational Institutions under the University and the various development departments in the state. About 3000 colour slides were duplicated and supplied to the Kerala State Department of Agriculture as part of the support to T & V system in the state. By means of this profit of Rs. 6,000/- was made to the University. Besides these, 917 colour slides, 541 B & W slides, 22 rolls of colour negative exposures, 936 B & W exposures, 1485 B & W copies ($\frac{1}{2}$ size) 35 B & W enlargements (15" x 12" size) 295 contact prints, 8 cover designs, 18 rolling charts, 37 posters, 35 illustrations, 142 graphs, 4 name boards and 8 maps were also prepared during the period. Photographic coverage of all University level functions was also made.

f) Agres news

The AGRES News publication was revised and one issue was published during the period.

g) Farm news programme

Three Farm News Programme items were prepared and despatched to 458 officers of the Kerala State Department of Agriculture during the period.

P. A. System

The Audio-visual laboratory is equipped with all necessary audio-visual gadgets. The P. A. system was arranged for all the University level functions, Farmers, Seminars and other extension activities. Film and slide shows were also conducted in the Farm Clinics and Farmer's Seminars.

h) Exhibitions

i) 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 March-May 1985. The KAU Pavilion was awarded the "Best Stall Prize" this year also.

ii) Mini-Exhibition

Mini exhibitions were arranged as part of Lab-to-Land and village adoption programmes and the farm advisory seminars of the University. A total of 21 mini exhibitions were arranged during the period under report.

Publications

A. Publications of non-periodicals

The following bulletins/monographs/leaflets were published during the period:

Technical bulletin (Mal)	കായ്കനികൾ (Revised Edition)
..	കാലിത്തീറ്റ
..	മണൽ
..	കുരുമുളക്
..	ഇഞ്ചി
Leaflet on (Mal)	മാതൃമേർക്കൽ ഒരു ആരോഗ്യപ്രശ്നം
..	മാതൃമേർക്കൽ തടയുന്നതിന് വീട്ടമ്മമാർ എന്തു ചെയ്യണം.
..	ആഹാരസാധനങ്ങളിലെ കലർപ്പ് എങ്ങനെ കണ്ടു പിടിക്കാം.
..	മികച്ച പുതിയ ഏളളിനങ്ങൾ—സോമ, സൂര്യ
..	മികച്ച മൂന്ന് നിലക്കടലയിനങ്ങൾ
..	കെ. എ. യു. മഞ്ചേശ്വർ
Booklet on (Mal)	കേരള കാർഷിക സർവകലാശാല കഴിഞ്ഞ അഞ്ചു വർഷങ്ങളിൽ

Manual on (Eng) Extension Teaching Methods

K. A. U. 2000 A. D.—Book

Report on case study training—Booklet

The following publications were under various stages of printing/processing

Revised edition of book on	കോഴിവളർത്തൽ
..	തെങ്ങ്
..	നെല്ല്
..	മരച്ചീനി
..	വാഴ
..	പയറുവർഗ്ഗങ്ങൾ
Materials sent to Press	താറാവുവളർത്തൽ
Printing in progress	Monograph on Bamboo (English)

Printing Manual on (Mal).
Printing Folder on (Eng)
Materials being collected

സസ്യസംരക്ഷണം
Diseases of crop plants of Kerala
University Directory
Hand Book on KAU.

B. Publication of periodicals

The following periodicals were published during the period under report.

1. KAU News letter — Vol. XII (2), Vol. XII (3) Vol. XII (4)
Vol. XII (5), Vol. XII (6) Vol. XII (7)
Vol. XII (8), Vol. XII (9) Vol. XII (10)
Vol. XII (11), Vol. XII (12) Vol. XIII (1)
Vol. XIII (2), Vol. XIII (3)
- 2 Kalpadhenu — Vol. XII (4) March—April—May
— Vol. XII (1) June—July—August
— Vol. XIII (2) Sept.—Oct.—November
- 3 Research Journals
 - a) Agricultural Research Journal of Kerala : 2 Nos.
 - b) The Kerala Journal of Veterinary Science : 2 Nos.

v. Farm Advisory Service

The FAS is the field wing of the Directorate of Extension to give opportunity for the farmers to discuss various technical problems they are confronting and to expose the scientists of the University to the field problems faced by the farmers.

The main work of the FAS is to conduct seminars in Agriculture Animal Husbandry and Fisheries in the different districts of Kerala State in collaboration with the various development Departments, other development agencies, input firms and service organisations. The FAS also make field visits as a "Diagnostic Team" to suggest solutions to various problems faced by the farmers whenever necessary. Conducting front line demonstrations on proven technologies is another item of work of the unit. Providing back stoppage to the Department of Agriculture is also envisaged in the programme. The activities of the FAS during 1985-86 are summarised below:

Seminars

The FAS actively participated and took leadership in the organisation of seminars in the adopted villages and lab-to-land centres of the University. The experts also served as resource personnel for leading discussions and clearing the doubts of the farmers in the seminars conducted by other development agencies, input firms and voluntary organisations. Altogether the FAS involved 69 seminars in which a total number of 9600 farmers participated.

Farm clinics

To extend help to the farmers in their own village, the programme called "Farm Clinics" was continued during the year. The farmers in the

locality are advised to assemble at a common place and the scientists visit the place on a fixed date. Four such clinics, one each at the adopted Village of Moorkanikkara, Nellikunnu, Nadathara and Panancherry were continued and the experts of the FAS gave technical advice and help to the farmers in the fields of Agriculture, Animal Husbandry and Fisheries. These centres were regularly visited once in a week in order to have follow-up action as well as to instill confidence in the FAS among the farmers.

FAS is conducting front line demonstration on new technology in the villages adopted by the University to influence the farmers and extension functionaries and also to instill confidence among them in the new technology. Two front line demonstrations were laid out during the year under report.

Consultancy service

The University offers consultancy services in Agriculture, Animal Husbandry and allied subject particularly in the following areas (1) layout and establishment of ornamental gardens (ii) plantation crops (iii) medical case of elephants. This was continued during the year under report also.

Miscellaneous

Teaching

The Scientists working in the Communication Centre and the FAS offered courses for UG and PG students of the College of Horticulture, Vellanikkara, College of Veterinary and Animal Sciences, Mannuthy and the College of Co-operation and Banking, Mannuthy.

KAU Press

The KAU Press at Mannuthy caters to all the printing requirements of the University. A total of 245 printing works were completed during the period under report. These items included books, monograph, technical bulletins, folders, pamphlets, registers, annual report, research report, research journals, magazines etc.

During the period under report a cutting machine at a cost of Rs. 2.25 lakhs and a Printing Machine at a cost of Rs. 5 lakhs were purchased to equip the press.

Krishi Vigyan Kendras

Three Krishi Vigyan Kendras (KVK) are functioning under the University. Skill oriented training courses with practical and vocational education background were regularly conducted by the KVKs. The training programmes scheduled in KVKs are based on the principle of 'Learning by Doing'.

The Krishi Vigyan Kendra at Pattambi and the Krishi Vigyan Kendra for tribals at Ambalavayal are funded by the ICAR. The IVK at Manjeshwar was inaugurated on 12-10-1985 and is being run with university funds.

The details of work done in these Krishi Vigyan Kendras are summarised below.

A) Krishi Vigyan Kendra, Pattambi

Training programmes

The following training programmes were conducted by the KVK during 1985-86.

Sl. No.	Course Title	No. of trainings			No. of participants		
		On Campus	Off Campus	Duration	Men	Women	Youth
A. Horticulture							
1.	Scientific management of coconut	1	33	1 day	671	16	—
2.	Scientific nursery techniques in plantation crops	1	—	..	—	—	13
3.	Scientific cultivation of Arecanut	—	1	1 day	22	—	—
4.	Crop Management practices in Banana	—	18	..	338	22	—
5.	Improved package of practices of Areaca Palm	—	1	..	23	—	—
6.	Vegetative propagation Technique	—	1	..	13	—	—
7.	Kitchen garden	1	—	..	—	26	—
8.	Propagation of Banana suckers	—	1	..	22	—	—
		3	55		1089	64	13
B. Field crops							
1.	High yielding varieties of Rice	—	5	1 day	103	—	—
2.	Fertilizer application of Rice	—	5	..	97	—	—
3.	Fertilizers	—	3	..	62	—	—
4.	Organic Manure—their importance	—	3	..	57	—	—
5.	Planting methods of rice	—	3	..	63	—	—
6.	Plant protection	—	5	..	80	—	—
7.	Pulses cultivation	6	4	..	103	87	—
8.	Pulses varieties for summer fallows	—	6	..	89	17	—
		6	34		654	104	—

1	2	3	4	5	6	7	8
C. Animal production							
1.	Management of Milch cows	3	12	1 day	165	18	15
2.	Goat rearing	—	1	..	14	4	—
<i>Poultry</i>							
3.	Selection of birds suitable for backyard and their maintenance	6	11	..	132	52	72
4.	Vaccination of poultry	1	4	..	8	—	10
		10	25		319	72	97
D. Fisheries							
1.	Inland pisciculture	2	15	..	240	1	15
2.	Economic Fish preservation methods	4	7	..	67	79	17
3.	Fish pickle (easy storage practice)	—	1	..	—	—	15
4.	Preparation of Fish flakes	3	—	..	—	—	47
		9	23		307	80	94
E. Home Science							
1.	Food Adulteration	2	2	..	—	10	50
2.	Importance of leafy vegetable	—	1	..	—	6	10
3.	Preparation of low cost balanced meal	2	1	..	—	28	45
4.	Integrated training for tribal women in various aspects of Home Science	1	—	15 days	—	—	15
5.	Importance of cereal pulses	1	—	1 day	—	10	10
6.	Preparation of low cost weaning food	3	—	..	—	20	20
7.	Child rearing practices	1	1	..	—	17	15
8.	Preservation of gooseberry	2	—	..	—	15	16
9.	Rehydration during diarrhoea and dysentery	2	2	..	—	31	38
10.	Fabric painting	2	—	..	—	3	21
11.	Vattal making, using cowpea	1	—	..	—	10	5
12.	Pappad making	2	—	..	—	20	15
13.	Pickling of mangoes	1	1	..	—	12	21
		20	10		—	242	281

1	2	3	4	5	6	7	8
F. Other Trainings							
1.	Intergrated Training for Tribal youths in Agriculture/ Animal Science / Fisheries/ Home Science	1	—	4 weeks	—	—	—
2.	Training in use and maintenance of P. P. Equipments for S. C. youths	1	—	3 days	—	—	30
3.	Leadership Training for S. C. Women	1	—	5 ..	—	20	—
4.	Bio Fertilizer use of						
	a. Azolla						
	b. Rhizobium						
	c. Blue green Algae						
	d. Azatobactor	1	—	5 ..	34	—	—
5.	Scientific storage of food grains	—	2	2 weeks	—	60	—
6.	Integrated training for Tribal women	1	—	15 days	—	14	—
Grand total		53	149		2403	657	535

Conducted tours

A total 114 persons including Farm Science Club members and tribal youths were taken on conducted tour in five batches during the period under report.

Survey work

420 farm families in 26 villages were surveyed during the period.

Farm Science Clubs

The Kendra organised 59 Farm Science clubs with 720 participants.

Radio talks

The scientists of the Kendra gave radio talks on important topics related to crop cultivation, poultry farming, food science and fisheries. A total of 13 such radio talks were broadcasted during the period under report.

Others

A new method for evaluating the impact of training was evolved by the Kendra. Fitted the "Quick oral critical point" the test simplifies the procedure of assessing the impact of KVK training programmes.

B. Krishi Vigyan Kendra for Tribals, Ambalavayal.

i) Training Programmes

A total of 49 training programmes benefitting 2008 persons were

organised by the Kendra during the period under report. The details of these training programmes are as follows:

Name of the training programme	Period	Duration	No. of batches	No. of participants
1	2	3	4	5
Training on preparation of plant protection chemicals	21.5.85	1 day	3	45
	22.5.85			
	28.5.85			
Training on management of paddy nursery	21.5.85	1 day	4	60
	22.5.85			
	28.5.85			
	29.5.85			
Training on seed treatment of rice	29.5.85	1 day	4	60
	31.5.85			
	4.6.86			
Training on familiarisation with different fertilizers	17.6.86	1 day	4	60
	30.5.85			
	31.5.85			
	17.6.86			
Training on selection of cows	22.6.85	1 day	2	30
	17.6.85			
	22.6.85			
Training on care of pregnant cows	10.9.85	1 day	3	48
	27.6.85			
	12.7.85			
Training on P. P. in paddy nursery	27.6.85	1 day	4	57
	1.7.85			
	5.7.85			
	8.7.85			
Training on manures and fertilizers for rice	21.8.85	1 day	4	57
	1.7.85			
	5.7.85			
	8.7.85			
Training on poultry management	5.7.85	1 day	2	27
	8.7.85			
	12.7.85			
Training on identification and control of soft rot and bacterial wilt disease of ginger	19.7.85	1 day	2	33
	12.7.85			
Training on manures and fertilizers for coconut	19.7.85	1 day	1	15
Training on care of pregnant and lactating mothers	22.8.85	1 day	1	15
Training on Intercultural operation in nutrition gardens	24.8.85	1 day	1	15
	24.8.85			

1	2	3	4	5
Training on oral Rehydration therapy	10.9.85 18.2.85 19.2.86	1 day	4	62
Training on selection and planting of banana suckers	10.9.85 19.9.85	1 day	3	43
Training on the importance of leafy vegetables	10.9.85 12.9.85 27.9.85	1 day	3	40
Training on control of shoot borer and mealy bugs in coffee	17.10.85 19.9.85 29.9.85	1 day	3	45
Training on Environmental sanitation and personal hygiene	23.9.85 20.9.85	1 day	1	15
Training on selection of cows and care of pregnant cows	20.9.85	1 day	1	15
Training on backyard system of rearing poultry	23.9.85 2.12.85 4.3.85 11.3.86 12.3.86	1 day	5	75
Training on control of major pests of paddy, stem borer, case worm and earhead bugs	27.9.85	1 day	1	15
Training on plant protection in summer vegetables	17.10.85 16.11.85 4.3.85	1 day	1	45
Training on the cultivation of summer vegetables	16.11.85	1 day	1	20
Training on the protein calorie malnutrition	19.11.85	1 day	1	15
Training on the common diseases seen in milking cows	19.11.85	1 day	1	15
Training on child care in tribal colonies	2.12.85 30.1.86 31.1.86 7.3.85 11.3.85 12.3.86	1 day	6	90
Training on cultivation of pulses and oil seeds in rice fallows	11.12.85 16.12.85 17.12.85 20.12.85 23.12.85 24.12.85 27.12.85 28.12.85 3.1.86 14.1.86	1 day	10	150

1	2	3	4	5
Training on selection of demonstration plot	11.12.85	1 day	1	15
Training on Nutritional importance of pulses and oil seeds in daily diet	11.12.85	1 day	1	15
	16.12.85			
	17.12.85			
	3.1.86			
	14.1.86			
Training on utilization of haulms of pulses and cakes of oil seeds in animals feeds	11.12.85	1 day	1	15
	17.12.86			
	16.12.85			
	3.1.86			
	14.1.86			
Training on Inter cultivation and P. P. in pulses and oil seed crops	28.1.86	1 day	8	120
	29.1.86			
	30.1.86			
	31.1.86			
	12.2.86			
	17.2.86			
	18.2.86			
	19.2.86			
Training on deworming of calves	30.1.86	1 day	4	68
	13.2.86			
	14.2.86			
	25.2.86			
Training on Health care and Immunization	28.1.86	1 day	6	90
	29.1.86			
	12.2.86			
	13.2.86			
	14.2.86			
	17.2.86			
Training on Artificial insemination in cows	12.2.86	1 day	2	25
	19.2.86			
Training on after cultivation of cowpea and sesamum	13.2.86	1 day	2	25
	14.2.86			
Training on preparation of ragimalt mixture	25.2.86	1 day	2	36
	26.2.86			
Training on labour saving device (Hay Box cooker and Janatha fridge)	28.2.86	1 day	5	75
	1.3.86			
	4.3.86			
	5.3.86			
	6.3.86			
Training on First Aid	28.2.86	1 day	1	15
Training on care and management of heifers	28.2.86	1 day	1	15
Training on after cultivation of Punja crop of rice	1.3.86	1 day	1	15

1	2	3	4	5
Training on control of rice blast Helminthosporium leaf blight in Punja crops	5.3.86	1 day	1	15
Training on goat rearing	6.3.86	1 day	1	15
Training on major causes of morbidity and mortality	13.3.86 14.3.86 18.3.86 19.3.86	1 day	4	59
Training on preparation of poultry and cattle feed	13.3.86 14.3.86 18.3.86 19.3.86	1 day	4	61
Training on pruning in coffee	14.3.86	1 day	1	15
Training on water borne diseases	20.3.86	1 day	1	15
Training on pig rearing	20.3.86	1 day	1	15
Training on bee culture	24.3.86 30.3.86	6 days	1	20
Total			132	2008

Non formal Education programme:

A non formal education class was started on October '85. 27 tribal women from two nearby colonies viz., Malika and Edakkal are attending the classes regularly in the evening hours.

Demonstration plots:

Ten demonstration plots of cowpea and sesamum were laid out in different tribal colonies of Wynad with the objective of bringing more area under pulses and oilseeds in second crop season (Rabi).

Linking Schools with KVK

Four schools in Wynad district were selected for implementing the Linking programme of IVK and Lab-to-Land programme during the year under report. Nutrition gardens were laid out in these schools and farm implements and critical inputs were supplied to them by the Kendra.

Radio talks

Five Radio talks were contributed by the Scientists of the Kendra during the period under report for broadcast by AIR

KVK for linguistic minorities, Manjeshwar

Training programmes

The following training programmes were conducted during the period under report

Sl No.	Name of Training	Duration	No. of courses	No. of trainees
1	Cultivation of Summer Vegetables	One day	One	26
2	Selection of mother palms and coconut nursery	One day	One	24
3	Cashew cultivation and problems	One day	One	30
4	Nutrition garden	One day	One	15
Total			Four	95

Seminars:

Seminars on 'Recent Development in Farm Technology' and 'Management of Pith Animals' were conducted on 12.10.85 in connection with the inauguration of the KVK. About 150 farmers attended the seminars.

Camps

A 'Cattle Health Camp' was organised on 12.10.85. The Scientists of Farm Advisory Service, Mannuthy rendered technical help for the conduct of the camp.

A one day camp on 'Cattle Infertility Testing' was organised at the KVK on 28.1.86. in collaboration with the Kerala State Department of Animal Husbandry.

Exhibition

In commemoration of the inauguration of the KVK, an Agricultural Exhibition was organised at the KVK on 12.10.85.

Publications:

Pamphlets on the objectives and function of the KVK at Manjeshwar were published in Kannada and Malayalam and were distributed to the farmers in the area.

National Demonstration Scheme (NDS) Sadanandapuram Quilon District

The National Demonstration Scheme is implemented by the KAU since 1975 with the specific objective of transfer of technology to achieve maximum production and net return per unit area of land per unit time. The scheme was functioning in Trichur district and was shifted to Sadanandapuram in Quilon district on first June 1983.

As directed by the ICAR, the programme already approved by the State Level Advisory Committee was revised giving more emphasis on pulses and oilseeds. According to the modified programme, the following demonstration were conducted during 1985-86.

Type of land	Crop sequence	No. of demonstrations
Wet land	Paddy—Paddy—Sesamum	2
	Paddy—Paddy—Pulse	9
	Paddy—Paddy—Groundnut	2
	Paddy—Pulse	1
Upland	Paddy—Sesamum	3
	Tapioca—Groundnut	2
	Cowpea—Sesamum	1
	Sweet Potato	1
	Entire Farm Demonstrations	5
Total		26

Performance of Crop varieties 1985-86

Virippu	Yield Q/Ha. Grain	No. of demonstrations
<i>Paddy</i>		
Var. Pavizham	55.50	1
Cul. 23333/2	54.75	2
Jyothi	48.75	5
Sabari	47.63	3
Cul. 1907	36.87	2
Groundnut TG. 14	1000 kg/ha	1
Cowpea C. 152	650 kg/ha	1
Sesamum (Surya)	320 kg/ha	1
Sweet potato Cross 4	7.25 t/ha	1
Tapioca	18.9 t/ha	1

Mundakan	Yield (Grain Q/ha)	No. of demonstrations
<i>Paddy Var:</i>		
Karthika	40.10	4
Lakshmy	39.60	6
Ptb.	38.50	1
Sabari	38.0	1
H-4	36.70	2
Ptb. 20	35.0	1
Cherady	35.2	2

Seminars and Field days:

	No. of farmers attended
1. Kisan Mela at Sadanandapuram on 26.10.85	150
2. Seminar at Keliyam on 15.3.86	50
3. Field days - 45 Nos.	620
Total	820

Lab-to-Land Programme

The lab-to-land programme, financed by ICAR were implemented at the following 32 Transfer of Technology Centres:

Sl. No.	Name of Centre	Name of District	No. of families adopted	Name of implementing institution
1	2	3	4	5
1	Kayamkulam	Alleppey	25	Rice Research Station, Kayamkulam
2	Moncompu	Alleppey	25	Rice Research Station, Moncompu
3	Thiruvalla	Alleppey	25	Sugarcane Research Station, Thiruvalla
4	Pilicode	Cannanore	25	Regional Agricultural Research Station, Pilicode
5	Panniyoor	Cannanore	25	Pepper Research Station, Panniyur
6	Kalady	Ernakulam	25	Communication Centre, Mannuthy
7	Odakkali	Ernakulam	25	Medicinal Plants Research Station, Odakkali
8	Panangad	Ernakulam	25	College of Fisheries, Panangad, Cochin
9	Puduveypu	Ernakulam	25	Fisheries Instructional Farm, Puduveypu
10	A. Vytila-R-Ernakulam		25	Rice Research Station, Vytila
	B. Vytila-R-Ernakulam		25	Rice Research Station, Vytila
11	Pampadumpara	Idukki	25	Cardamom Research Station, Pampadumpara
12	Anakkayam	Malappuram	25	K. V. K., RARS., Pattambi
13	Nilambur	Malappuram	50	SC/ST Centre, Nilambur (R. S.)
14	Tavanur	Malappuram	50	I. A. T., Tavanur
15	Attappady	Palghat	50	Livestock Station, Thiruvazhamkunnu
16	Malampuzha	Palghat	50	F. A. S., Mannuthy.
17	A Keshayoor	Palghat	25	R. A. R. S., Pattambi
	B Thrithala	Palghat	25	R. A. R. S., Pattambi
18	Kottarakkara	Quilon	25	National Demonstration Scheme, Sadanandapuram Kottarakkara

1	2	3	4	5
19	Chalakuḁi	Trichur	75	A. R. S., Chalakuḁi
20	Kozhukulli	Trichur	25	Communication Centre, Mannuthy
21	Madakkathara	Trichur	25	College of Horticulture, Vellanikkara
22	Mannamangalam	Trichur	25	Communication Centre, Mannuthy
23	Ollukkara	Trichur	25	College of Horticulture, Vellanikkara
24	Pannencherry	Trichur	25	College of Horticulture, Vellanikkara
25	Vilvattom	Trichur	50	College of Veterinary and Animal Sciences, Mannuthy
26	Amboori	Trivandrum	100	College of Agriculture, Vellayani, Trivandrum
27	Kalliyoor	Trivandrum	25	College of Agriculture, Vellayani, Trivandrum
28	A. Muttacadu	Trivandrum	25	College of Agriculture, Vellayani, Trivandrum
	B. Balaramapuram	Trivandrum	25	Coconut Research Station, Balaramapuram
29	Karamana	Trivandrum	25	Model Agro. Research Station, Karamana
30	Ambalavayal	Wynad	25	Regional Agri. Research Station, Ambalavayal
31	K. V. K. Pattambi	Palghat	100	K. V. K., Pattambi
32	Kumarakom	Kottayam	25	R. A. R. S, Kumarakom
Total			1200	

Varieties breeds used:

- 1) Paddy : Jaya, Triveni, Jyothi, Mashoori.
- 2) Sesamum : Kayamkulam-1
- 3) Pulses:
 - A. Cowpea : K 1552, Kanakamani, C-152
 - B. Blackgram : T 9
 - C. Greengram : KM 1
 - D. Groundnut : TMV 2
- 4) Goat : Sannen Malabari
- 5) Poultry : Austrowhite

Critical inputs supplied:

- a) Goats
- b) Horticultural plants.
- c) Seeds/Seedlings.
- d) Poultry
- e) Fertilizers
- f) Poultry Cage—simple type Costing not more than Rs. 50/-per cage.
- g) Implements.
- h) Plant Protection Chemicals.
- i) Cottage industry—Coconut leaves, plastic cane for chair making.
- j) Medical care—Medicines.
- k) Fish fingerlings.
- l) Supplementary feed.
- m) Feed trays for poultry
- n) Smokeless choolas.

Community inputs supplied

- 1) Sprayers
- 2) Goats (Bucks)

Regional interdisciplinary Teams:

In order to monitor and guide the Lab-to-Land activities five Regional Interdisciplinary Teams (RIT) were constituted for the Northern Region, Central Region, High Range Region, Special Problem Area Region and Southern Region at Pilicode, Pattambi, Trichur, Kumarakom and Trivandrum. The Regional Interdisciplinary Team also reviewed the work done by the Transfer of Technology Centres and approved action programmes for the T. T. Centres covered by the region.

Training for Implementing Officers

Regular training programmes for the implementing officers of the Lab-to-Land Programme were organised at various Transfer of Technology Centres, once every quarter. The conduct of training at various TT Centres provided opportunities for the implementing officers to gain first hand knowledge about the implementation of the programme in various centres.

Nutrition gardens in Schools:

Nutrition gardens were established at 23 schools in different parts of Kerala. Fertilizers, quality seeds, and implements worth Rs. 500/- per school were distributed as community inputs during 1985-86 for these schools. The staff and students were given periodical training in Nutrition gardening. The involvement of students in establishing Nutrition gardens has motivated the staff and students, to take up similar activity in their own houses.

Vegetable cultivation among the adopted families:

About 1500 packets of vegetable seeds were distributed under this activity. This has served as an incentive to the farmers for producing

vegetables under limited land resource. An average of 0.750 kg. of vegetables could be harvested per farmer per week during the crop season.

Intercropping coconut with banana:

This cropping pattern was observed to increase the income of the farmers and was observed to be highly beneficial in increasing the income of the marginal farmers substantially. 424 farmers adopted this practices.

Improved paddy varieties like Swarna Prabha, Bhavani, and Jowar and Groundnut (TMV 2) were introduced in Attappady drought prone Tribal area in Palghat District. This has helped to increase the productivity of these crops in the areas. Thus the tribals at Attappady were exposed to new avenues in agriculture by which they could gain experience in scientific cultivation of rice, oilseed, and minor millets.

Cultivation of Ginger, as a crop that could escape the attack of wild animals in the forest area, has proved to be safe crop at the Appankappu tribal colony, Nilambur. The efforts of Tribals at Appankappu clearly showed a change in their attitude towards settled cultivation. Banana cultivation has also been taken up by one farmer in the colony.

Smokeless choolas were supplied to 230 farmers on a need based strategy, selected from among the weaker sections of the adopted farmers. This has helpful in reducing the expenditure on fire wood.

The State Bank of Travancore, and State Bank of India provided financial loan assistance upto Rs. 5000/as loan to the farmers identified by the University. This resulted in generating employment in the village itself. 300 farmers from among the Lab to Land beneficiaries have been identified for this purpose.

The farm women were given training in child care, nutritional disorders, kitchen gardening, skills, post harvest technologies and preservation of vegetables etc. at 12 centres.

Goat rearing was one of the viable technologies that was transferred to the landless labourers, and SC/ST farmers. The children reared the goat as their prized possession. With a period of two years, each family earned about Rs. 500/-by way of sale of goats kids. Five hundred and thirteen farm families were involved in goat rearing programme.

Poultry and duck rearing were found to be yet another interesting and paying technology for the landless class. Ten birds each was supplied to 650 families. Three to four eggs received from ten birds per day increased income and nutritional status of the family. It also helped to generate additional employment to the members of the family.

Rabbits were supplied to 10 families. Rabbit rearing is also getting popular among the farmers. It is proposed to do the supply of Rabbits with training in rabbit rearing and also with marketing in collaboration with Meat Products of India.

Cottage Industries such as cane chair making, bamboo baskets, coconut outjams and screw pine matmaking were found to be useful in utilising the under employment periods of the family members. The sale proceeds of these articles became a revolving fund for the farm family. 25 beneficiaries were involved in their activity.

Fish farming, especially in the small ponds of 5 to 10 cents area, were found to be economical. The harvest recorded showed an average yield of 3500 kg per hectare per year. This programme was appreciated by farmers at Vytila, Puthuvyppu, Panangad, Panancherry and Kumarakom centres. 25 farmers were benefitted by this activity.

With the introduction of fish farming system in the marshy backyards of the homesteads, waste land and weed infested areas could be converted to production plots.

Bee keeping was also encouraged among 25 farmers at Thrithala. An average yield of 10 kg of honey per year per apiary could be collected.

Implements

Non-availability of proper implements was a problem faced by the marginal farmers and landless agricultural labourers.

Area development programme—an experiment

Area development approach was adopted at Palissery near Chalakudy in 20.8 hectares belonging to 75 farm families. All the 75 farmers formed into an association worked as a group under the leadership of the members of the group. A cropping pattern comprising of two crops of rice followed by a third crop of rice or a pulse/oilseed was followed. Group efforts in farm operations, choosing the variety, irrigation, manuring common nursery and plant protection activities were introduced. Social activities through group management for selected farm operations was super imposed over individual rights and initiative of individual members. This approach helped to bring about two fold increase in yield from the area development paddy programme. This programme was operated for the last two years.

The area development programme taken up at Kadukkamkunnu in Malampuzha Command Area was to ensure controlled irrigation from channels to individual plots, and to take a third crop of pulses or oilseeds. During summer season, a third crop of cowpea/sesamum/greengram etc. was taken in about 20 ha. belonging to 50 farmers without irrigation. A third crop was attempted at in this region for the first time in 1984-85 through the Lab-to-Land Programme.

The pulse crops such as cowpea, greengram, and blackgram, as well as sesamum could be raised successfully in the rice fallow which otherwise would have left fallow but for the Lab-to-Land Programme.

Supply of fertilizers as a supplementary dose was helpful in enhancing the yield of horticulture plants, and field crops.

Small broader farms taken up by three unemployed youth at Malampuzha under the scheme will be helpful in creating aptitude, confidence and skill in broiler production technology.

Village Adoption Programme

The Village Adoption Programme (VAP) of the University aims at developing the adopted villages as field laboratories for testing innovations, demonstrating improved technology in Agriculture and allied fields, without discriminating the rich and poor or on caste/religions considerations.

The KAU has adopted 27 villages spread throughout the State for the implementation of this programme. Rs. 2000/-each have been provided to each centre for conducting front-line demonstrations, Kisan Melas and training programmes for the farmers in these adopted villages. Only critical inputs are supplied free as part of the programme.

During the period under report, farm advisory seminars and kisan melas were organised in all these adopted villages. Farm clinics are established under this programme in Nadathara, Moorkanikkara, Nellikunnu and Pananchery Centre.

A joint kisan mela for all the adopted villages around the KAU Headquarters was organised at Marakkal on 30-11-85. A mini exhibition was also arranged on the occasion.

Tribal area Research Centre, Amboori and integrated Development of Kanikkar Tribals dispense in the Hamlets on the slopes of Agasthyamudi Peak.

The following are the salient features of activities undertaken during 1985-86.

Agriculture.

With a view to establish experimental units of rubber plantation in selected homesteads a programme to supply quality planting materials was initiated. A rubber nursery of 4,000 buildings of improved variety of RR11 105 has been established in Karikuzhi, one of the hamlets in the tribal settlements.

A programme to improve the production capacity of the seedlings of unknown progeny planted by the tribal farmers was started. These plants which are of 2-4 years old are suitable for *in situ* budding with high yielding clones like RR11-105. About 1200 plants were successfully budded *in-situ* during the year.

The high yielding variety of arecanut 'Mangala' was introduced in the Tribal settlements.

Pepper vines of improved but local varieties collected from selected vines from various settlements. These were planted in polythene bags for rooting.

Stone wall planting of pepper along the soil conservation contour bunds have also been attempted in the premises of the field office at Karikuzhi as a pilot programme.

A fully replicated intercropping trial with Tapioca, cowpea and sweet potato was laid out at Karikuzhi. All the three crops were harvested. The results indicated that the maximum yield and return were obtained from tapioca inter-cropped with cowpea followed by tapioca intercropped with sweet potato.

A management trial on colocasia was laid out. The results revealed that maximum yield was from plots of medium level management.

One fully replicated experiment on low land paddy was laid out in the reservoir area where the water reach during summer month. Jyothi and Kochuvith were the varieties tried. The yield obtained were 3-8 and 3-7 tonnes/ha respectively.

As part of Development activities all the farmers in the area were distributed with planting materials of fruit plants of Jack grafts, mango-grafts, Papaya and Lemon.

Animal Husbandry projects

100 families were supplied with one goat each. 41 are now being maintained by the tribal farmers.

The result of goat rearing programme reveals that goat rearing can be an additional source of income for the Kanikkars. For better results, extension work to educate them to plan the sale of goat, so that they maintain a based population and only the surplus is sold out to give a continuous source of additional income is necessary.

The two heifers supplied during June 1983 are being properly maintained by two farmers. One has conceived. The second one has not conceived and it is under treatment.

100 female and 20 male cross bred ducklings were supplied to 10 selected families during first week of February 1985.

The results of the duck programme reveal that the same is not feasible in this area because of the presence of crocodile in the reservoir and as the Kanikkar are not capable of stall feeding these birds.

The demonstration unit of rabbit rearing set up at the field office Karikuzhi has been converted to a breeding stock by adding four female and one male.

Under Poultry backyard system the trial with Kadakkanath hybrid birds could not succeed mainly because of non-availability of sufficiently large number of birds. So far 400 birds have been distributed. It is proposed to distribute 300 birds to 100 families which will be completed by February.

Home Science

Height and weight of pre-school children and pregnant women were recorded. Total number of pre-school children is 68. Collected information about feeding of the child, health care, play habits, sleeping habits, breast-feeding practices etc. of children. Along with the house visits, needed education was also given to house-wives.

The programme started to inculcate thrift habit among tribal people continued. Collection of monthly saving is continued.

The monthly collections were not satisfactory due to destruction of a few coin boxes. It is necessary to provide new boxes to them and the programme is being extended to more number of families so as to get sufficient data for interpretation.

Even though the number of families initially selected was low and amount saved is not high, many house wives are approaching the project to get coin boxes with a desire to attempt saving.

Low-cost balanced recipes were prepared with locally available food items for infants and pre-school children. Tapioca, plantation, arrow root, wheat, rice and ragi were the main items included along with green gram or bengal-gram and groundnut with the intention of improving protein quality of the product. For sweetening the product and to improve the mineral supply, jaggery is added.

The following were the recipes designed. Six of them prepared and tested for acceptance by sensory evaluation.

1. Ragi pudding
2. Plantation (raw) pudding
3. Tapioca porridge
4. Arrowroot porridge
5. Wheat porridge
6. Wheat pudding
7. Asparagus mix (for lactating mothers)
8. Cereal pulse mix

A total number of 29 families participated in the programme of Open School home science education programme.

Peripatetic home science education programme

'Weaning Foods' was the major topic of discussion during the visits from September to December 1985.

Discussion cum Demonstration class

Four group meetings of housewives at different hamlets were organised during period September to December 1985.

The number of participants ranged from 9 to 14 and the recipes shown were weaning foods.

Other subjects discussed were weaning food for infants and environmental sanitation.

Tailoring unit

Eventhough considerable progress has been made by some of the students, yet some others are not progressing in the development of skills for various reasons. Some illustrative reasons are given below:-

As they have to earn their livelihood, sometimes they go in search of work and cannot attend the training sessions.

The general poverty and social backwardness have retarded the progress.

Some incentives such as clothes, money etc. are being given to some students for their attendance, as otherwise they may not be in a position to attend the class.

This programme is being continued.

Health

Powder from the tubers of *Asparagus racemosus* (Sathavari) was prepared by boiling with cows milk. Two female patient suffering from leucorrhoea were treated with this fine powder of asparagus. They were generally weak and anaemic. They were advised to take a teaspoonful of powder with a glass of hot milk, twice daily. Their general health was improved after fifteen days treatment. Still they are having leucorrhoea complaints. They were advised to use this medicine for three months, regularly.

Veteverie zizanoidis (Ramacham) was planted in two separate plots. The roots of this plant can be used in pyrexia and rheumatic complaints.

Sixty five species of medicinal plants have been raised in the Herbal Museum. Samples at certain medicinal herbs, Jeevamritha pachila, Kuttujeerakom, Njarayani were collected. These plants are growing only in the Valleys of Agasthyamudi.

Selected tribal youths were given training to identify and collect the medicinal plants.

Small Scale Industry

A trial run of the leaf cup making machine for three days was conducted. The processing of cups and plates were found to be poor. With adjustments of the blades and platform the performance of the machine improved.

The food processor machine is showing good performance.

During the year under report two locally made beehives were introduced on a trial basis and the performance of the same is very much encouraging than the previous research hives.

One set of rubber roller machine and accessories was purchased for the use in the project. It is being set up for rolling rubber sheets.

One movie projector purchased was used to screen educational film.

The slide projector and over head projector purchased were used for the training programmes.

The camera purchased for TARC was used for taking photographs of various programmes in the TARC.

The cassette recorder was used to record interview with tribal farmers, women and children. It was also used for recording some of their religious ceremonies.

Other items

The tribal welfare officers and project officers from all the districts of Kerala visited the TARC on 20-11-1985 part of their training programme sponsored by the Institute of Management.

The Field publicity wing and Government of India organised a one day seminar on various welfare activities of different Government agencies on 21-11-1985 at Karikuzhi. The Regional Director of F. P. W. presided over and the Indian Overseas Bank, Kerala Agricultural University, Rural Information Bureau and DRDA explained their various activities. About 150 Kanikkar Tribal people attended the seminar and there was a film show followed by the seminar.

A team of 26 students of the 1st year B. Sc. in Co-operation and Banking visited the TARC, Amboori on 27-11-1985.

A medical camp was held on 14-12-'85 at the field office in which Professors and Directors from Medical College participated.

The Vice-Chancellor visited the TARC, Amboori on 2-1-1986 and inspected the working especially the rubber planting and budding programme.

All India Co-ordinated project on Scheduled Caste Area Research, Nilambur

The all India Co-ordinated project on Scheduled Caste area Research (AICP on SCAR) sponsored by the Indian Council of Agricultural Research (ICAR) is being implemented by Kerala Agricultural University (KAU) at Nilambur, Malappuram district, Kerala State since November 1982 with the broad objective of "developing appropriate technology modules and disseminate them in ways such that the benefits of the new and advanced technology already generated and being effectively employed with considerable economic advantages elsewhere would become available to the weaker sections of the society".

The programme encompasses the fields of Agriculture, Livestock production, Poultry production, Small-scale and Cottage Industries, Health and Nutrition and Area Development in an integrated manner so as to

generate employment, augment income, improve health and nutritional status to herald the socio-economic upliftment of the people belonging to the Scheduled Castes and Tribes. The programme is of Research oriented Development type.

The AICP on SCAR is implemented in the Nilambur Community Development Block area. Though the general extension programmes are being implemented in all the eight Panchayats of the Block, the selection of beneficiary families under the Project has been confined to five panchayats only. A potential area has been identified as the Growth Centre in each of these five Panchayats.

Specific programmes for the Socio-economic upliftment of Scheduled Caste involving application of relevant technological modules were chalked out.

A bench mark survey was conducted to develop a socio-economic profile of the beneficiary families. The survey was undertaken by trained youths belonging to the Scheduled Castes. Based on the results of the survey, programmes for the socio-economic upliftment of Scheduled Castes, involving application of relevant technological modules, were chalked out in disciplines like agriculture, animal husbandry, homestead vocation, health and nutrition, adult education and extension.

An action plan was chalked out and the AICP on SCAR is being implemented on those guidelines to achieve the avowed objectives of the programme.

Agriculture/Horticulture

It has been found during the Bench Mark Survey that nearly 85% of the working population of the selected families are agricultural labourers. Around 57% of the families have reported land ownership, chiefly consisting of garden land with an average land holding size of 26.38 cents. Since the operational land holdings are small, the scope for improvement of agriculture is lesser when compared to that of horticulture in the project area.

The initial programme for popularising vegetable cultivation among the families was successful and as a result most of the families were able to supplement their income by the sale of vegetables after meeting their consumption requirements.

Adaptability trials on various varieties of Sesamum revealed the suitability of improved varieties of 'Kayamkulam-1' and 'Kayamkulam-2' released by the KAU to the area.

The trials on Banana cultivation with intercrops of pulses showed that timely planting and proper manuring of the main crop could double the yield and income.

In spite of the inclement climate in the area, the performance of 'Suvarnamodan' (PTB-42) paddy variety introduced to the area was encouraging. Local variety 'Kalluruni' could give better yield under scientific cultural practices.

Scientific cultivation of Tapioca in one of the Colonies yielded 14 T/Ha under dry land conditions. This was much higher than the 4 to 8 T/Ha hitherto obtained locally following traditional practices. A co-operative system of cultivation has also been initiated.

Skill-oriented training programme organised for the benefit of the Scheduled Caste youth helped them to start their own enterprises with assistance from Developmental Agencies.

Animal Husbandry

The programme on Animal Management including scientific and clean milk production have yielded positive results. The programme for the improvement of the local breed of goats through cross breeding with the cross bred bucks is progressing. Periodic pregnancy diagnosis camps for cattle were organised in the project area with the help of Regional Artificial Insemination Centre and Department of Animal Husbandry.

Homestead vocations

With the introduction of Improved Potter's Wheels the average income of the Potter families has increased two fold. The time spent on production of pots was also reduced as a consequence. The time saved is now utilised for marketing the products and the women folk now could take up subsidiary occupations. Through the various Mahila Samajam ten tailoring units were organised which benefitted sixty three women. The two units for handicraft training were continued during the period.

Training on "Apiary Management" was organised to benefit ten families. Out of the ten beehives supplied eight have set up colonies. The training programmes on Chip making and Leaf Cup making were continued during the period.

Health and Nutrition

As briefly mentioned earlier, the scheme on popularising vegetable cultivation was focussed towards combating dietary deficiencies prevalent among the beneficiaries of the project. The Centre organised five lecture cum training classes each on better infant feeding practices and oral rehydration therapy for children at all the Growth Centres with the help of the Department of Home Science, College of Agriculture, Vellayani and the Krishi Vigyan Kendra, Pattambi.

Extension Education Programmes

The Bench Mark Survey revealed that 47% of the working population among the project beneficiaries are illiterate. Educational film

shows were conducted at regular intervals in all the Growth Centres during the period.

The project centre could establish close contact with the various developmental departments of the State Government working at Nilambur which has helped in the implementation of the various research oriented development programmes of the Centre.

Scheme for the development of Tribal farmers on the eastern side of Peechi dam.

The main objectives of the scheme is to hasten the socio-economic development of the tribal people of the selected colonies by boosting up the general development of agriculture and horticulture in the colony area with the involvement of the tribal people. A Research Associate has been appointed in the scheme from 1.8.'85 on working arrangement.

A preliminary survey of the Poovanchira and Payyanam Malayan colonies where 45 tribal families are inhabiting has been completed. After a study of the needs of the tribal people, the following programmes have been identified for implementation.

Supply of planting materials of pepper, banana, pineapple and
Planting and maintenance of the above crops in the colonies.

Goat rearing and poultry keeping.

Bee keeping.

Conduct of training programmes.

The Vice-Chancellor, visited the Poovanchira Malayan Colony on 5-12-'85.

UNICEF Training cell

A training cell (Rural Home Science) funded by UNICEF was established in the Department of Home Science at the College of Agriculture, Vellayani for the purpose of implementing training programmes, correspondence courses, etc. on nutritional aspects for the benefit of women.

Training programmes

A three month long Pre-Service training for the Anganwadi workers of Urban Basic Service Projects of Cochin corporation was conducted.

The Training on Hazards of Food Adulteration for Rural Women was conducted for 5 batches consisting of 133 women. The training was conducted.

The Training on Better Infant Feeding and Weaning practices was organised during August-September 1985. 170 women in 5 batches participated in this training programme.

Correspondence courses

The Correspondence courses on Better Infant Feeding Practices (Mal) was completed with 545 participants. Another course on Better Infant Feeding Practices (Eng) was in progress during the period. There are 65 participants in this course.

Nutrition news letter

The Nutrition Newsletter was published regularly during the period under report.

Nutrition Education Camps

16 one day Nutrition Education Camps were organised in different centres benefitting 798 participants.

Two day Nutrition Education Camps on growth monitoring were conducted at 20 centres benefitting 988 rural women.

Campaigns

Three campaigns on Better Infant Feeding Practices were conducted in Kayamkulam, Sherthalai and Alleppey Municipalities, in which a total of 1570 women participated.

Seminar

A one day seminar on child Survival and Development of Interventions was organised at Sherthalai on 7-1-'86.

National Service Scheme

During the period under report, eight N. S. S. units were functioning in Kerala Agricultural University with 1000 volunteers. The following are the activities of the NSS units of the KAU.

College of Agriculture, Vellayani

- 1 The two community centre of the NSS units at Kakkamoola and Palapoor continued to function with facilities for reading news papers and weeklies and indoor games.
- 2 Under the International Youth Year Programme Professor M. P. Manmadhan delivered an extension lecture on 25th May, 1985.
- 3 Twenty six NSS volunteers donated blood.
- 4 An interclass quiz competition was conducted during May 1985.
- 5 The NSS volunteers had given publicity to modern Agricultural practices by displaying posters in the community centres and adopted villages.
- 6 Vanamahotsava was celebrated and 400 seedlings were planted.
- 7 Cleaning campaigns were conducted to clear the premises of Government Hospital, Vellayani and the College and Hostel premises.
- 8 The volunteers collected pests from the farmers fields in the adopted villages and remedies suggested to control the pests.

- 9 A vaccination campaign was conducted on 7-12-1985 at Kakkamoola and 250 birds were vaccinated against Ranikhet disease of poultry.
- 10 International Human Rights Day was celebrated on 10th December.

Training programmes, meetings, seminars etc attended

Dr. Skariah Oommen, Programme Officer, NSS attended the Regional Workshop of NSS functionaries at Madurai Kamaraj University.

Eleven NSS volunteers attended the Training in Nonformal Education at the Directorate of Extension, KAU, Mannuthy.

Dr. Skariah Oommen and Sri. P. A. Rajan Asari, Programme Officers attended the pre-camp orientation training at the Directorate of Extension, Mannuthy.

Seven NSS volunteers attended the training for volunteer leaders of NSS at Training & Orientation Centre, Kalamassery.

Sri. M. M. Jaleel was deputed to attend the Inter State National Integration camp at St. Xaviers College, Trivandrum.

Five NSS volunteers were deputed to attend the Inter Agricultural University Youth meet 1985 from 22nd to 31st December 1985 at Pattiyakkudi Girijan colony, Thodupuzha in Idukki District.

An inter Collegiate special camping programme from 19th to 23rd October, 1985 was conducted at Kakkamoola in Kalliyoor Panchayat. There were 100 participants including 43 women volunteers drawn from all the colleges under the Kerala Agricultural University. Local youth also actively participated.

The following assets were created by the NSS volunteers;

Repaired 1½ km road from Chavadinada to Cicilipuram. Cleaned the premises, drainage system, latrines, bathrooms etc. of the government hospital, Vellayani.

Constructed a pit in the Hospital compound to dispose wastes.

A health check up of calves was also done and deworming medicines were given. A calf show, cattle sterility campaign and pregnancy diagnosis of animals were also conducted.

College of Veterinary & Animal Sciences, Mannuthy

As part of Vanamahotsava, distributed Jack seedling and planted avenue trees in Mullakkara Harijan colony.

Campus cleaning programme was held on 14-9-1985. 42 volunteers took part. Manuring and weed cleaning around the campus was conducted.

As part of Avenue Beautification programme of KAU under NSS, Avenue Trees were planted on both side of National Highway 47 from Don Bosco School to Vellanikkara by the Veterinary College NSS volunteers.

Took part in Thekkinkad Maidan cleaning programme organised by District Collector, Trichur by levelling the allotted area of the maidan.

Conducted a vaccination camp and treated cattle at Kalady. The vaccination against outbreak of Anthrax disease was greatly appreciated by the local people.

Cattle vaccination and treatment camp was organised with the assistance of NSS 25 volunteers at Payyanam Malayan colony. Vaccinated 34 animals against H. S. disease, treated 40 animals for various ailments. 18 sterility cases were diagnosed.

College of Horticulture, Vellanikkara

The NSS volunteers actively participated in the village adoption programme and Lab-to-Land programme of the University. The community centre at Mullakkara continued to function with facilities for reading news papers, leaflets etc.

The volunteers arranged cleaning campaign in the Harijan colonies at Mullakkara and Edappalam. They were also involved in the cleaning of Thekkinkad Maidan at Trichur, and in protecting the tree plants in the Maidan. In the University main campus they cleaned the premises of the college hostels and officers quarters.

The volunteers took active part in the conduct of flower show organised by Trichur Agri-Horti Society and vanamahotsava celebrations by planting 1500 Eucalyptus seedlings.

Twenty eight NSS volunteers donated blood to the patients in the Medical college hospital, Trichur. Medical camp, animal health camp etc. were organised by the NSS unit of the college in the Harijan and Malayan colonies, Edappalam and Payyanam respectively.

Raising kitchen gardens, planting banana suckers, construction of roads and ESP type latrines, etc. were the main items of work taken up during the camp periods. In addition to this discussion classes, flower shows, sports and games competitions were also arranged.

The NSS unit of the college of Horticulture has been adjudged as the best in Trichur District.

College of Fisheries, Panangad

The NSS volunteers of this unit took up a training programme on Plastic caning. More than 15 people, most of them being women and children belonging to economically and socially weaker sections made use of this training. A few of these trained girls have already started earning through these.

Volunteers conducted seminars and discussions on topic of educational value on almost every week.

College of Co-operation & Banking, Mannuthy

The student volunteer strength of the unit is 110.

As part of its community development programme, one local youth association is adopted as the community centre. Newspapers and magazines are supplied regularly with effect from April 1985. Non-formal education classes were conducted at this centre.

As part of the International Youth Year, competitions were conducted. Debates, seminars and other activities were conducted during the month of May and June, 1985.

Social forestry programme was conducted during the month of June and July. Seedlings were planted in the Directorate of Extension campus and on the road sides between Mannuthy and Donbosco.

A major work of cleaning and maintenance campaign of the Primary Health Centre at Vellanikkara started on the Independence day on 15th August, 1985.

Selected volunteers of this unit participated in various National Integration camps as part of the International Youth Year which are:

Blood donations were made by the volunteers on several occasions to the needy patients.

UN Day, International Literacy Day and Human Rights Day were also celebrated during this period.

T & V monthly workshop

The Scientists of Kerala Agricultural University regularly attended the T & V Monthly Workshops of all the districts in the State as resource personnel. They also participated in the pre-workshop co-ordination meetings and the joint field visits.

Public relations unit

As part of the Public Relations function of the University, 33 press releases were issued to various news papers and other mass media during the period under report. The University's advertisements, notifications etc, were also channelised through the Public Relations Unit.

Extension lecture series

During the period under report the following extension lectures were organised:

1 An extension lecture on "മദ്യവർജ്ജനം സമൂഹത്തിൽ" was delivered by Prof. M. P. Manmadhan; renowned Gandhian on 22-5-1985 at the Directorate of Extension, Mannuthy.

2 As part of the Kerala State Co-operative Bank Diamond Jubilee Endowment lecture series, a three-part extension lecture series was organised at the Directorate of Extension, Mannuthy on 27th and 28th February 1985. Sri. B. K. Sinha, Dy. Chief Director (Co-operation) Department of Agriculture and Co-operation, Government of India delivered the lectures relating to the Role of Co-operatives in Agricultural Development.

Students and staff of the University attended the lectures in large numbers.

Extension studies/projects

The following extension studies are in progress.

- 1 Content analysis of Research Journal of KAU.
- 2 Content analysis of 'Kalpadhenu'
- 3 Lab-to-Land at Kerala Agricultural University.
- 4 Perception about trimester system (completed)
- 5 Perception about Package of Practices Book (1982) (completed)
- 6 Awareness and adoption of KAU Rice varieties by Farmers (completed)
- 7 Evaluation of correspondence course
- 8 Evaluation of Farm School on All India Radio
- 9 Evaluation of Exhibition
- 10 Research study on "Environmental orientations" (Funded by Government of India)

In addition to the above, a research project on "Co-existence of Tribal people at Appankappu and with Elephants" has been prepared during the period.

A scheme for establishing "Adult Education Centre" under KAU has been submitted to the Ministry of Human Resources Development, Government of India for funding.

A proposal for establishing "Central Training Institute under the Directorate of Extension has been sent to the Government of India for funding.

Krishi Darshan Programme

This is a new programme organised with the purpose of establishing good rapport with the farming public and to expose them to the latest developments in the Research Stations under KAU. All the research stations have taken up this programme and the programme is being continued.

Horticultural Therapeutic aid

This is a novel extension programme implemented at the Cheshire Home, Trivandrum and the Pope Paul-Mercy Home, Peringandoor, Trichur by the University. This programme is organised with the objective of improving the mental health of the physically and mentally retarded people through horticulture and to improve the diet of the above people through the production of vegetables.

Under this programme, free advice was given and inputs such as seedlings, seeds etc. were supplied to establish institution and ornamental gardens. The programme is progressing satisfactorily.

KAU Commission

The Director of extension serves as the member-convenor of the Kerala Agricultural University Commission. During the period under report, the members of the Commission visited various campuses of the University and studied the Research, Teaching and Extension activities. Four meetings of the Commission were also held during the period under report.

Seminars and Workshops Conducted

Sl. No.	Name of Seminar & Workshop	Venue	Date
1.	Advanced workshop on monthly workshops (World Bank sponsor)	Directorate of Extension	9-11 April, 1985
2.	Workshop on "System of Education towards KAU 2000 AD"	KAU Head-quarters, Vellanikkara	28-29 May, 1985
3.	Workshop on "Package of Practices Recommendations (Crops) 1985"	KAU Head-quarters, Vellanikkara	14-15 June, 1985
4.	Workshop on "Development journalism"	Press Club, Trichur	11-11-1985
5.	Symposium on Care and Management of Elephants	College of Vety. & Animal Sciences, Mannuthy	14-11-1985
6.	Workshop on "Package of Practices Recommendations (Livestock, Poultry, Elephants) 1985"	College of Vety. & Animal Sciences, Mannuthy	16-17 December 1985
7.	Demonstration-cum seminar on "Cocoa processing equipment"	Directorate of Extension, Mannuthy	25-1-86
8.	"Writers" Workshop for KAU Scientists"	Directorate of Extension, Mannuthy	11-13 Feb. 1986

CHAPTER IV

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. K. R. Krishna Pillai continued as the Director of Physical Plant during the year.

Budget provision for the year is Rs. 350 lakhs under works (Plan) and Rs. 26.25 lakhs under maintenance and repairs. The expenditure upto 31-3-1986 is Rs. 241 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 and VI quarters 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 Madakkathara, Bachelors Hostel, Trainees Hostel, School building, Net house, Type I quarters, Ladies Hostel, Canteen building and Glass house are completed. Providing street lights along the 'A' Road and 'B' Road etc. are nearing completion. Works of office for Pineapple Research Station, Insectory building, flat type quarters at Vellanikkara and G. L. tank for improving water supply arrangements in Main Campus are in progress. Ten numbers of type II quarters and paddies for estate workers have also been arranged, but only one duplex could be started. 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 and VI quarters and construction of two blocks of Teachers Hostel in Main Campus are in progress. Construction of a type IV quarters, Labour lines creche building and a waiting shed at Madakkathara and 2 Nos of Type E quarters at Vellanikkara has been started.

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. Two works of Rearing House, Breeder House, building for hundred experimental animals additional Ladies Hostel, Additional lecture hall and type V quarters under NARP are completed. The works of an Additional Floor to P. G. Hostel, Metabolism Centre, Small Animal Breeding Station and a Lab. under NARP are in progress. Improvements to Foot Ball Court and providing under drains and improvements to Hockey Court are completed. Construction of two flats for 36 families, construction of Breeder house and Layer House, and fencing the balance portion of southern side of Mannuthy Campus are in progress. Work of U. G. Hostel for men is progress in Mannuthy. For improving water supply arrangements, a Ground level tank with 5 lakhs litres, laying of pipes and construction of pump house, erection of Pump Sets has been completed and further arrangements, made with the Water and Waste Water Authority for giving drinking water from Peechi and they have given connection to Mannuthy Campus. Works of a Staff Club and a paper store attached to Press Building have been started.

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. The works of additional fish ponds and improvements to acquired buildings have been arranged. Construction of type V and IV quarters at Panangad completed. The lab and seed store at Vytila under NARP [are completed. Construction of a type IV quarters at Vytila and Watchman's Quarters at Puduveyppu are in progress. Type V quarters at Puduveyppu is completed.

At Vellayani, construction of Deep Litter Poultry and the works for improvement to protected water supply to Vellayani Campus have been completed. Construction of a Lab. and Library building and Indoor stadium has been arranged and are in progress. Block topping of the main road in Vellayani Campus is completed.

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 have been arranged and are nearing completion. At Balaramapuram, forming approach road to office has been completed.

Under NARP, Type V, IV and Type II quarters and farm structures under NARPS cheme at Kumarkom and at Moncompu have been completed and type II quarters at Moncompu, works of Laboratory buildings, Moncompu and Kumarakom under NARP are in progress. The trainees Hostel at Kumarakom and Lab. building at Kayamkulam under this 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 completed.

At Thiruvazhamkunnu, construction of cow barns for 100 cows and Milk Chilling Plant are nearing completion. The Laboratory building and formation of the farm road are in progress. The construction of silos has been completed.

At Pattambi, construction of type V, IV and II quarters, Net House, Green House, Meteorological Laboratory and other farm structures under NARP are completed. Construction of the lab. building under NARP is nearing completion. The construction of Office-cum-Hostel building under KVK and quarters under KVK also are completed. Seed Store and Threshing yard and under breeder seed project also are in progress. The seed testing laboratory and lab. under KVK are also completed.

At Ambalavayal, the works for various building 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 V and IV quarters are completed. Construction of labourers waiting shed, Seed Store and fencing and compound wall are nearing completion. Construction of Type II quarters and Canteen building is in progress.

Fencing and compound wall for the farm at Thumburmuzhi has been started and improvement to water supply arrangements completed. Extension of laboratory building at Chalakudy under NARP is completed.

At Pampadumpara, the works of construction of type II and type IV quarters are in progress. Construction of a waiting shed at Pampadumpara is completed.

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 (KADP). 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.

		<i>No. of plants</i>
1.	RRIM 629	525
2.	RRIM 623	325
3.	RRIM 600	1300
4.	RRII 105	8318
	Total	<u>10468</u>

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 24.46 tonnes of rubber was produced during the year. There was a stock balance of 24.828 tonnes of rubber as on 31-3-1986. The total expenditure during the year was Rs. 11,24,091.01. The total receipts from estate during 1985-86 was 3,50,446.76.

CHAPTER VI

Finance & Accounts

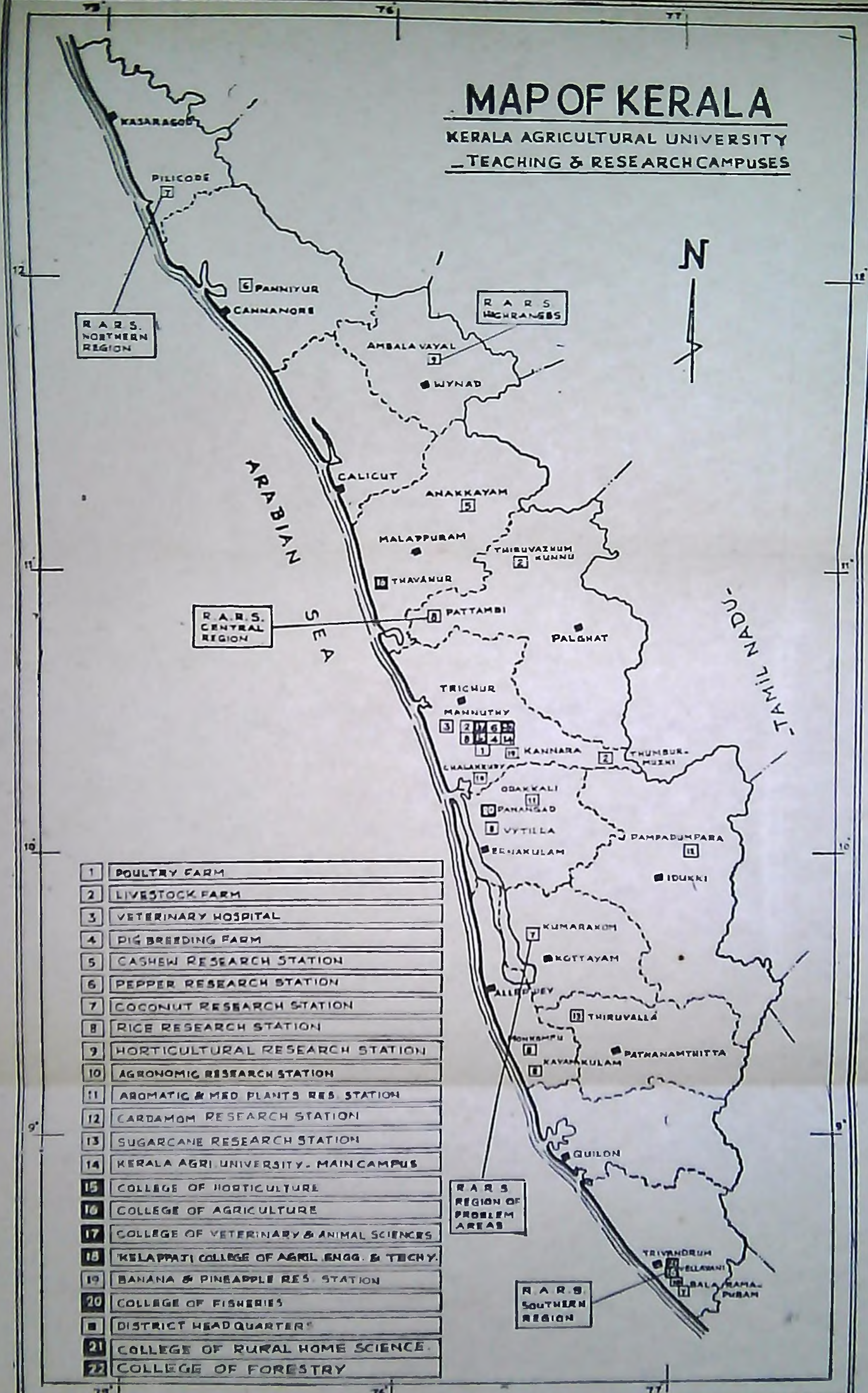
Sri K. T. Narayanan Nambiar continued as Comptroller i/c till 9-2-86 and thereafter Sri K. K. Pankajakshan, Deputy Secretary to Government was appointed as Comptroller.

For 1985-86 the University has approved budget of Rs. 1904 lakhs. During 1985-86 Government has released Rs. 570 lakhs and Rs. 230 lakhs under non-plan and plan respectively.

□□

MAP OF KERALA

KERALA AGRICULTURAL UNIVERSITY
 -TEACHING & RESEARCH CAMPUSES



- | | |
|----|--|
| 1 | POULTRY FARM |
| 2 | LIVESTOCK FARM |
| 3 | VETERINARY HOSPITAL |
| 4 | PIG BREEDING FARM |
| 5 | CASHEW RESEARCH STATION |
| 6 | PEPPER RESEARCH STATION |
| 7 | COCONUT RESEARCH STATION |
| 8 | RICE RESEARCH STATION |
| 9 | HORTICULTURAL RESEARCH STATION |
| 10 | AGRONOMIC RESEARCH STATION |
| 11 | AROMATIC & MED PLANTS RES. STATION |
| 12 | CARDAMOM RESEARCH STATION |
| 13 | SUGARCANE RESEARCH STATION |
| 14 | KERALA AGRI. UNIVERSITY. MAIN CAMPUS |
| 15 | COLLEGE OF HORTICULTURE |
| 16 | COLLEGE OF AGRICULTURE |
| 17 | COLLEGE OF VETERINARY & ANIMAL SCIENCES |
| 18 | KELAPPATI COLLEGE OF AGRIL. ENGG. & TECHY. |
| 19 | BAHANA & PINEAPPLE RES. STATION |
| 20 | COLLEGE OF FISHERIES |
| ■ | DISTRICT HEADQUARTERS |
| 21 | COLLEGE OF RURAL HOME SCIENCE |
| 22 | COLLEGE OF FORESTRY |

R.A.R.S. NORTHERN REGION

R.A.R.S. INCHRANGEB

R.A.R.S. CENTRAL REGION

R.A.R.S. REGION OF PROBLEM AREAS

R.A.R.S. SOUTHERN REGION



Appendix I

MEMBERS OF THE STATUTORY AUTHORITIES

THE GENERAL COUNCIL

EX-OFFICIO MEMBERS

- The Chancellor
- The Pro-Chancellor
- The Vice-Chancellor
- The Secretary to Government (Agri.)
- 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, Kerala Agricultural University
- The Dean, Faculty of Fisheries, Kerala Agrl. University
- The Dean, Faculty of Veterinary & Animal Sciences, Kerala Agrl. University
- The Dean, Faculty of Basic Sciences & Humanities, Kerala Agrl. University
- The Dean, Faculty of Agricultural Engineering & Technology, Kerala Agrl. University
- The Director of Extension, Kerala Agrl. University
- The Director of Research, Kerala Agrl. University
- The Director of Students' Welfare, Kerala Agrl. University

ELECTED MEMBERS

Members of the Legislative Assembly

- 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 District
- Sri. K. C. Joseph, Member, Legislative Assembly, Congress House, Sreekantapuram

Sri. K. V. Surendranath, Member, Legislative Assembly, Indian Communist Party, Keral State Council Office, Thycaud, Trivandrum

Representatives of Students of Post-Graduate Courses

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

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

Sajeevan, P. B. (84-D1-19), D. A. Sc. Student, Kelappaji College of Agri. Engineering & Technology, Tavanur, Malappuram District

Representatives of Teachers of Faculties

a) Faculty of Agriculture

F. M. H. Khaleel, Assistant Professor, Inservice Training Scheme, Mannuthy P. O., Trichur

b) Faculty of Veterinary and Animal Sciences

Dr. V. Raju, Assistant Professor, College of Veterinary & Animal Sciences, Mannuthy P. O., Trichur

c) Faculty of Fisheries

Dr. P. M. Mathew, Professor (Fisheries Research), College of Fisheries, Panangad, Ernakulam

Representative of Non-teaching staff

V. Balagopalan, Section Officer, Regional Agri. Research Station, Ambalavayal-673 593, Wynad District

Representatives of Presidents of Panchayats (4 Nos.)

Vacant

Representative of Mayors of Municipal Corporations & Chairman of Municipal Councils

Vacant

MEMBERS NOMINATED BY THE CHANCELLOR

Agricultural Scientists (2 Nos.)

Vacant

Farmers (5 Nos.)

Vacant

Non-official Representatives (3 Nos.) of
Co-operation
Fisheries
Animal Husbandry

|
|
|

Vacant

Non-Official Representative of Plantation Industry
Vacant

Woman Social Worker
Vacant

Engineer who has specialised in Agri. Engineering or Irrigation
(1 No.)
Vacant

Educationist
Vacant

Representatives of Agriculture Labour (2 Nos.)
Vacant

Representative of Plantation Labour
Vacant

OTHER MEMBERS

Representatives of University Senates of (3 Nos.)

Calicut — Dr. T. P. Muhammed, Medical Practitioner, Feroke
Cochin — Vacant
Kerala — Sri. S. Subramonyan Potti, T. C. 14/1680,
Sanskrit College Road, Trivandrum

Representative of Indian Council of Agri. Research

Dr. Vellayathum, Assistant Director General, ICAR, Krishi Bhavan,
Dr. Rajendra Prasad Road, New Delhi-1

ACADEMIC COUNCIL

Members

Vice-Chancellor, Kerala Agricultural University, Vellanikkara,
Trichur-680 654
The Dean, College of Agriculture, Vellayani, Trivandrum
The Dean, College of Veterinary & Animal Sciences, Mannuthy,
Trichur-680 651
The Dean, College of Fisheries, Panangad, Cochin
The Director of Research, Kerala Agricultural University, Vellanikkara,
Trichur
The Director of Extension, Kerala Agricultural University, Mannuthy
The Director of Agriculture, Kerala, Trivandrum
The Director of Animal Husbandry, Kerala, Trivandrum
The Registrar, Kerala Agricultural University, Vellanikkara, Trichur

The Director of Students' Welfare, Kerala Agricultural University,
Vellanikkara, Trichur

Dr. R. S. Aiyer, Professor & Head, Department of Soil Science, &
Agricultural Chemistry, College of Agriculture, Vellayani, Trivandrum

Dr. K. C. George, Professor, Department of Statistics, College of
Vety. & Animal Sciences, Mannuthy, Trichur

Dr. C. Sreedharan, Professor of Agronomy, College of Horticulture,
Vellanikkara, Trichur

Dr. G. Nirmalan, Professor & Head, Department of Physiology & Bio-
Chemistry, College of Vety. & Animal Sciences, Mannuthy, Trichur

Dr. D. Manikantan Thampi, Professor of Aquacultur, College of Fish-
eries, Panangad, Ernakulam

Dr. K. V. Peter, Professor & Head, Department of Olericulture, College
of Horticulture, Vellanikkara, Trichur

Prof. T. F. Kuriacose, Project Co-ordinator (Rice), Agricultural
Research Station, Mannuthy, Trichur

Dr. G. T. Nair, Professor of Agricultural Extension, Krishi Vigyan
Kendra, Regional Agricultural Research Station, Pattambi

Most Rev. Benedict Mar Gregorios, Arch-Bishop of Trivandrum,
Trivandrum

Dr. M. Aravindakshan, Director, Centre of Excellence for Tree Crops
& Spices, College of Horticulture, Vellanikkara, Trichur

Dr. K. V. Ahmed Bavappa, Director, Central Plantation Crops Research
Institute, Kasaragod

Dr. (Mrs.) P. Pushpamma, Dean, College of Home Science, Andhra
Pradesh Agricultural University, Hyderabad

Dr. S. M. Ajinkya, National Professor of Eminence, Bombay Veterinary
College, Parel, Bombay

Dr. C. R. Raju, Agricultural Scientist, Central Plantation Crops
Research Institute, Kasaragod

Sri. Jose Joseph (83-11-50), Post-graduate Student, Department of
Plant Pathology, College of Agriculture, Vellayani, Trivandrum

Dr. George Koshy, Associate Professor, College of Agriculture,
Vellayani, Trivandrum

Dr. P. Rabindranath, Associate Professor, College of Fisheries, Pan-
angad, Cachin

Dr. P. C. Alex, Assistant Professor, College of Vety. & Animal Scien-
ces, Mannuthy

Sri. K. P. P. Kurup, Managing Director, Trivandrum Regional Co-
operative Milk Producers Union, Girija Bhavan, Thycaud, Trivandrum
695 014

Dr. P. Basak, Advisor & Dean i/c, Kelappaji College of Agricultural Engineering & Technology, Tavanur

The Associate Dean, College of Horticulture, Vellanikkara

The Associate Dean i/c, College of Co-operation & Banking, Mannuthy
Sri. T. P. George, Professor of Agricultural Engineering, College of Horticulture, Vellanikkara

Dr. L. Prema, Associate Professor i/c, Professor of Home Science, College of Agriculture, Vellayani, Trivandrum

Sri. S. M. A. Aslam, Special Officer (Forestry), Vellanikkara

Sri. K. K. Nair, I. F. S. (Retd), Managing Director, Kerala Wood Industries Ltd., A. C. Villa, Karunalaya, Wynad Road, Calicut-673 001

Dr. R. Kalyanasundaram, Director, Centre of Excellence for Research in Animal Diseases, College of Vety. & Animal Sciences, Mannuthy.

BOARD OF STUDIES

FACULTY OF AGRICULTURE

Dean, Faculty of Agriculture, Kerala Agril. University — Chairman
Heads of Department under the Faculty (15 Nos.) — Members

Agronomy

Agril. Entomology

Agril. Botany

Agril. Economics

Agril. Engineering

Agril. Extension

Agril. Statistics

Horticulture

Plant of Pathology

Soil Science & Agril. Chemistry

Plant Breeding

Plantation Crops

Pomology, Floriculture & Landscaping

Olericulture

Processing Technology

Two Specialists

Dr. S. Subramonyam, Professor & Head of Department of Agronomy, Tamilnadu Agricultural University, Coimbatore-641 003

Dr. R. Gopalakrishnan, CWRDM, Calicut

Such other members

Dr. E. Tajudeen, Professor, Model Agronomic Research Station, Karamana

Sri. R. Sivasankara Pillai, Associate Professor, Coconut Research Station, Balaramapuram

Student Representatives

Nil

Special invitees

Director of Agriculture, Trivandrum
Assoc. Dean, College of Horticulture, Vellanikkara
Prof. C. A. Jos, Professor & Special Officer (C & B), Mannuthy
Director, Institute of Agri. Technology, Tavanur
Dr. L. Prema, Professor i/c. College of Rural Home Science,
Trivandrum

FACULTY OF VETERINARY & ANIMAL SCIENCES

Dean, Faculty of Vety. & Animal Sciences

Chairman

Heads of Departments under the Faculty (18 Nos.)

Members

Anatomy

Animal Breeding & Genetics

Animal Management

Animal Reproduction

Clinical Medicine

Dairy Science

Extension

Microbiology

Nutrition

Parasitology

Pathology

Pharmacology

Physiology & Biochemistry

Poultry Science

Preventive Medicine

Statistics

Surgery

Veterinary Public Health

Two Specialists

Dr. P. Kothandaraman, Dean, Madras Veterinary College, Madras-7

Dr. P. G. Nair, Head, Southern Regional Station, Natural Dairy
Research Institute, Bangalore-560 030

Such other members

Dr. K. Radhakrishnan, Professor, Research Co-ordination, College of
Veterinary & Animal Sciences, Mannuthy

Dr. C. R. Ananthasubramoniam, Professor (Project Co-ordinator),
Cattle & Buffaloes

Student Representative

Nil

Special invitees

Director of Animal Husbandry, Trivandrum
Director of Dairy Development, Trivandrum
Assoc. Director (Veterinary), Vellanikkara

FACULTY OF FISHERIES

Dean, Faculty of Fisheries

Heads of Departments under the Faculty (7 Nos.)

Chairman
Members

Aquaculture

Fishery Biology

Fishery Hydrography

Processing Technology

Fishing Technology

Fisheries Engineering

Management Studies

Two Specialists

Prof. H. P. C. Setti, Director of Instruction, Faculty of Fisheries,
Mangalore

Prof. G. S. Sharma, Head of Department, Marine Sciences,
Cochin University, Foreshore Road, Ernakulam

Such other members

Dr. P. M. Mathew, Professor, Fisheries College, Panangad

Sri. C. G. Rajendran, Assistant Professor (Aquaculture), College of
Fisheries, Panangad

Student Representatives

Nil

Special invitees

Director of Fisheries

Managing Director, Kerala Fisheries Corporation, Cochin-682 031

Managing Director, Kerala Inland Fisheries Development Corporation,
Cochin-682 018

THE EXECUTIVE COMMITTEE

Vice-Chancellor, Kerala Agricultural University
Secretary to Government (Agri.) and Agricultural

Chairman

Production Commissioner, Trivandrum

Member

Secretary to Government (Finance), Trivandrum

"

Secretary to Government, Development
Department, Trivandrum

"

Dr. R. M. Acharya, Deputy Director General (AS)
Indian Council of Agrl. Research, Krishi Bhavan,
New Delhi-110 001

"

Dr. N. Sadanandan, Dean, College of Agriculture, Vellayani, Trivandrum	Member
Sri. K. Sivasankara Pillai, Associate Professor, Coconut Research Station, Balaramapuram, Trivandrum	..
Prof. Alexander Zacharias, St. Joseph's College, Devagiri, Calicut	..
Sri. Therampil Ramakrishnan MLA, Krishnakripa, Trichur-3	..
Sri. Raghavan Pozhakadavil MLA, Karalam P. O., (Via) Irinjalakuda, Trichur	..
Sri. A. V. Hamza, Athakkaveedu House, Ponnani Nagaram P. O., Pin-679 583, Malappuram Dist.	..

Appendix II

SUB COMMITTEES OF THE EXECUTIVE COMMITTEE

FINANCE COMMITTEE

Vice-Chancellor	Chairman
Secretary, Finance	Member
Secretary to Government & Agrl. Production	"
Commissioner	"
Sri. Therambil Ramakrishnan, MLA	"
The Comptroller	Convenor

PLANNING AND DEVELOPMENT COMMITTEE

Vice-Chancellor	Chairman
Secretary to Government & Agrl. Production	Member
Commissioner	"
Sri. Raghavan Pozhakadavil, MLA	"
Sri Therambil Ramakrishnan, MLA	"
Prof. Alexander Zacharias	"
Sri K. Sivasankara Pillai, Assoc. Professor	Member-Convenor

RESEARCH REVIEW SUB COMMITTEE

Vice-Chancellor	Chairman
Sri Raghavan Pozhakadavil, MLA	Member
Sri Therambil Ramakrishnan, MLA	"
Prof. Alexander Zacharias	"
Sri A. V. Hamza	"
The Director of Research	Member-Convenor

SPORTS BOARD

Vice-Chancellor	Chairman
Chairman of the Students Welfare Committee	Member
Deans of Faculties & Associate Dean (Hort)	"
Registrar	"
Sri K. Sivasankara Pillai, Assoc. Professor	"
Secretary, Athletic Association of the respective	"
Colleges/Institute	"

Note: The Director of Research and/or the Dean (s) may be invited whenever considered necessary.

Student members in the General Council	Member
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

Prof. Alexander Zacharias	Chairman
Sri Raghavan Pozhakadavil, MLA	Member
Sri Therambil Ramakrishnan, MLA	"
Sri A. V. Hamza	"
Dr N. Sadanandan, Dean (Ag)	"
Sri K. Sivasankara Pillai, Associate Professor	"
The Registrar	Convenor

STUDENTS WELFARE COMMITTEE

Sri Raghavan Pozhakadavil, MLA	Chairman
Sri Therambil Ramakrishnan, MLA	Member
Prof. Alexander Zacharias	"
Sri. A. V. Hamza	"
Sri K. Sivasankara Pillai, Assoc. Professor	Member-Convenor

WORKS COMMITTEE

Vice-Chancellor	Chairman
Sri A. V. Hamza	Member
Sri Raghavan Pozhakadavil, MLA	"
The Dean, Faculty of Agriculture	"
Director of Physical Plant	Member-Convenor

SUB COMMITTEES OF THE GENERAL COUNCIL

STATUTE COMMITTEE

Prof. Alexander Zacharias, St. Joseph's College, Devagiri, Calicut	Chairman
Dr A. Ramakrishnan, Prof. of Poultry Science, College of Vety. & Ani. Sciences, Mannuthy	Member
Sri K. K. Damodaran, Senior Grade Typist Kerala Agrl. University, Vellanikkara	"
Sri K. Sivasankara Pillai, Assoc. Professor, Coconut Research Station, Balaramapuram, Trivandrum Dist.	"
Sri Raghavan Pozhakadavil MLA, Karalam P. O. (Via) Irinjalakuda, Trichur Dist.	"

Sri C. G. Rajendran, Asst. Professor (Aqua) College of Fisheries, Panangad, Ernakulam Dist.	Member
Sri C. Krishnan Nair, President, Pilicode Panchayath, Pilicode P. O. Cannanore Dist. 670353	"
Sri Therambil Ramakrishnan MLA, Krishnakripa, Trichur Dist.	"
Registrar, KAU Vellanikkara	Member-Convenor

ASSURANCE COMMITTEE

Sri O. Lukose, Ex. MLA, Arukuzhippil, Kappumthala P. O. Kaduthuruthy, Kottayam Dist.	Chairman
Smt Vijaya D. Nair, Madathil House, P. O. Thalikulathur, Calicut	Member
Sri K. P. Chelly, DKTF Dist. Vice-President, P. O. Mankada, Malappuram Dist.	"
Sri K. K. Surendran, Kottikkal House Vellanikkara P. O., Trichur Dist.	"
Sri K. A. Kurien Master, P. O. Alakode, Cannanore Dist.	"

ACCOUNTS COMMITTEE

Prof. K. J. Kurien, Nirmala College, Moovattupuzha Ernakulam Dist.	Chairman
Sri J. Mathew, President, Kaniampetta Panchayath, P. O. Varadoor, Karani Via., Kalpetta, Wynad Dist.	Member
Dr M. Aravindakshan, Prof. & Head, Department of Pomology, College of Horticulture, Vellanikkara	"
Sri S. Subramanian Potty, TC-10/1198-1 Sanskrit College Road, Palayam, Trivandrum	"

RESEARCH COUNCIL

Vice-Chancellor, Kerala Agri. University	Chairman
Director of Research, Kerala Agri. University	Secretary
Director of Extension, Extension Directorate, Mannuthy	Member
Dean, Faculty of Agriculture, College of Agri. Vellayani-695 522	"
Dean, Faculty of Vety. & Animal Sciences, Mannuthy	"
Dean, Faculty of Fisheries, Panangad-682 506	"
Associate Dean, College of Horticulture Vellanikkara-680 654	Member
Dr S. Kedarnath, Director, Kerala Forest Research Institute, Peechi 680 653	"

Director of Research, Tamil Nadu Agricultural University, Coimbatore-641 003	Member
Dr P. Basak, Advisor & Dean i/c., Kelappaji College of Agri. Engineering & Technology, Tavanur	"
Director, Central Plantation Crop Research Institute, Kasargod-679 124	"
Dr V. K. Vamadavan, Head, Water Management, Kunnamangalam, Calicut-673 571	"
Prof. Alexander Zacharias, St. Joseph's College Davagiri P. O., Calicut	"
Sri Therambil Ramakrishnan, MLA, Krishnakripa, Trichur-3	"
Prof. K. J. Kurien, Nirmala College, Moovattupuzha	"
Mr K. Sivasankara Pillai, Associate Professor Coconut Research Station, Kattachalkuzhi P. O., Balaramapuram, Trivandrum Dist.	"
Sri O. Luckose, Ex. MLA, Arookuzhippil, Muttachira, Kappumthala P. O., Kaduthuruthy (Via) Kottayam Dist.	"

CO-OPTED MEMBERS (AGRI)

- Prof. (Research Co-ordination) College of Agriculture, Vellayani
 Director of Agriculture, Kerala State or his nominee
 Sri P. S. D. Nair, Retd. Additional Director of Agriculture, DII/1828, Jai Gokul, Brigadier Lane, Trivandrum-695 033
 Managing Editor, Agricultural Research Journal of Kerala, College of Horticulture, Vellanikkara.
 Associate Director of Research (M & E), Directorate of Research
 Associate Director of Research (AR & T), Directorate of Research
 Associate Director of Research (PIg), Directorate of Research

CO-OPTED MEMBERS (VETY & ANIMAL SCIENCES)

- Professor (RC), College of Veterinary & Animal Sciences, Mannuthy
 Director of Animal Husbandry, Vikas Bhavan, Trivandrum
 Director of Dairy Development, Pattom, Trivandrum-4.
 Associate Director of Research (V & AS), Directorate of Research, Vellanikkara.
 Editor, Kerala Journal of Vety. Reserach, Veterinary College, Mannuthy.
 Dr M. N. Menon, Retired Animal Husbandry Commissioner to Govt., of India, 'Anuradha', Peroorkada, Trivandrum-695 005.
 Dr A. Ramakrishnan, Professor & Head, Department of Poultry Science, College of Veterinary & Animal Sciences, Mannuthy.

CO-OPTED MEMBERS (FISHERIES FACULTY)

Prof. C. T. Samuel, Department of Industrial Fisheries & Marine Sciences, University of Cochin, Foreshore, Road, Cochin-682016.
Dr. K. H. Alikunhi, Retd. Fisheries Advisor to Government of Kerala. Crescent Hatchery & Prawn Farm, Alamanar, Eriyad, Kodungallur.
Professor (Fisheries Research), College of Fisheries, Panangad.

CO-OPTED MEMBERS (OTHERS)

Dr. K. T. Vijaya Madhavan, Head of Department of Zoology, St. Joseph's College, Devagiri, Calicut.

Dr. K. Raghavan Nambiar, Department of Civil Engineering, College of Engineering, Trichur-680 309.

Mr. K. K. Nair, Managing Director, Kerala Wood Industries Ltd., Karunalayam, Calicut-673 001.

Sri. S M.A. Aslam, Special Officer, Faculty of Forestry, Kerala Agricultural University Headquarters, Vellanikkara.

Dr. P.K.G. Panicker, Director, Centre for Development Studies, Ullloor, Trivandrum-695 011.

FACULTY RESEARCH COMMITTEES

AGRICULTURE

Chairman

Director of Research, KAU

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

Associate Director of Research (AR&T)

Directorate of Research, Vellanikkara

Associate Director of Research (M&E)

Directorate of Research, Vellanikkara

Associate Director of Research (Plg.)

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, Prof. of Horticulture (Pepper), College of Horticulture, Vellanikkara
Cocoa & Beverage crops	Dr. R. Vikraman Nair, Prof. of Horticulture (Cocoa), College of Horticulture, Vellanikkara
Cashew	Prof. K. K. Vidhyadharan, Prof. of Horticulture (Cashew) College of Horticulture, Vellanikkara
Fruits & Floriculture	Dr. M. Aravindakshan, Special Officer & Head, Department of Pomology, College of Horticulture, Vellanikkara
Pulses & Oilseeds	Dr. V. Gopinathan Nair, Prof. of Plant Breeding College of Agriculture, Vellayani
Essential Oils & Medicinal Plants	Dr. S. Ramachandran Nair, Professor, Department of Plantation Crops, College of Horticulture Vellanikkara
Post Harvest Technology & Nutrition	Prof. K. K. Vidhyadharan, Prof. of Horticulture (Cashew), KADP College of Horticulture, Vellanikkara.
Sugarcane, Cotton & Misc. Crops	Prof. K. M. N. Namboodiri, Prof. of Agrl. Botany, College of Horticulture, Vellanikkara
Fodder crops	Dr. C. Sreedharan, Prof. of Agronomy, College of Horticulture, Vellanikkara.
Plant Protection	Dr. N. Mohandas, Prof. of Entomology, College of Agriculture, Vellayani.
Soils & Agronomy	Dr. P. Padmaja, Professor (Project Co-ordinator) Soils & Agronomy, College of Horticulture, Vellanikkara.
Farm Economics & Extension	Dr. V. Radhakrishnan, Prof. of Agrl. Economics, College of Horticulture, Vellanikkara.

Agro Meteorology

Dr. P. Balakrishna Pillai
Prof. of Agricultural meteorology
College of Horticulture, Vellanikkara

Cropping Patterns &
Farming Systems

Dr. V. K. Sasidhar,
Prof., Department of Agronomy,
College of Agriculture, Vellayani.

Vegetables & Tuber Crops

Dr. K. V. Peter,
Prof., Department of Olericulture,
College of Horticulture, Vellanikkara.

Coconut & Arecanut

Prof. K. Kannan, Associate Director,
Regional Agrl. Research Station,
Ambalavayal.

Soil Conservation and
Farm mechanisation

Prof. T. P. George,
Professor, Department of Agrl. Engg.
College of Horticulture,
Vellanikkara.

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 Vety. & Animal Sciences, Mannuthy. Dr. K. C. George

Professor, Department of Agrl. Extension, College of Agriculture, Vellayani. Dr. A. M. Thampi

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

VETERINARY & ANIMAL SCIENCES

Director of Research, Kerala Agrl. University	Chairman
Dean, Faculty of Veterinary & Animal Sciences	Member
Director of Extension, KAU	"
Assoc. Director of Research (V & AS)	"
Heads of Departments in the Faculty of Vety. & Animal Sciences	"
Dr. S. Sulochana, Assoc. Professor, Department of Microbiology	"
Professor (Farms)	"
Dr. A. Venugopalan, Professor (Res. Co-ordination)	Secretary & Convenor

VARIETY EVALUATION COMMITTEE

Director of Research, Kerala Agri. University	Chairman
Director, CTCRI, Trivandrum or his nominee	Member
Director, CPCRI, Kasaragod or his nominee	"
Director of Agriculture, Trivandrum or his nominee	"
Director of Extension, Kerala Agri. University	"
Professor of Agronomy, College of Agri., Vellayani	"
Professor of Plant Pathology, College of Agri., Vellayani	"
Professor of Agricultural Botany, College of Agriculture, Vellayani.	"
Professor of Horticulture, College of Agri., Vellayani	"
Professor of Entomology, College of Agri., Vellayani	"
Associate Director, RARS, Pattambi	"
Associate Director, RARS, Pilicode	"

THE POST GRADUATE COMMITTEE

Vice-Chancellor, Kerala Agri. University	Chairman
Director, P. G. Studies	Member
Dean, Faculty of Agriculture, KAU	"
Dean, Faculty of Vety & Animal Sciences, KAU	"
Director of Extension, KAU	"
Director of Research, KAU	"
Dean, Fisheries	"
Associate Dean, College of Horticulture, KAU	"
Professor (Research Coordination)	"
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

Vice-Chancellor	: Sri. T. Madhava Menon, IAS
Registrar	: Sri. Thomas C. George (upto 3-12-85) .. K. Sethumadhavan, IAS (from 4-12-85)
Comptroller i/c.	: Sri. K. T. Narayanan Nambiar (upto 9-2-86)
Comptroller	: Sri. K. K. Pankajakshan (from 10-2-86)
Deputy Registrar (Admn)	: Sri. K. G. Balakrishna Pillai (upto 30-6-86)
Deputy Registrar (Acad.)	: Sri. C. K. Ramakrishnan (upto 31-1-86) .. T. R. Sankunny (from 1-2-86)
Deputy Comptroller	: Sri. K. T. Narayanan Nambiar
Secretary to Vice-Chancellor	: Sri. K. V. Abdul Khader
Assistant Registrar (Admn.)	: Sri. P. V. Karunakaran Nair
Assistant Comptroller (c.c.)	: Sri. P. C. Raveendran Pillai (upto 6-9-85) Smt. V. A. Saraswathy Bai (from 7-9-85)
Assistant Comptroller (LIA)	: Smt. K. Padmavathy
Recruitment Officer	: Sri. P. M. Chandran (also holding charge of Labour Officer)
P. A. to Registrar	: Sri. A. K. Abdul Kadir.
Special Officer (Forestry)	: Sri. S. M. A. Aslam
Special Officer (Agro-forestry)	: Sri. V. R. Krishnan Nair
Section Officers	: Smt. V. Chandrika Smt. E. K. Bharathy Sri. K. K. Subramanian

Section Officers

Smt. M. N. Sreedevi
" T. A. Zainaba Beevi
" V. V. Radhamma
Sri. K. N. Pushpangadharan
Sri. K. Chandramohanan
" K. I. Chakunny
Smt. D. A. Shyamala
" K. M. Mary
Sri. K. P. Sreedharan
" K. Ravikumar
" V. R. Sankarankutty
Smt. K. Leelamma (on leave)
Sri. P. Unnikrishnan
" K. A. Mohammed
" Pius Fernandez
" T. Aravindan
" V. C. Bharathan Pillai
Smt. V. R. Vijayamma
Sri. M. N. Sasidharan
Smt. K. Subhashini
Sri. K. Kunnhoosa (on working ar-
rangement at College of Forestry)
Sri. V. Balagopalan

Senior Office Superintendents : Sri. P. Govindankutty Menon
" A. Abdul Kadir (on other duty
as P. A. to Registrar)
" O. U. Chandran
" M. R. Raveendran

Office Superintendents : Smt. P. O. Elsy
Senior Grade, Grade I Smt. V. B. Leelavathy Amma (on
Grade II Typist other duty as P. A. to Comptroller)
Sri. V. P. Asokan
" P. Haridasan
" K. Sadasivan Nair
Smt. K. L. Mary
" K. N. Santhakumari
Sri. R. Sadan
" K. K. Damodaran
Smt. P. P. Rosy
" P. Subhashini
" M. A. Bhargavi
" K. Saraswathi Amma
" H. K. Khadeeja Beevi
Sri. K. J. Lonan

Gr. II Typist

Sri. S. Sudhakaran Nair (on working arrangement at Directorate of P. G. Studies)

Smt. V. K. Mariamma

.. K. A. Valsala

.. P. Sarada

.. Lillykutty Sebastian

.. K. Girija

.. L. Sobhanakumari

.. P. Vilasini

.. Indira Amma (Office of the Director of Students Welfare)

.. K. Sobhana

.. P. Prasanna kumari

.. T. K. Sukumari

Senior Grade Assistants

: Sri. K. P. Ramachandran Nair

Smt. V. J. Rosily

Sri. P. M. Balakrishnan

Smt. T. Remadevi

Sri. N. K. Achuthan

Smt. P. V. Nalini

.. R. Thankamani

Sri. N. K. Unnikrishnan

Smt. P. K. Elsy

.. A. D. Omana

Sri. P. V. Sreekumaran

Smt. Susy Mathew

.. K. P. Saramma

.. K. Thankam

.. P. E. Haleema Beevi

Sri. K. K. Sadeesan

.. P. V. Raveendran

Smt. A. T. Gracy

.. M. A. Urmila Devi

.. C. Mercy John

Sri. A. Abdul Karim

.. V. S. Skandakumar

.. K. A. Varied

.. V. A. Achuthan

Grade I Assistants

: Smt. S. Rajalakshmi Amma

Sri. M. Radhakrishnan

.. K. R. Suresh

Smt. K. N. Lalithamma

.. Jeslet Mercy

	Smt. V. Chellamma
	Sri. M. Mohammed Basheer
	Smt. V. R. Chandrika
	.. M. Jesseentha
	.. T. K. Ambika
	.. C. Usha
	.. S. Valsala
	Sri. K. C. Joseph
	Smt. P. V. Remani
	.. N. Mary Joseph
	Sri. P. K. Mohanan
	.. K. S. Paul
	Smt. P. A. Geetha
	Sri. N. P. Valsan
	.. P. L. Tony
	Smt. P. K. Pushpaja
Grade-II Assistants	: Sri. T. Jagadeesan
	.. M. E. Rajan
	Smt. A. Daisy Anto
	Sri. P. Krishna Prakash
	.. N. V. Unnikrishnan Nair
	Smt. K. P. Vasanthakumari
	Sri. V. R. Pius
	Smt. M. P. Narmada
	.. P. E. Jasmin Beevi
	Sri. P. V. Mohanan
	.. K. Girindra Babu
	Smt. T. B. Latha
	.. S. Sathee Devi
Driver (HDV-Grade I)	: Sri. V. R. Kochu
.. Grade II)	: Sri. T. K. Govindan
.. Grade II)	: Sri. U. N. Sankaran Kutty
Driver (LDV)	: Sri. M. K. Rajendran
	.. C. P. Karunakaran Nair
	.. K. A. Mohamedkutty
	.. M. R. Gopinathan
	.. M. S. Reghu
	.. O. K. Sasidharan
	.. K. P. Jose
	Sri V. Gopalakrishnan,
	.. R. Gopalakrishnan
	.. K. O. John Stephen
	.. C. L. Antony

L. G. Binder	: Sri. R. Vijayan
Watchman	: .. Silak Bahadur
Peons	: .. S. Parameswaran Nair
	.. C. R. Chandran
	Smt. P. D. Annamma
	Sri. V. I. Balan
	.. E. K. Padmanabhan
	Smt. P. D. Rosa
	Sri. P. K. Bhaskaran
	.. V. Krishnan
	.. C. C. Velukutty
	Smt. K. K. Chandra
	Sri. M. K. Muralidharan
	.. N. P. Chandran
	Smt. K. L. Fathima beevi
	.. P. V. Devoo,
	Sri. C. O. Varunny
Sweeper	: Smt. C. P. Kousallia
Sweeper-cum-Scavenger	: Smt. K. Santhakumari
Class IV employee	: Sri. V. Sankaran
	.. K. Govindankutty
	.. John Mendez
	.. V. Gopinathan
	.. K. V. Chetty
	.. V. Mohandas
Sweeper-cum-Attendant	Smt. T. R. Annamma
	Sri. M. O. Kochannan
Bus Attendant	: Sri. K. S. Narayanan
	.. T. G. Radhakrishnan
	.. V. A. Ouseph
	.. Beer Bahadur Singh
Clerical Assistant	: Sri. T. N. Aravindakshan
	Smt. M. M. Kamani
Lab Assistant	: Sri. K. R. Gopalakrishnan
Cook-cum-caretaker	: Smt. P. Sankara Pillai
Duplicator Operator	: Sri. P. A. Francis
	.. A. V. Poulouse
	.. T. R. Govindan
Daffedar	: Sri. T. S. Keralavarman
Class IV employee	: Sri. R. G. Babu

DIRECTORATE OF RESEARCH

Director of Research	:	Dr. P. C. Sivaraman Nair (from 11.3.86)
Director of Research i/c.	:	Dr. M. Aravindakshan (from 11.3.86)
Associate Directors of Research	:	Dr. C. C. Abraham Prof. P. N. Pisharody Dr. M. Subramaniam
Professor (Bot.) i/c Associate Director	:	Dr. (Mrs.) Mary K. George (upto 10.10.85)
Assistant Professor (Ag. Stat.)	:	Sri. P. Gangadharan
Section Officers	:	Smt. P. N. Sudhadevi (upto 27.11.85) Sri. K. A. Mohammed (from 27.11.85)
Senior Grade Assistant	:	Sri. V. Viswambharan (upto 31.7.85) Smt. V. K. Pathumma
Grade I Assistant	:	Smt. P. E. Haleema Beevi Sri. K. Subramonian .. K. Haridas .. P. O. Kesavan (from 27.6.85)
Senior Grade Typist	:	Smt. T. Valsala (upto 27.5.85) Sri. K. K. Damodaran Smt. P. Subhashini Sri. P. Haridasan (from 27.5.85 to 1.3.86)
Grade-I Typist	:	Smt. K. Saraswathy Amma .. K. Akhileswari Sri. S. Sudhakaran Nair Smt. P. V. Brizhitha (from 1.3.86)
Lab Assistant Gr. III	:	Smt. A. N. Saraswathy (from 20.11.85)
Duplicator Operator	:	Sri. K. R. Govindan
Driver (L. V.)	:	Sri. K. P. Jose .. V. Gopalakrishnan
Higher Grade Peon	:	Sri. C. C. Velukutty .. P. K. Bhaskaran Smt. V. C. Ammini

DIRECTORATE OF PHYSICAL PLANT

Director of Physical Plant	:	Sri. K. R. Krishna Pillai
P. A. to D. P. P.	:	Smt. Elizabeth Thomas
Financial Assistant	:	Sri. A. I. Alex
Section Officer	:	Sri. A. Basil ,, C. Sasikumaran Nair
Senior Grade Assistants	:	Sri. P. J. John Smt. C. V. Santha ,, M. K. Shailaja ,, A. K. Lyla ,, E. K. Prabhavathy
Senior Office Supdt. (FC & D)	:	Sri. T. K. Prabhakaran
Office Superintendent (Steno to D. P. P.)	:	Sri. V. T. Kurian
Typist Gr. I	:	Smt. S. Sudha Devi ,, S. Radhamma ,, P. Sarojini Ammal
Assistant Grade I	:	Sri. V. A. Achuthan
Typist Gr. II	:	Smt. T. K. Sukumari
Driver Gr. I	:	Sri. P. K. Sasi
Blue printer-cum-sterio Operator	:	Sri. T. T. Ousephunny
Peon	:	Sri. C. V. Vijayan ,, K. C. Krishnan ,, V. A. Pareeth Smt. V. Saraswathy Sri. P. Kunhiraman
Grade II Assistants	:	Smt. K. S. Vijaylakshmi Sri. P. Krishna Prakash Smt. R. S. Saroja (on loss of pay leave)

Division and sub divisions of the Engineering Wing

Executive Engineer	:	Sri. P. O. Thomas
Asst. Executive Engineer	:	Sri. K. Antony Francis ,, T. K. Rajan ,, M. N. Raghavan ,, Chandrasekharan Achari ,, P. Sreekumaran ,, A. V. Balakrishnan ,, P. M. James ,, E. K. Gokulan

Assistant Engineer (Hr. Gr.)	:	Sri. P. Karunakara Panicker .. J. Selvanose
Assistant Engineers	:	Sri. C. Jose Mathew .. R. Chithambaran Pillai .. T. K. Sugathan .. A. J. Anto .. K. V. Ramanunni .. P. M. Paulson .. T. M. Reghunath .. A. K. Unnikrishnan .. P. Raman .. M. Parameswaran .. T. S. Sukumaran .. P. R. Govindan .. C. L. Yacob .. Joseph K. Manavalan .. M. F. Antony
Drafts man/Overseer Gr. I	:	Sri. V. S. Balan .. C. C. Devassy .. S. Murukesan Assary .. V. Sankunny .. V. Usifen .. Savy Joseph .. P. Raveendran Nair .. Suresh Babu .. M. V. Chackochan .. Abdul Khadar .. P. M. Vasudevan, .. P. M. Mohammed Ismail .. K. T. Vasudevan .. R. Kumaran Nair .. A. P. Jose .. B. Lukose .. T. A. Rappai .. K. S. Vasu .. A. P. Satheesan Smt. M. Vijayakumari
Section Officers	:	Sri. K. Prabhakaran Natar .. C. Krishnan Nair
Senior Grade Assistants	:	Sri. K. Narayanan Namboodiri .. N. Rajasekharan Smt. L. Syamaladevi .. B. Thankamoni .. A. A. Kousallia

1st Gr. Assistants	: Smt. G. Rema Bai Sri. Y. Rajas Smt. C. Santhakumari .. M. Rugmini .. A. T. Gracy
Gr. II Assistants	: Smt. P. V. Remani
Office Superintendent	: Smt. M. I. Balamani Sri. K. Muraleedharan
Senior Grade Typists	: Smt. M. K. Jainuva .. P. P. Rosy (transferred to Communication Centre)
Gr. I Typists	: Sri. P. Nataraja Pillai Smt. V. C. Mariamma
Road Roller Driver	: Sri. M. K. Bhaskaran
Technician Gr. I	: Sri. P. K. Vijayan .. T. S. Govindan
Driver Gr. II (L. M. V)	: Sri. K. M. Subramonian .. V. R. Chandran .. K. Vikraman Nair
Pump Operator Gr. I	: Sri. V. B. Esaf .. K. K. Francis .. M. V. Parameswaran .. A. Narayanan (on leave)
Pump Operator Gr. II	: Sri. R. Kumaran Nair .. V. K. Parameswaran .. K. M. Baby .. T. P. Jose Mathew .. C. R. Kochu
Peon	: Sri. K. A. Sankaru .. V. L. Antony .. K. S. Sarada .. K. P. Kumaran .. M. K. Gangadharan
Peon (Higher Grade)	: Sri. I. Nesan
Cleaner-cum-Conductor	: Sri. K. M. Haneefa (on leave)
Watchman	: Sri. V. A. Paily .. N. C. Murugan .. K. K. Balan
Asst. Lineman	: Sri. K. V. Ravi
Electrician (Gr. III)	: Sri. C. A. Varghese (1st Gr. electrician working in this post)
Transport Officer	: Sri. Abraham P. Daniel

DIRECTORATE OF PG STUDIES

Director	: Dr. N. Sadanandan
Gr. I Typist	: Sri. S. Sudhakaran Nair
Peon	: Sri. Govindan

DIRECTORATE OF STUDENTS WELFARE

Director of Students Welfare i/c	: Dr. T. G. Rajagopalan
Deputy Director of Students Welfare i/c	: Sri. O. K. Paul
Jr. Assistant Professor	: Smt. P. J. Manga
Sr. Grade Assistant	: Sri. P. M. Balakrishnan

DIRECTORATE OF EXTENSION

Director of Extension	: Dr. A. G. G. Menon
Associate Director of Extension	: Dr. G. R. Nair
Editor (Publications)	: Sri. R. T. Ravi Varma
Section Officer	: Smt. B. Syamala Devi
Steno to DE/Office Supdt.	: Sri. K. Sadasivan Nair
Steno to ADE/Office Supdt.	: Sri. P. I. Itoop (upto 21-1-86) Smt. P. P. Rosy (21-1-86)
Sr. Grade Assistants	: Sri. K. V. Sugunan Smt. P. K. Elsy
Gr. II Assistants	: Smt. K. N. Chandralekha .. E. Hymavathy
Gr. I Typist	: Smt. P. N. Savithri
Driver	: Sri. M. K. Rajendran Nair (upto 28-1-86)
Peon	: Sri. Antony (from 28-1-86) .. C. R. Chandran

Farm Advisory Service

Professor (Plant Protection)	: Dr. M. J. Thomas
Professor (Agronomy)	: Prof. A. I. Thomas
Assoc. Professor (Agronomy)	: Sri. E. P. Koshy
Assoc. Professor (Hort.)	: Sri. N. Ramachandran Nair
Assoc. Professor (Poultry Sci.)	: Dr. G. Reghunathan (upto 11-3-86)
Assoc. Professor (Ani. Sci.)	: Dr. U. T. Francis (from 12-3-1986)
Assoc. Professor (Plant Prot.)	: Dr. K. Sasidharan Pillai

Communication Centre

Asst. Professor (Inf.) (Ag.)	: Dr. C. Bhaskaran Sri. Joy Mathew
Asst. Professor (Anim. Sci.)	: Dr. Sabu Kuruvilla (upto 17-3-86)
Jr. Assistant Professor	: Sri. K. Abdul Kareem (from 8-8-85) .. Jose Joseph (from 9-10-85)

Publication Unit

Assoc. Professor (Pub.)	: Sri. K. C. Varghese
-------------------------	-----------------------

Asst. Professor (Pub.)	: Sri. Ranjan. S. Karippai (upto 31-10-85)
Asst. Professor (Ani. Sci.)	: Dr. Amritha Viswanath
Asst. Professor (Fisheries)	: Dr. K. G. Padmakumar (upto 11-6-85)
Language Editor (Mal)	: Smt. K. Mridula Devi

Exhibition and Graphic Service Unit

Asst. Professor (E and G)	: Smt. N. P. Kumari Sushama
Jr. Asst. Professor (E and G)	: Sri. G. Surendran

Supporting staff

Chief Artist	: Sri. G. Gopinathan Nair
Section Officer	: Sri. K. R. Mohanan
Technician Gr. II	: Sri. K. Sukumaran
Sr. Office Supdt.	: Sri. N. Somarajan
Artist	: Sri. P. S. Kesavan Namboodiri
Dark Room Assistant	: Sri. A. Sulaimankutty
Farm Assistant (Agri.)	: Smt. K. P. Ambika
Senior Grade Assistant	: Smt. K. P. Mary
Assistant Gr. I	: Smt. N. Kunhilakshmi
Assistant Gr. II	: Smt. P. Vijayakumari ,, N. V. Thankom
Drivers	: Sri. P. K. Sasidharan ,, M. R. Gopinathan (upto 29-12-85) Sri. M. A. Joseph (from 30-12-85)
Peons	: Smt. V. S. Bharghavi ,, M. S. Ammini
Watchman	: Sri. Silak Bahadur

Training Service Scheme, Tavanur

Assistant Professor (Agri.)	: Sri. P. Ahamed
Jr. Assistant Professor	: Both vacant
Farm Assistant (Agri) Sr. Gr.	: Sri. N. Saidalikutty
Typist Gr. II	: Smt. A. J. Mary

Training Service Scheme, Mannuthy

Assistant Professor (Extn)	: Sri. F. M. H. Khaleel (from 18.1.85)
Farm Assistant (Agri) Gr. II	: Sri. K. Gopalakrishnan (from 22.2.85)
Driver (HV) Gr. II	: Sri. K. V. Kochappan
Duplicator Operator	: Sri. C. A. Divakaran

Training Service Scheme, Vellayani

Assistant Professor (Extn)	: Smt. G. Sobhana
Farm Assistant (Agri)	: Smt. J. Vimala Bai
Typist Sr. Grade	: Smt. C. Padmavathy

Krishi Vigyan Kendra, Pattambi

Professor of Extension	:	Dr. G. T. Nair
Assoc. Professor (Hort)	:	Dr. M. N. C. Nair
Assoc. Professor (Agro)	:	Sri. P. J. Ittyaverah
Assoc. Professor (Ani. Sci)	:	Dr. U. T. Francis (upto 4.3.86)
Assoc. Professor (Home Science)	:	Smt. Sheena S. Nair
Asst. Professor (Poultry Science)	:	Dr. O. J. George
Asst. Professor (Fisheries)	:	Dr. G. S. Narayanan
Asst. Professor (Hort)	:	Sri. P. C. Rajendran (upto 15.12.85)
Asst. Professor (Home Sci)	:	Smt. C. R. Chandralatha
Section Officer	:	Sri. K. Sivanandan
Assistant Grade-II	:	Smt. Leelamma Augustine (upto 19.10.85)
Typist Gr. II	:	Smt. V. K. Resy
Farm Assistant Gr. II	:	Sri. C. G. Pradeep " David Dharmakumar
Driver	:	Sri. T. R. Sasidharan
Peon	:	Sri. T. Ramachandran (upto 19.11.85)
Hostel Attendant	:	Sri. P. K. Govindan
Watchman	:	Sri. K. Kumaran

Krishi Vigyan Kendra for Tribals, Ambalavayal

Professor	:	Sri. P. Chandrasekharan
Assoc. Professor	:	Dr. V. Thomas Alexander
Assistant Professors	:	Dr. A. Radhamma Pillai Sri. T. P. Manomohandas
Section Officer	:	Sri. R. Rajendran Unnithan
Assistant Gr. II	:	Sri. T. K. Abdul Azeez
Sweeper	:	Sri. V. Alikutty
Watchman	:	Sri. K. Koya
Attender	:	Sri. M. C. Krishnan

Krishi Vigyan Kendra, Manjeswar

Jr. Asst. Professor	:	Sri. B. Jayaprakash Naik
Assistant Gr. II	:	Sri. P. M. F. Babu
Peon/Attendant	:	Sri. V. Kunhraman
Watchman	:	Sri. T. Vittal Shetty

Scheduled Caste Area Research Centre, Nilambur (AICRP)

Associate Professor (Extn)	:	Sri. P. Rajendran
Asst. Professor (Home Eco)	:	Sri. Vijayakumar (JAP)
Technical Assistant	:	Sri. A. Abdurahiman
Typist Grade-II	:	Smt. K. Girija
Driver Grade-II	:	Sri. E. P. Narayanan

Tribal Area Research Centre, Amboori (AICRP)

Co-ordinator	:	Dr. R. S. Aiyer
Assoc. Prof (Extn)	:	Sri. P. Ramachandran Nair
Asst. Professor (Agronomy)	:	Sri. V. Sreekumar
.. .. (Animal Husbandry)	:	Dr. M. R. Rajan
.. .. (Home Science)	:	Smt. C. Nirmala
Small Scale Industries	:	Sri. G. Mohanan
Health	:	Dr. N. Madhuri Devi
		V. N. Radhakrishnan
Jr. Asst. Professor	:	Smt. K. Rari John
Home Science Helpers	:	Smt. C. Jayakumary
		Smt. Vasantha
		Smt. P. Chinnamma
Driver	:	Sri. G. Balachandran Nair
Clerk-cum-typist	:	Smt. A. Vasantha
Peon	:	Smt. K. Kunji

National Demonstration Scheme, Sadanandapuram

Associate Professor	:	Sri. G. Indrasenan (upto 19.11.85)
Assistant Professor (Soils)	:	Sri. K. Raveendran Nair
Assistant Professor (Agro)	:	Sri. I. Johnkutty
Farm Assistant	:	Sri. P. K. Rajasekharan
		Smt. K. S. Sujatha (upto 5.3.86)
Driver	:	Sri. D. Prasannakumar (from 17.3.86)
		Sri. P. S. Babu.

Lab-to-land programme & Village Adoption Programme

Co-ordinator	:	Prof. A. I. Thomas
Implementing Officers/Project Leaders	:	No separate staff. The scientists in Research Stations/Educational institutions under Kerala Agricultural University function as Implementing Officers/Project Leaders.

K. A. U. Press

Press Manager	:	Sri. K. Rajappan
Section Officer	:	Sri. P. V. Gopalakrishnan Nair (upto Dec. '85)
		Sri. K. A. Appu Chettiar from Jan. 86
Office Superintendent	:	Smt. P. O. Elsy
General Foreman	:	Sri. G. Narayana Pillai
Senior Foreman	:	Sri. P. I. Lonappan
Assistants, Senior Grade	:	Smt. K. M. Mary
		Sri. K. R. Dilipkumar (upto 5/85)
		Sri. K. A. Mohammed (upto 11/85)
		Smt. T. Remadevi (from 6/85)
		Sri. P. Aliyar (from 1/86)

Printer (U. G.)	:	Sri. V. R. Kumaran " T. P. Joseph
Compositor (U. G.)	:	Sri. V. Subramoniyar Smt. K. M. Thankamma
Binder (U. G.)	:	Sri. K. R. Vijayan
Printer (L. G.)	:	Sri. C. Viswanathan " P. R. Aravindakshan " N. J. Samuel " P. Prabhakaran
Compositor (L. G.)	:	Smt. K. Leela " P. A. Elsy Sri. V. Rajendran
Binder (L. G.)	:	Smt. P. T. Annie " S. Sarojini Amma " M. Kamalamma
Proof Readers	:	Sri. K. K. Sadasivari Smt. Sherly Sam
Computer	:	Smt. K. Santhakumari
Security Guard	:	Sri. M. S. Reghu
Peon (H. G.)	:	Sri. M. Somasekharan
Helper	:	Smt. P. Prasannakumari
Horticultural Therapeutic		
Scientist in-charge	:	Dr. G. Sreekantan Nair (Professor) (Part-time)
Krishi Darshan Programme		
Co-ordinator	:	Sri. Joy Mathew, Assistant Professor
Socio Cultural Pilot Survey (GOI) sponsored		
Principal Investigator	:	Dr. A. G. G. Menon Director of Extension
National Service Scheme		
Programme Co-ordinator	:	Dr. A. G. G. Menon Director of Extension
Programme Officers	:	Dr. S. Skariah Oommen Sri. P. A. Rajan Asari Dr. P. Balakrishna Pillai Dr. M. Achuthan Nair (upto 30-11-85) Sri. A. Augustine (from 1-12-85) Dr. M. K. Rajagopalan " V. Raju Sri. T. M. Sankaran Dr. U. Ramachandran

Department of Entomology

Professor & Head

Professor

- : Dr. N. Mohandas
- : Dr. K. V. Mammen
- .. A. Visalakshi
- .. K. John Kurien
- .. Geoge Koshy
- .. K. P. Vasudevan Nair
- Sri. K. K. Raveendran Nair

Assistant Professor

- : Sri. P. A. Rajan Asari
- Smt. K. Santhakumari
- .. K. Saradamma
- Sri. P. Reghunath
- Smt. Suma Kuruvilla
- Dr. P. B. Gopinath
- .. S. D. Rita Kumari
- Sri. C. Nandakumar
- Smt. Naseema Beevi

Junior Assistant Professor

- : Smt. Ambika Devi
- .. K. S. Premila
- .. K. Sudharma
- .. Hebsy Bai
- .. R. Ushakumari

Department of Plant Pathology

Professor & Head

Professor

- : Dr. K. I. Wilson
- : Dr. M. C. Nair
- .. S. Balakrishnan

Associate Professor

- : Dr. Susamma Philip
- .. S. K. Nair
- Smt. G. Padmakumari
- Dr. C. K. Peethambaran

Assistant Professor

- : Smt. K. J. Alice
- Dr. S. Bhavani Devi
- Sri. B. Rajagopalan
- .. M. Abraham
- .. B. Balakrishnan

Junior Assistant Professor

- : Sri. M. Vijayan
- Smt. V. K. Girija
- .. D. Geetha
- .. Kamala Nair
- Sri. C. Gokulapalan
- Kum. Lulu Das

Department of Plant Physiology

Professor

Associate Professor

- : Dr. S. Seshadrinath
- : Sri. A. T. Abraham

Department of Agricultural Economics

Associate Professor	:	Sri. Karayalar
Assistant Professor	:	Sri. E. K. Thomas
Junior Assistant Professor	:	Smt. Elsamma Job
		.. S. Regeena

Department of Agricultural Extension

Professor	:	Dr. A. M. Thampi
Associate Professors	:	Dr. G. Balakrishna Pillai
		.. B. Babu
		.. Abdul Rahiman Kunju
Assistant Professors	:	Dr. Muraleedhara Prasad
		Sri. V. Padmanabhan
		Smt. G. Sobhana
		Sri. Mottilal Nehru
		Smt. P. S. Geethakutty

Department of Agricultural Statistics

Professor	:	Sri. P. V. Prabhakaran
Junior Assistant Professor	:	Sri. M. Jacob Thomas (till 31-1-85)

Department of Horticulture

Professor	:	Dr. S. Ramachandran Nair
Assistant Professor	:	Sri. Vasanthakumar
Junior Assistant Professor	:	Smt. V. L. Sheela

Department of Home Science

Associate Professor	:	Dr. L. Prema
Assistant Professor	:	Smt. Vimalakumari
		.. V. Usha
Junior Assistant Professor	:	Smt. Mary Ukkru

Department of Animal Husbandry

Associate Professor	:	Dr. Skariah Dommen
---------------------	---	--------------------

Instructional Farm, Vellayani

Associate Professor	:	Sri. K. Pushpangadan
Assistant Professor	:	Smt. M. Suharban
Junior Assistant Professor	:	.. K. R. Sheela
		.. R. Devika

Administrative Staff of the College of Agriculture

Administrative Officer	:	Sri. V. Sreenivasan (1-4-85 to 31-10-85)
		Sri. K. G. Balakrishna Pillai (19-12-85 to 6.2.86)

Section Officer	: Sri. C. S. Asoka Kumar (upto 25-3-86) Smt. R. Kamala Bai Sri. D. Gilbert Smt. B. Sridhari Amma Sri. M. A. Alikutty .. K. Sreerangan
Senior Office Superintendent	: Smt. L. Lalitha Smt. T. Lekshmikutty Amma Sri. L. Radhakrishnan Potti Smt. V. Subaida Beevi
Office Superintendent	: Smt. Emiammal Sri. M. R. Raveendran .. A. William
Senior Grade Typist	: Sri. N. Haridas Smt. C. Padmavathy .. N. Dasamma
Grade I Typist	: Smt. S. Majida Beevi Sri. Nataraja Pillai .. C. Rajendran Nair Smt. M. Ponmoni Mohana .. S. Vasundhara .. P. Radha
Grade II Typist	: Smt. L. Sobhanakumari
Senior Grade Assistant	: Smt. J. R. Fathima Malar Smt. G. Joice .. P. Jameela
Grade I Assistant	: Sri. K. Viswanathan Asari .. N. K. Mohan Kumar .. B. Sukesan .. T. Sasikumar Smt. E. N. Savithry .. P. Lalitha Kumari Amma .. B. C. Girija Devi Sri. S. Reghupathy Chettiar Smt. S. G. Kumari Girija Sri. N. Hrishikesan Nair Smt. V. Leela .. C. Chandrika Kumari Sri. P. R. Mohana Chandran .. S. Vallinayakam Pillai Smt. M. Razya Beegum .. M. Padmakshy .. T. A. Mrudula Kumari

Manpower Development Scheme of Coffee Board

Professor : Dr. G. Sreekantan Nair
(from 1-1-84 to 31-3-85)
Assistant Professor (Hort) : Sri. E. V. Nyba (1-11-84 to 31-3-85)

Department of Olericulture

Professor & Head : Dr. K. V. Peter
Assistant Professor : Sri. T. R. Gopalakrishnan
" V. K. Raju
" S. Rajan
Smt. Salikutty Joseph
Junior Assistant Professor : Smt. Baby Lissy Markose
" P. Indira

Department of Agricultural Meteorology

Professor : Dr. P. Balakrishna Pillai
Assistant Professor : Sri. A. V. R. Kesava Rao
Res. Associate : Sri. P. Shadanan Nair

Department of Processing Technology

Professor (holding addl. charge) : Dr. K. V. Peter
Assistant Professors : Smt. K. A. Girija
Sri. P. Jacob John
Junior Asst. Professor. : Smt. V. Indira

Department of Agronomy

Professor : Dr. C. Sreedharan
Associate Professor : Dr. M. Achuthan Nair
Assistant Professors : Dr. P. V. Balachandran
" J. Thomas
" B. Mohankumar
(upto 9-11-84)
Smt. V. L. Geetha Kumari
Junior Assistant Professor : Smt. Mercy George

AICP for the Improvement of Tuber Crops (other than potato)

Assistant Professor (Agro) : Dr. C. T. Abraham
Junior Assistant Professor : Smt. E. K. Lalitha Bai

Department of Soil Science and Agricultural Chemistry

Professor : Dr. P. Padmaja
(Project Co-ordinator, Soils)
Associate Professors : Smt K. Leela
" G. Droupathi Devi
Dr. A. K. Sharda
Assistant Professors : Smt. K. C. Marykutty
Sri. Samuel Mathew
Smt. P. K. Sushama
Dr. Saleena Mathew

Coconut Root (wilt) Disease Project (CRWDP)

Professor and Head of Dept of
Soil Sciences

Associate Professor

Junior Assistant Professor

- : Dr. A. I. Jose
- : Dr. V. K. Venugopal
- : Sri. K. M. Sathianathan

(1-4-84 to 27-7-84)

Department of Agricultural Botany

Professor

Assistant Professors

- : Dr. K. M. Narayanan Namboodiri
- : Smt. Achamma Oommen
- .. K. T. Prasanna Kumari
- Sri. V. V. Radhakrishnan

Department of Agricultural Entomology

Associate Professor

Assistant Professors

- : Dr. G. Madhavan Nair
- : Dr. (Mrs) Sosamma Jacob
- Smt. S. Pathummal Beevi

Scheme for investigating root (wilt) disease of coconut palms

Professor & Head of Department
of Entomology

Assistant Professor (Nemat)

- : Dr. T. S. Venkitesan
- : Smt. Susannamma Kurien

AICP on biological control of crop pests and diseases

Associate Professor

Junior Asst. Professor

- : Dr. P. J. Joy
- : Sri. N. V. Satheesan

Department of Plant Pathology

Professor and Head

Professor

Associate Professor

Assistant Professors

Junior Asst. Professor

Root (wilt) Scheme
Professors

Junior Assistant Professors

- : Dr. Abi Cheeran (from 24-11-84)
- : Dr. K. M. Rajan (1-4-84 to 23-11-84)
- : Dr. P. Varadarajan Nair
- Sri. P. C. Jose
- .. A. Sukumara Varma
- : Dr. Sally K. Mathew
- Sri. Rajendran Pillai
- Smt. S. Estelitta
- : Dr. K. I. Wilson (upto 23-11-84)
- Dr. K. M. Rajan (from 23-11-84)
- : Sri. T. Premanathan
- Smt. S. Beena

KADP

Professor (Pepper)

Junior Assistant Professor

- : Dr. Abi Cheeran
- : T. N. Vilasini
- Sri. M. Govindan

Department of Agricultural Engineering

Professors	: Sri. T. P. George " K. John Thomas (from 30-10-84)
Associate Professor	: Dr. A. N. Rama Devi (upto 30-10-84)
Assistant Professors	: Sri. Jippu Jacob " M. Sivaswami " Sankara Narayanan
Junior Assistant Professors	: Smt. K. P. Visalakshi Sri. Koshy Varghese (from 15-5-84)

Department of Agricultural Economics

Professor	: Dr. V. Radhakrishnan
Associate Professor	: Dr. K. Mukundan
Assistant Professors	: Sri. K. Ravi " K. J. Joseph
Junior Assistant Professor	: Sri. Selvin Jebaraj Norman

Department of Agricultural Extension

Associate Professor	: Sri. K. P. Ramachandran Nair (from 8-8-84)
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Department of Agricultural Statistics

Professor	: Sri. P. V. Prabhakaran (upto 31-5-84)
Associate Professor	: Sri. V. K. Gopinathan Unnithan
Assistant Professor	: Smt. P. Soudamini

KADP

Professor (Coconut)	: Dr. K. Kumaran
" (Cocoa)	: Dr. R. Vikraman Nair
" (Cashew)	: Sri. K. K. Vidyadharan
" (Pepper)	: Dr. Abi Cheeran
" (Radio Tracer)	: Dr. P. A. Wahid
Associate Professor (Safety Officer)	: Smt. N. V. Kamalam
" (Instrumentation)	: Sri. K. Madhavan Nair
Assistant Professors	: Sri. Arthur Jacob " A. Augustin " P. C. Antony " K. Rajamohan " A. V. Mathew
Research Associate	: Sri. M. S. Hajilal

Department of Physical Education

Junior Assistant Professors	: Smt. Susy V. John Sri. E. Soman
Farm Supervisors	: Smt. P. K. Vijayalakshmi Sri. P. C. John " K. C. Kochumon Smt. K. V. Eleyamma " J. Vimala

Senior Grade Farm Assistants	:	Sri. V. M. Mathew Smt. M. K. Chandramathi
Ist Grade Farm Assistants	:	Smt. N. J. Eleyamma Sri. C. B. Sugathan .. N. M. Pavithran Smt. M. G. Sujatha Sri. K. S. Thankappan .. N. M. Mohanan .. V. Unnikrishnan
IInd Grade Farm Assistants	:	Smt. Valsamma George Sri. P. B. Bhashajan Smt. R. Jayanthi Sri. P. R. Sathian
Lab Attenders	:	Sri. M. C. Chandran .. K. R. Prabhakaran
Lab Assistants	:	Sri. E. K. Chathu .. K. K. Chandran .. K. G. Krishnan .. P. Unnikrishnan .. T. R. Balakrishnan .. Basil Rodrigus .. V. Nandakumar .. K. M. George
Mali	:	Sri K. Krishnan Kutty .. K. Sachinmayan
Processing Technical Assistant	:	Sri. K. K. Kumaran
Technical Assistant	:	Sri. M. Thankappan Nair
Technicians Grade II	:	Sri. P. M. Ramesh Chandran .. T. R. Viswambharan .. T. V. Johny .. B. S. Suresh
Pump Operator	:	Sri. E. Parameswaran Nair
Administrative Officer	:	Sri. P. K. Ramachandran Nair
Section Officers	:	Sri. A. Appuchottiar .. Lourden Leord .. V. Venugopalan
Senior Grade Assistants	:	Sri. K. N. Pushpangadan Smt. K. K. Gauthami .. P. T. Thankamony Sri. K. Balachandran
Ist Grade Assistants	:	Sri. P. V. Sreedharan .. K. M. Mathew Smt. C. C. Rosily

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Department of Anatomy

Professor in charge : Dr. P. A. Oommer
Associate Professor : Dr. Lucy Paily
Asst. Professor : Dr. K. Sreedharan Unni

Department of Animal Breeding & Genetics

Professor : Dr. G. Mukundan
Associate Professors : Dr. C. A. Rajagopala Raja
Dr. Sosamma Iype
Junior Assistant Professor : Dr. C. R. Girija

Department of Animal Management

Professors : Dr. T. G. Rajagopalan
Dr. C. K. Thomas
Associate Professor : Dr. Kurien Thomas
Assistant Professors : Dr. Francis Xavier
Dr. P. C. Saseendran

Department of Animal Reproduction

Professors : Dr. C. P. Neelakanta Iyer
Dr. K. Prabhakaran Nair
Dr. V. Sudarsanan
Associate Professors : Dr. E. Mathai
Dr. M. S. Nair
Dr. E. Madhavan
Assistant Professors : Dr. T. Sreekumaran
Dr. Joseph Mathew
Junior Assistant Professors : Dr. K. Ramachandran
Dr. K. V. Atman
Dr. K. N. Aravinda Ghosh

Department of Clinical Medicine

Professor & Head : Dr. K. M. Alikutty
Associate Professor : Dr. N. M. Aleyas
Assistant Professor : Dr. P. C. Alex
Junior Assistant Professors : Dr. K. M. Jayakumar
Dr. P. G. Baby

Department of Dairy Science

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Associate Professors : Dr. K. Pavithran
Dr. M. V. Sukumaran
Dr. N. Narayanan Nair
Dr. R. Rajendrakumar

Assistant Professors : Dr. M. Mukundan
Dr. P. I. Geevarghese

Department of Extension

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Junior Assistant Professor : Dr. C. V. Andrews
Dr. M. R. Subhadra

Department of Microbiology

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Dr. V. Jaya Prakash
Junior Asst. Professor : Dr. D. Sudharma

Department of Nutrition

Professor and Head : Dr. E. Sivaraman
Associate Professors : Dr. C. T. Thomas
Dr. Maggie D. Menachery
Dr. C. S. James
Assistant Professors : Dr. T. V. Viswanathan
Dr. M. Nandakumaran
Dr. A. D. Mercy
Junior Assistant Professor : Dr. P. Gangadevi

Department of Parasitology

Professor : Dr. K. Rajamohanam
Associate Professors : Dr. C. Chandrasekharan
Dr. V. Sathianesan
Dr. K. Madhavan Pillai
Dr. C. George Varghese
Assistant Professors : Dr. C. Pythal
Dr. H. Subramaniam

Department of Pathology

Professor and Head : Dr. A. Rajan
Professors : Dr. K. M. Ramachandran
Dr. K. I. Mariyamma
Associate Professors : Dr. K. V. Valsala
T. Sreekumaran
Jr. Assistant Professors : Dr. N. Divakaran
C. R. Lalithakunjamma
C. B. Manomohan

Department of Pharmacology & Toxicology

Professor : Dr. M. K. Rajagopalan
Senior Scientist : Dr. Jacob V. Cheeran

Associate Professors : Dr. Zacharias Cheriyan
 Assistant Professors : .. P. Marykutty
 : Dr. N. Gopakumar
 : Sri V. R. Reghunandan

Department of Physiology and Biochemistry

Professor : Dr. G. Nirmalan
 Associate Professors : Dr. G. Venugopalan
 : .. M. G. Ramakrishna Pillai
 : .. K. P. Sadanandan
 Assistant Professors : Dr. K. A. Surendranathan
 : Sri. P. K. Ismail
 Jr. Assistant Professor : Dr. Sisilamma George

Department of Poultry Science

Professor & Head : Dr. A. Ramakrishnan
 Professors : Dr. A. K. K. Unni
 : .. C. K. Venugopalan
 Associate Professors : Dr. G. Reghunathan Nair
 : .. R. Sabarinathan Nair
 Assistant Professors : Dr. V. K. Elizabeth
 : .. T. V. Viswanathan
 : .. K. Narayanankutty
 : .. M. R. Rajan
 : Smt. Gracamma Kurian
 Jr. Assistant Professors : Dr. Peethambaran
 : .. Leo Joseph

Department of Preventive Medicine

Professor : Dr. E. P. Paily
 Special Officer—Clinics & : Dr. P. T. Georgekutty
 Internship
 Associate Professor : Dr. K. Baby
 Assistant Professors : Dr. K. Venugopal
 : .. M. R. Saseendranath
 Jr. Assistant Professor : Dr. M. Abdul Azeez

Department of Surgery

Professor : Dr. P. O. George
 Associate Professors : Dr. K. N. Muraleedharan Nair
 : .. A. M. Jalaludin
 : .. S. Ravindran Nair
 : .. C. Abraham Varkey
 Assistant Professor : Dr. T. Saradamma
 : .. K. Rajankutty

Department of Veterinary Public Health

Professor	:	Dr. R. Padmanabha Iyer
Associate Professors	:	Dr. M. Soman .. P. Prabhakaran .. E. Nanu
Assistant Professor	:	Dr. M. T. Jose

Department of Statistics

Professor & Head	:	Dr. K. C. George
Assistant Professors	:	Sri. K. L. Sunny .. N. Ravindranath
Jr. Assistant Professors	:	Smt. V. Narayanikutty .. K. S. Sujatha

Department of Animal Production Economics

Professor	:	Dr. T. Prabhakaran
Physical Education		
Jr. Assistant Professor	:	Sri. O. K. Paul Smt. Molly Cherian
Administrative Officer	:	Sri. K. Balakrishnan Nair
Section Officer	:	Smt. V. R. Vijayamma Sri. K. Kuttappan Achary Smt. K. Rajamma .. L. Syamala
Sr. Office Superintendent	:	Smt. D. Hymavathy
Lab Technicians	:	Sri. T. K. Poullose .. C. Georgekutty
Research Assistant	:	Smt. Aniamma Chacko Sri. P. N. Vishnu Namboodiri Smt. Mariamma Kurien
Technician	:	Sri. C. Ramadasan
Sr. Gr. Assistants	:	Smt. T. Remadevi .. Lillykutty Thomas .. A. Subhalakshmi Ammal Sri. P. Aliyar Smt. A. K. Kamalabai .. K. K. Beena
Gr. I Assistant	:	Smt. S. Rajalakshmi Amma .. K. S. Nirmala .. Sherly Mathew Sri. T. Somasundaram Smt. P. P. Annamma Sri. Jacob Simon
Gr. II Assistants	:	Smt. Mabel Philip Smt. Brigit Kuruvilla Sri. K. J. Kuruvilla

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Gr. II Typist	: Smt. K. A. Geetha
Farm Supervisors	: Smt. P. V. Kunjai Sri. C. Rarnakrishnan Smt. T. Kallianikutty Sri. M. K. Kumaran .. E. Sreedhara Marar
Farm Supervisors	: Smt. V. K. Radha Sri. N. Bhaskara Pillai .. T. K. Gopalan .. T. K. Abdul Rahiman .. O. Sreedharan
Farm Assistant Senior Grade	: Sri. A. S. Karunakaran
Grade I Farm Assistants (Vety)	: Sri. K. L. Jose Sri. C. C. Narayanan Smt. P. C. Lilly Smt. P. C. Mary Sri. P. S. Kumaran Smt. P. Remani Sri. J. K. Narayanan Smt. P. K. Vijayamani Sri. K. V. Balan
Technicians	: Smt. K. Indiradevi Sri. P. M. Joseph Sri. Eugine G. Varghese
Reference Assistants	: Smt. K. S. Ambili Sri. P. Sanjeev .. Abdulrazak .. T. A. Joseph Smt. B. Leela
Steward	: Sri. K. V. Sudhindran
Matron	: Smt. T. P. Sicily
Sycc	: Sri. V. L. Devassy
Clerical Assistants	: Sri. E. Gangadharan .. T. Narayana Menon .. N. Raghavan Achari .. K. K. Balakrishnan .. C. C. Pandit .. C. K. Karappan .. K. Gopalan

Peons	: Sri. K. Madhavan : K. T. Devassy Smt. V. Ammini Amma : M. V. Ammini : P. L. Mariam : K. A. Mathiri Sri. K. V. Sukumaran : I. Govindankutty
Duplicator Operators	: Sri. C. D. Jose : M. Gopinathan
Technical Assistant Attendants	: Smt. K. P. Santhabai : Sri. M. Divakaran Smt. M. R. Kathru
Sweeper-cum-Attendants	: Sri. V. V. Vasu Smt. P. I. Kunjumol Sri. P. K. Velayudhan : A. Velayudhan
Sweepers	: Smt. A. N. Saraswathy Sri. I. R. Rajan
Drivers	: Sri. M. Balakrishnan : M. Sooryanarayanan : C. L. Anthony : A. J. Anthony
Cleaner-cum-Attendant Sweeper-cum-Attendant	: Sri. E. L. Timothy : Smt. P. N. Santhakumari

COLLEGE OF FISHERIES, PANANGAD

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Professor (Aquaculture)	: Dr. D. M. Thampy
Professor (Fisheries Research)	: Dr. P. M. Mathew
Assoc. Professor (F. Biol)	: Dr. P. Ravindranath
" (F. hydrography)	: Sri. K. K. Varma
" (Fish processing)	: Sri. D. D. Namboodiri
" (Fish Tech)	: Sri. P. Radhakrishnan
" (Statistics)	: Sri. T. M. Sankaran
" (Botany)	: Sri. K. M. George
Asst. Professor (Algology)	: Dr. Thresiamma James
" (Aquaculture)	: Sri. C. G. Rajendran
" (Fish breeding)	: Sri. Syed Ismail Koya
" (Zoology)	: Dr. R. Shylajakumari
" "	: Dr. J. M. Jose
Asst. Professor (Aquatic bio)	: Dr. C. T. Cherian
" (Chem Oceanography)	: Sri. P. S. Mrithunjayan
" (Fish biochemistry)	: Sri. P. M. Sherief
" (Fish Microbiology)	: Dr. M. C. George

Jr. Asst. Professor (Genetics)	:	Kum. Elizabeth Joseph
.. (Ichthyology)	:	Dr. B. Madhusoodhana Kurup
.. (Meteorology)	:	Sri. N. N. Raman
.. (Nutrition)	:	Smt. Lizy Bahanan
.. (Aquaculture)	:	Dr. M. V. Mohan
		.. Anna Mercy
Research Fellows	:	Kum. D. Jessy
		.. Susheela Mathew
		.. K. Vanaja.
		.. S. Devika Rani
		.. K. M. Lathy
		.. V. Rekha
		Sri. I. K. Venugopalan
		.. N. C. Pradeep
		.. K. A. Navas
		.. N. Ramadas
		.. K. S. Sajeevan
		.. R. P. Jayasankar
		.. H. V. Narayanan
Fieldmen (Fisheries)	:	Sri. V. K. Balakrishnan
		.. K. K. Reghu
		.. N. Chakrapani
Fisherman-cum-Watchman	:	Sri. M. S. Moni
		.. A. M. Kareem
		.. A. N. Reghu
		.. P. J. Kunjappan
		.. P. M. Gopi
		.. P. P. Puspakaran
Farm Assistant Gr. II	:	Sri. A. X. George
Administrative Officer	:	Sri. K. G. Balakrishna Pillai
Section Officers	:	Sri. A. Kuriakose
		Smt. B. Lalitha Bai
Office Supdt.	:	Sri. K. Paul Sextus
Sr. Gr. Typist	:	Smt. R. Sarada Devi
Sr. Gr. Assistant	:	Smt. M. S. Sulaika Boevi
Gr. I Assistants	:	Smt. K. Muthumani
		Sri. K. G. Antony
Gr. II Assistants	:	Smt. K. A. Lucy Mary
		.. K. R. Santha
Gr. I Assistant	:	Sri. P. U. Kesavan
Gr. II Assistants	:	Smt. B. Bhanumathy
		Kum. Prema B. Nair
		Sri. P. T. George
Clerical Assistant	:	Smt. T. N. Kausalya
Drivers (Gr. II HD)	:	Sri. I. T. Rappai (from 30-10-84)
		.. P. K. Devassy

Drivers Gr. II (LD)	: Sri. A. P. Chacko
	.. T. K. Ramanan
	.. K. Uthaman
	.. K. Joy
Bus attendant	: Sri. T. G. Radhakrishnan
Peons	: Sri. P. M. Varghese
	.. K. K. Raghavan
	.. Rajendra Babu Pillai
Class IB (lib) Peon	: Sri. K. N. Sasikumar
Sweeper-cum-attendant	: Sri. R. Gopal Singh
Part-time sweepers	: Smt. E. Leelamony
	.. P. B. Naveesa

Instructional Farm & Fisheries Station, Puduveypu

Associate Professors	: Dr. K. Jayasree Vadhyar
	Sri. K. S. Purushan
Assistant Professor (Brackish water fish farming)	: Dr. V. Jayaprekash
Assistant Professor (Aquaculture)	: Sri. M. M. Jose
Research Fellow	: Sri. K. S. Sajeevan
Grade-II Assistant	: Smt. C. M. Girija

KELAPPAJI COLLEGE OF AGRICULTURAL ENGINEERING AND TECHNOLOGY, TAVANUR

Adviser & Dean i/c.	: Dr. P. Basak
---------------------	----------------

Department of Farm power, Machinery & Energy

Professor & Head	: Sri. C. P. Muhammed
Associate Professor	: Sri. Jippu Jacob
Assistant Professor	: Sri. M. Sivaswami
Junior Assistant Professors	: Sri. M. Mathew John
	.. G. Rajagopal
	.. Abdul Harris

Department of Agricultural processing & Structures

Assistant Professor	: Sri. Jobi V. Paul
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Department of Irrigation & Drainage Engineering

Professor & Head	: Sri. K. John Thomas
Junior Asst. Professors	: Sri. M. S. Hajilal
	Miss D. Sasikala

Department of Land, Water Resources & Conservation Engineering

Professor & Head	: Sri. K. John Thomas (Addl. Charge)
Junior Asst. Professors	: Sri. Koshy Varghese
	Sri. Alexander Seth

Department of Supportive & Allied Courses of study

Associate Professor	:	Dr. P. C. Antony
Assistant Professors	:	Sri. Philipose Joshua Sri. P. Ahamed Dr. E. Komala Amma Sri. U. A. Raphel Dr. K. V. Satheesan
Junior Asst. Professors	:	Sri. M. A. Peter Sri. Habeebur Rahman .. P. Rajendran .. Velayudhankutty Smt. T. J. Rehumath Niza .. K. Nandini .. V. P. Lakshmikutty
Research Assistant	:	Sri. A. P. Gopalakrishnan
Technical Staff		
Librarian	:	Sri. P. A. Parameswaran
Trade Assistants	:	Sri. C. Velayudhan .. P. Balakrishnan .. A. K. Padmanabhan .. U. P. Kannan .. C. S. Krishnan .. T. P. Aboobacker
Lab Assistants	:	Sri. P. K. Chandran .. P. Krishnankutty .. P. V. Kumaran .. P. Theyyunni Menon .. P. K. Chandran
Technicians	:	Sri. K. T. Ramachandran .. V. K. Asokan .. K. P. Sreedharan Nair .. Thomas Skaria
Farm Assistants Sr. Gr.	:	Smt. R. V. Balamani Sri. N. Saidalikutty
Farm Assistant Gr. I	:	Sri. K. Sothumadhavan .. C. Subramanian .. V. P. Ramakrishnan
Farm Assistant (Vety) Gr. I	:	Sri. K. Velayudhan
Gardener (Hr. Gr.)	:	Sri. K. Mammikutty
Pump Operator	:	Sri. E. Parameswaran Nair
Administrative Staff		
Administrative officer	:	Sri. N. Balakrishnan
Section Officers	:	Sri. C. Assainar .. A. K. Sreenarayanan .. P. M. Parameswaran Namboodiri

Senior Office Supdt.	:	Sri. C. Krishnan kutty Nair
Senior Gr. Assistants	:	Sri. C. Arumughan
		.. P. Unnikrishnan
		.. K. Mohamed Naha
		.. K. U. Prabhavathy
		.. K. Leelamma
Assistant Grade I	:	Sri. M. P. Balan
		.. K. V. Purushothaman Nambiathiri
		.. V. Sivadasan
		.. N. U. Jayarajan
		.. P. Janardhanan
		Smt. K. P. Kalliani
Sr. Gr. Typist	:	Sri. K. P. Abdurahiman
Typist Grade I	:	Smt. P. Lalitha
Typist Grade II	:	Sri. P. I. Ittoop
Driver Grade I	:	Sri. N. V. Krishnan
.. Grade II	:	Sri. A. M. Abdulkhadir
.. (LDV)	:	Sri. C. N. Soman
		.. P. S. Kabeer
Peons (Hr. Gr.)	:	Sri. Kunhikutta Menon
		Smt. K. Rohini
Peons	:	Smt. C. Ponna
		.. K. V. Madhavi
		Sri. M. Abdurazack
		.. T. P. Vijayan
		.. C. Kunhan
Watchman	:	Sri. C. P. Damodaran
		.. K. Kuttikrishnan
Sweepers	:	Sri. K. Ravunni
		Smt. Ammukurupathiar
Sweeper-cum-marker	:	Sri. K. Kunhan
Sweeper-cum-attendant	:	Smt. V. Kuttimalu
Scavenger	:	Sri. C. Muhamedkutty
Regional Agricultural Research Station, Pilicode		
Associate Director i/c.	:	Dr. R. R. Nair
Professor (Agron)	:	Dr. R. R. Nair
.. (SS & Ag. Chem)	:	Sri. K. Babukutty (upto 30-6-85)
		Dr. Thomas Varghese (from 1-7-85)
Professor (Agronomy)	:	Sri. I. P. Sreedharan Nambiar
Professor (Oil Tech.)	:	Dr. P. K. Narayanan Nambiar
		Sri. N. N. Ramankutty

Assoc. Professor (Agro.)	:	Sri. K. Sankara Panicker
" (Metro.)	:	Dr. GSLHV Prasad Rao
" (Pl. Br.)	:	Smt. V. K. Mallika (on study leave)
" (Stat.)	:	Sri. K. C. Chandy
" (Gen.)	:	Sri. M. P. Abdurazak
" (Ent.)	:	Dr. N. K. Vijayakumar
" (Pl. Path.)	:	Smt. Sumangala S. Nambiar
"	:	Sri. K. Sathyarajan
"	:	Sri. T. C. Radhakrishnan
Assistant Professors (Micro.)	:	Sri. K. P. Mammooty
" (Agri.)	:	Dr. Sudhakara
" (Hort.)	:	Sri. L. Rajamony
" (Ent.)	:	Sri. A. M. Ranjith
" (Bot.)	:	Sri. P. C. Balakrishnan
" (Pl. Path.)	:	Smt. A. Naseema (on study leave)
Research Officers	:	Sri. K. Bhaskaran Nambiar
		(on study leave)
		Sri. P. K. Ramachandran Nambiar
Junior Asst. Professors	:	Smt. C. Latha Bastine
		Sri. Syam S. Kurup
		" Abdul Khader
		" Rajagopalan
		" M. Govindan
Farm Assistants Grade I	:	Sri. Basil Rodrigues
		" A. Vijayan
		" K. J. Loveson (on study leave)
		" P. N. Ratheesan
		" K. A. Kurien
		" M. M. Sankaran
		" M. V. Premarajan
		" R. Nelson
Lab Assistants Grade II	:	Sri. V. Narayanan
		" T. Raghavan
		" T. Venu (on L. S. A. training)
Administrative Officer	:	Sri. N. Padmanabhan Nair
		(upto 30-11-85)
Section Officer	:	Smt. C. M. Radhakutty
Sr. Grade Assistants	:	Sri. K. Balachandran
		" P. M. F. Babu
		Smt. S. Droupadi
Assistant Grade I	:	Smt. Suma Varghese
		Sri. E. V. Sasidharan
		Smt. M. Leela
		" C. Shobhanakumri
		" T. Lakshmikutty

Sr. Grade Typist	: Smt. P. Radha Sri. M. C. Jayakumar
Typist Grade II	: Smt. V. P. Shyamala Sri. K. Ravindran
Tractor Driver Grade II	: Sri. P. Sasidharan Nair (on LSA Training)
Driver Grade III	: Sri. A. V. Kunhikrishnan " P. S. Vijayakumaran Nair
Jeep Driver	: Sri. T. M. Sukumaran
Oil Engine Driver	: Sri. P. K. Sadanandan
Higher Grade Peon	: Sri. P. K. Kannan " P. Raghavan " K. Raman
Peon	: Sri. T. K. Chandran " T. Raghavan
Sr. Gr. Farm Assistants	: Sri. P. S. Simon Smt. K. Rugmini Amma " P. Padmavathy

Pepper Research Station, Panniyur

Professor (Ag. Chem) & Head	: Sri. V. Sukumara Pillai
Professor (Pl. Breeding)	: Sri. C. A. Joseph (on working arrangement at Moncompu)
Associate Professor (PP)	: Sri. S. Sasikumaran
Assistant Professor (PP)	: Sri. P. K. Unnikrishnan Nair
Assistant Professor (Bot)	: Sri. K. K. Ibrahim
Farm Supervisor Gr. II	: Smt. M. J. Annakutty (upto 4.6.85)
Farm Supervisor Gr. II	: Sri. M. Rajaretnam (from 21-6-85)
Sr. Gr. Farm Assistant	: Sri. P. Raghavan
Gr. I Farm Assistant	: Sri. P. J. Joseph
Field Supervisor	: Sri. K. Unnikrishnan
Grade II Farm Assistants	: Sri. D. Prasanna kumar (upto 13-6-85) " A. Ramakrishnan " Kunhimohammed " L. Mohandas " A. Sasidharan (from 19-6-85) " K. Lakshmanan (from 24-6-85)
Administrative Assistant	: Smt. K. Pankajakshi
Grade I Assistant	: Smt. Merly Sarojini Sri. V. Narayanan
Grade II Typist	: Smt. K. Pushpavalli
Hr. Grade Peon	: Sri. K. Chindan
Watchman	: Sri. M. P. Narayanan (upto 13-6-85) " T. KunhIRaman (from 13-6-85)

Hr. Grade Lab. Assistant	:	Sri. V. Achuthan
Peon	:	Sri. P. Narayanan
Jeep Driver	:	Sri. K. Sreedharan
Regional Agricultural Research Station, Ambalavayal		
Associate Director of Research	:	Sri. K. Kannan
Assistant Professors	:	Sri. K. C. Aipe
		.. C. M. George
		.. P. J. Joseph (from 2.8.85)
Junior Assistant Professors	:	Smt. Sansamma P. George
		Sri. C. S. Jayachandran Nair
		.. V. S. Devadas
		Smt. Jessy M. Kuriakose
Farm Supervisor Grade-I	:	Sri. S. M. Jainulabdeen
		(upto 3-8-85)
Farm Supervisor Grade-II	:	Smt. K. Panki (upto 7-6-85)
Farm Assistant Senior Grade	:	Sri. K. M. Vijayakumaran
Farm Assistants Grade I	:	Sri. V. K. Kumaran
		Smt. P. Padmavathy
Farm Assistants Grade-II	:	Sri. A. Kunhimohammed
		.. K. M. George
		.. T. K. Omanakuttan
		.. M. V. Premarajan
		.. N. R. Rajan
		.. K. Lakshmanan
		.. P. P. Philip
		.. K. T. Jacob
		.. C. P. Nandakumar
Field Supervisor	:	Sri. K. Raghavan
Tractor Driver Grade-II	:	Sri. M. Mohammedkutty
Oil Engine Driver	:	Sri. A. Varghese
Lab Assistants	:	Sri. A. Govindan Nair
		.. K. Achuthakurup
		.. M. Vasu
Lab Assistant Grade-III	:	Sri. C. R. Balakrishnan
		(upto 26-12-85)
		.. P. V. Gopalakrishnan Nair
		(from 2-1-1986)
Section Officers	:	Sri. V. Balagopalan
Senior Grade Assistant	:	Sri. E. George (upto 30-11-85)
Assistants Grade-1	:	Sri. K. Kelappan
		Smt. P. Sulochana
Assistants Grade-II	:	Sri. T. K. Abdul Azeez
		.. K. M. Abdul Nazar
Senior Grade Typist	:	Sri. G. Shanmughan
Typist Grade-II	:	Smt. K. T. Vijayalakshmy

Jeep Driver Grade-I	:	Sri. M. Unnikutty
Driver LV Grade-II	:	Sri. T. L. Francis
Hr. Grade Peon	:	Sri. K. Raman
		.. K. Gopalan Nair
		.. K. R. Chandrasekharan
Watchmen (Hr. Grade)	:	Sri. T. Kunhappa
		.. P. Moosa
Watchman	:	Sri. K. Ibrahimkutty

Cashew Research Station, Anakkayam

Assoc. Professor (Ag. Bot)	:	Sri. K. I. James (upto 9.1.285)
Junior Assistant Professor	:	Smt. P. V. Nalini (from 2.12.85)
		.. K. Nandini (1-4-85—2-12-85)
Farm Assistants Gr. I	:	Sri. K. Aboobacker
Assistants Grade-I	:	Sri. C. Rajagopal
Drivers	:	Sri. Unnikrishnan (upto 22-2-86)
Mali	:	Smt. P. P. Ummachu
Peon	:	Sri. C. Muhammed.

Regional Agricultural Research Station, Pattambi

Associate Director	:	Sri. N. Rajappan Nair
Professor (Soil Science)	:	Dr. K. P. Rajaram
..		.. N. P. Chinnamma
.. (Ag. Bot)	:	Dr. K. J. James (from 17-12-85)
.. (Ag. Chem)	:	Dr. P. K. G. Menon
.. (Ag. Botany)	:	Dr. K. Karunakaran
.. (Pl. Pathology)	:	Dr. V. P. Sukumara Dev.
Assoc. Professor (Agron)	:	Sri. D. Alexander
.. (Ag. Bot)	:	Smt. P. Chandrika
.. (Agronomy)	:	Sri. P. J. Tomy
Asst. Professor (Agron)	:	Sri. K. Viswambharan
		Dr. B. Mohankumar
		Dr. Kamalam Joseph
		Sri. M. A. Hassan
		Smt. K. E. Savithri (upto 4-9-85)
Asst. Professor (Ag. Chem)	:	Sri. K. Anilkumar
.. (Bio-chemistry)	:	Dr. Jacob John
.. (Ag. Extn)	:	Sri. S. Mothilal Nehru
.. (Hort)	:	Smt. K. K. Santha
.. (PP)	:	Dr. A. Sreedharan
Junior Asst. Professor	:	Sri. T. Premanathan.
.. (Ag. Econ)	:	Smt. Jessy Thomas
.. ..	:	Smt. C. A. Mary
.. (Pl. Br)	:	Smt. C. A. Rosamma
.. (Agro)	:	Sri. P. P. Joy

Farm Supervisor (Vety) Hr. Gr.	:	Sri. K. Achuthan (upto 30-9-85)
Farm Supervisors (Agri) Gr. II	:	Sri. K. P. Kesava Menon Smt. P. T. Sarada Sri. Abraham K. Cheru
Farm Assists. Sr. Gr.	:	Sri. N. S. Gertrude Sri. V. Kundhu Smt. R. V. Balamani Sri. P. Bhaskaran
Farm Assistant (Vety)	:	Sri. P. Balakrishnan
Farm Assistant Gr. I (Agri)	:	Sri. T. R. Sudevan .. P. A. Moni Smt. E. L. Riechal Sri. C. P. M. A. Azeez .. C. B. Venugopalan .. M. Saifudeen
Farm Assistant Gr. II	:	Sri. K. Juslin .. P. C. Girijavallabhan .. M. J. Joseph .. T. Velayudhan .. C. Gireesan .. M. Rajendran
Farm Assts. Gr. II	:	Sri. Sreenivasan Palasseri .. M. V. Yusuf Smt. K. Krishnakumari
Administrative Officer	:	Sri. T. P. Ponnann
Section Officers	:	Sri. N. Soman .. K. P. Koyamu
Senior Office Supdt.	:	Sri. K. Mammoo
Office Supdt. (FC & D)	:	Sri. M. P. Ramankutty Nair
Senior Grade Assistants	:	Sri. K. Rangaswamy .. M. P. Ahammed .. P. M. Cherukutty Smt. K. Parukutty
Assistant Grade I	:	Smt. P. Moonakshykutty Sri. M. G. Rajendrababu Smt. N. V. Thankamany Sri. A. V. Sreenivasa Raghavan
Assistant Grade-II	:	Sri. O. Sathumadhavankutty
Senior Grade Typist	:	Smt. S. Seemanthini
Typist Grade-II	:	Smt. P. Vasanthakumari (1-8-85 to 30-9-85) .. V. G. Girija .. V. Santhakumari (from 1-10-85)
Duplicator Operator	:	Sri. A. Jayagovindan (upto 4-6-85) Sri. C. Kunhan (from 12-2-86)

Technician	:	Sri E. Abdul Hakkim
Drivers	:	Sri. A. Krishnan
		.. M. V. Ramachandran
		.. K. M. Ayyappan (upto 31-7-85)
		.. K. Parameswarani (from 7-8-85)
Head Peons	:	Sri. T. C. Kandan
		.. Pandrathodi Narayanan
		.. A. Chamy
Peons (Higher Grade)	:	Sri. K. Vasu
		.. A. Manmoo
		.. K. P. Narayanan
		.. T. Raman
Peon	:	Sri. K. V. Balakrishnan
Lab Assistants	:	Sri. V. P. Pula
		.. Subramaniam
		.. M. Vasu (from 1-4-85)
		.. K. Achutha Kurup (from 3-7-85)
		.. T. Gangadharan
		.. P. Sankaran
		.. V. Bhaskaran
		.. M. P. Sankaran
		.. T. Ramakrishnan
		Smt. P. Santhakumari
		Sri. K. R. Ganesh
Electrician	:	Sri. Satheesh Kumar
Watchman	:	Sri. Bag Bahadur
		.. V. P. Mammy
		.. P. K. Aboo
		.. P. Mohammed
		.. K. C. Surya Bahadur
Sweeper	:	Smt. P. Kunhilakshmy

Banana Research Station, Kannara

Associate Professor	:	Dr. K. Pushkaran
.. (Hort)	:	Smt. S. Prasanna Kumari Amma
.. (P. B.)	:	Sri. B. R. Reghunath
.. (Pl. Physiology)	:	Smt. Alice Kurian
.. (Ent)	:	Sri. Job Sathyakumar charles
Junior Assistant Professors	:	Smt. A. K. Babylatha
		.. S. Estelitta
Farm Supervisor (Agri)	:	Sri. C. K. Vijayan
Farm Asst. (Agri.) Gr. I	:	Sri. T. Ravindran
		(upto 4-6-85)
		Smt. T. Jayamoni
		(10-6-85 to 15-6-85)
		Sri. P. R. Sathyan (from 15-6-85)

Farm Asst. Gr. II	: Sri. V. J. Paul Sri. V. J. Reghu (upto 3-6-85) Sri. M. V. Sasidharan Nair (upto 3-6-85) Smt. R. Jayanthi (from 4-3-85) Sri. M. N. Pavithran (from 10.6.85) ,, C. I. Surendran (from 18-6-85)
Oil Engine Driver	: Sri. K. A. Narayanan
Administrative Assistant	: Sri. K. Viswambharan
Clerk-Typist	: Sri. K. K. Parameswaran
Assistant Gr. II	: Sri. U. P. Davis
Mali	: Sri. V. A. Ouseph (upto 15-7-85) ,, C. M. Prabhakaran Smt. P. Subhadra (from 7-8-85)
Peon	: Smt. K. Sosamma
Peon (Hr. Gr.)	: Sri. T. Achuthan Nair
Watchman	: Sri. T. Bhaskaran (from 12-8-85) ,, C. Narayanan (from 12-8-85)

Cashew Research Station, Madakkathara (AICS & CIP)

Professor (Agron)	: Sri. P. G. Veeraraghavan
Assistant Professor (Ent.)	: Sri. D. Sitarama Rao
Junior Asst. Professor (Hort)	: Smt. V. A. Celine

MSCRIP

Professor (Hort.)	: Sri. S. Balakrishnan
Associate Professor (Ento.)	: Dr. Susamma Mathai
Assistant Professor (Hort.)	: Sri. K. Aravindakshan
Farm Assistant	: Sri. Eswarachandran (upto 2-12-85) Sri. N. R. Rajan (upto 29-3-85)
Farm Assistant Grade-I	: Sri. M. J. Kochappan (upto 1-6-85) ,, P. M. Poulouse (from 3-8-85)
Farm Assistant Grade II	: Sri. P. M. Joshy
Assistant Grade II	: Sri. C. Chandran (upto 28-5-85) ,, E. Shamsudeen (from 10-6-85)
Typist Grade II	: Smt. P. Vilasini
Mali	: Sri. K. S. Radhakrishnan (from 2-12-85)
Driver (Grade II)	: Sri. P. I. Rappai
Sweeper (Part-time contingent)	: Sri. P. S. Ratnakumaran (from 20-2-86)

Pepper Research Scheme, Vellanikkara

Junior Assistant Professor	:	Sri. N. Mohan Babu
Farm Assistants	:	Sri. T. C. Sidharthan (upto 2-7-84) Sri. P. S. Prasannakumar (from 23-8-84)
Assistant Grade II	:	Sri. T. Premkumar
Peon	:	Smt. T. Mariam
Watchman	:	Sri. V. Alikutty (upto 13-6-84)

Agricultural Research Station, Mannuthy

Professor (Project Co-ordinator Rice)	:	Sri. T. F. Kuriakose
Professor (Ag. Bot.)	:	Sri. P. A. Varkey
Assoc. Professor (Agron.)	:	Sri. S. Janardhanan Pillai
Asst. Professor (Agro.)	:	Sri. T. M. Kurien
Asst. Professor (Ag. Engg.)	:	Smt. Latha Koshi (from 17-7-86)
Junior Assistant Professors	:	Smt. Tassy Joseph .. M. T. Kanakamani Sri. Sunny K. Oommen .. P. A. Joseph Smt. K. P. Prasanna
Administrative Assistant	:	Sri. P. Gopinathan Nair (upto 27-11-85) Smt. Sudhadevi (27-11-85 to 4-12-85)
Senior Grade Assistant	:	Smt. S. Vanaja (upto 22-11-85) .. P. A. Lakshmy (from 8-5-86) .. K. P. Narayanikutty (from 2-6-86)
Typist Senior Grade	:	Smt. P. Reetha Joseph
Typist	:	Smt. K. Leela (upto 28-2-86) .. K. Padmavathy (from-1-3-86)
Assistant Grade-I	:	Smt. A. Santhakumari Sri. K. G. Somanath
Assistant Grade II	:	Smt. M. Komalam
Jeep Driver	:	Sri. N. K. Antony (upto 3-4-86) .. P. S. Kabeer (from 2-6-86)
Peons	:	Smt. I. Parukutty Sri. C. R. Velayudhan
Watchmen	:	Sri. Manbahadur (upto 16-3-86) .. M. V. Radhakrishnan (from 16-8-86) .. P. V. Kumaran

Farm Supervisors Grade I	:	Sri. V. Chakrapani (upto 7-5-85)
		Sri. K. C. Achuthan (upto 7-5-85)
Farm Supervisors Grade II	:	Sri. T. K. Mithran
		Smt. P. G. Yamuna
		Smt. H. Rachel (from 16-5-85 to 8-5-86)
		Sri. N. T. George (from 15-8-85)
Senior Gr. Farm Assistants	:	Sri. S. Krishnan Chettiar
		.. M. P. George (upto 31-12-85)
		Smt. S. Kamalabai (from 17-5-86)
		Sri. T. Gopalan (from 15-9-85)
Lab Assistant Gr. III (Senior)	:	Sri. C. K. Dharmadas
Lab Assistant Gr. IV	:	.. T. V. Parameswaran
1st Grade Farm Assistants	:	Smt. L. Radhammal
		Sri. K. Vijayanarayanan
		.. C. A. Mathew
Field Supervisor	:	Sri. T. Raman Nair (from 8-5-84)
Mechanic/Tech. Gr. II (from 7-12-84)	:	Sri. K. O. Porinchu (upto 28-5-86)
		Sri. T. R. Viswambharan (from 28-5-86)
		Sri. Sambasivan Nair
		.. K. M. Muraleedharan
Design Engineer	:	Smt. Susan Cherian (from 17-7-86)
Workshop mate	:	Sri. C. J. Joseph
Agronomic Research Station, Chalakudy		
Professor (Agron)	:	Dr. G. Raveendranathan Pillai
Associate Professor (Soil Phy)	:	Smt. G. Santhakumari
Assistant Professor (Agron)	:	Sri. Jose Mathew
		.. Kuruvilla Varghese
		Sri. C. S. Gopi
.. (Ag. Chem)	:	Sri. R. Chandran Pillai
Farm Supervisor Grade I	:	Sri. T. C. Sidharthan
Farm Assistant Grade I	:	Sri. P. N. Sadasivan
Farm Assistants Grade II	:	.. A. A. Abdulla
		.. V. James
Lab Assistants Grade III	:	Sri. T. K. Velayudhan
		.. T. K. Balakrishnan
Farm Assistants Grade I	:	Sri. Unnikrishnan
		.. Haridas
		.. P. V. Reghunath
		.. P. K. Reghu

Administrative Assistant	:	Smt. V. M. Lalithakumari
Assistants Grade I	:	Smt. K. Vinayabai Sri. K. F. Mathew
Assistant Gr. II	:	Smt. S. Sathoe Devi
Typist Gr. II	:	Smt. P. K. Sara
Pump Operator	:	Sri. K. S. Subran
Jeep Driver	:	Sri. V. K. Karunakaran
Ploughman	:	Sri. K. C. Mathew
Peon	:	Sri. K. Radhakrishnan
Rice Research Station, Vyttila		
Professor	:	Sri. T. U. George
Jr. Assistant Professor	:	Smt. Reena Grittle Pinhero
Farm Supervisor Grade I	:	Sri. P. Damodaran Smt. M. J. Annakutty
Farm Assistants Grade I	:	Smt. P. Jayamony (upto 1-6-85) Sri. A. A. Abdulla .. P. Haridas Smt. Padma Narayana Pillai Sri. E. R. Soman .. P. M. Poulouse .. M. C. Sachidanandan
Administrative Assistants	:	Sri. M. Abubakkerkhan .. K. M. Vincent Pareira Smt. T. Vijayalekshmi (upto 10-6-85) .. Vinaya Bai (from 10-6-85)
Peons (Higher Grade)	:	Sri. N. S. Reghunandan .. N. Vasu
Watchman	:	Sri. Beg Behadur
Aromatic and Medicinal Plants Research Station, Odakkali		
Professor (Agronomy)	:	Sri. E. V. G. Nair
Jr. Assistant Professors	:	Sri. K. P. Kuriakose Smt. K. S. Shylaraj
Administrative Assistant	:	Sri. K. Ravikumar
Assistant Grade I	:	Smt. Sophiamma Joseph
Assistant Gr. II	:	Smt. K. P. Premakumari
Office Superintendent (FC & D)	:	Sri. K. K. Ramachandran Nair
Peon	:	Sri. M. M. Poulouse
Watchman	:	Sri. P. T. Kalidasan
Sweeper-cum-Attendant	:	Sri. K. B. Sivarama Kurup
Permanent Labourers	:	Smt. K. A. Ponnamma Sri. I. Veeran
Graduate Lab. Assistant	:	Smt. K. K. Santhakumari Amma
Lab Assistant Gr. I	:	Sri. T. K. George
Boiler Attender	:	Sri. K. Chellappa Mooppan

Farm Supervisor	:	Smt. V. V. Mariamkutty
Farm Assistant Grade I	:	Sri. E. N. Sudhakaran Nair ,, V. James
Farm Assistant Grade II	:	Sri. C. I. Surendran

Cardamom Research Station, Pampadumpara

Professor (Pl. Path.)	:	Dr. P. Karunakaran
Associate Professor (Agro)	:	Sri. C. K. Prabhakaran Thambi
Assistant Professor (Ento)	:	Sri. C. M. George
Jr. Assistant Professor	:	Sri. P. G. Sadankumar
Grade II Farm Supervisor	:	Sri. L. Davy
Sr. Gr. Farm Assistants	:	Smt. L. Indira ,, K. Devaky
Grade II Farm Assistants	:	Sri. K. K. Vijayakumar ,, P. K. Abdul Salam ,, V. P. Prasad ,, T. V. Kuttychan
Gr. II Lab Assistant	:	Sri. P. V. Joseph
Administrative Assistant	:	Sr. L. Wilson
Grade II Assistants	:	Sri. Ramachandran Nair
Typist Gr. II	:	Sri. K. Chandrakumar
Jeep Driver	:	Sri. K. Chacko
Peon (Higher Grade)	:	Sri. K. N. Sankara Pillai
Field Supervisor	:	Sri. K. N. Raghavan
Watchman	:	Sri. K. Raghavan Pillai ,, K. V. Thankappan ,, K. K. Ramakrishnan ,, Chacko Chandy

Regional Agricultural Research Station, Kumarakom

Professor (Agronomy) & Head	:	Sri. U. Mohammed Kunju
,, (Ento)	:	Sri. D. Joseph
,, (Eco)	:	Sri. E. K. Narayanan Nair
,, (Ag. Chem & SS)	:	Sri. K. Chandrasekharan Nair
Associate Professor (Aqua)	:	Sri. K. S. Purushan
Assistant Professor (Agro)	:	Sri. K. C. Rajan
,, (Bot)	:	Smt. P. Maya Devi
,, (Ento)	:	Sri. Babu M. Philip
,, (Micro)	:	Sri. P. Siva Prasad
,, (Agrl. Chem)	:	Smt. Sosamma Cheriyan
,, (Fish)	:	Dr. P. K. Abdul Aziz
,, (Weed Science)	:	Sri. Abraham Varghese
,, (Hort)	:	Smt. K. Lila Mathew
,, (Hort)	:	Smt. Sabina George Thekkayan
,, (Plant Br.)	:	Sri. G. Mathai
,, (Plant Physi)	:	Smt. Kavitha K. Mydin

Junior Assistant Professors	:	Smt. Alice Antony Sri. Sam T. Kurumthottical Smt. Elizabeth K. Syriac
" " (Fisheries)	:	Dr. K. G. Padmakumar
" " (Aqua)	:	Dr. K. Rajasekharan
" " (Pl. Br.)	:	Sri. K. Inasi
Administration Officer	:	Sri. Philip K. Kurian
Office Supdt. (FC & D)	:	Sri. K. V. Kurian (upto 1-1-86) " K. K. Gopikuttan Nair (from 2-1-86)
Office Supdt.	:	Smt. C. B. Merlin (Sr. Gr. Typist i/c)
Section Officer	:	Sri. H. Salahudeen
Assistants Gr. I	:	Sri. M. P. Govinda Pillai " M. R. Ramachandran Nair " P. G. Sreekantha Pai " P. M. Mani Smt. M. N. Radhamma " Annamma Varghese
Typists Grade I	:	Sri. M. C. Jayakumar Smt. T. K. Ponnammia Sri. K. C. Mohan Kumar
Pump Operator Gr. II	:	Sri. C. C. Punnan
Sr. Gr. Farm Assistants	:	Sri. K. K. Viswanathan " V. P. Rajappan Nair Smt. N. Kamalamma
Gr. I Farm Assistant	:	Sri. K. Sasidharan " K. O. Shahul Hameed " K. B. Varghese " C. V. Kuttappan
Grade I Farm Supervisor	:	Sri. M. N. Narayana Pillai (upto 30-9-85)
Grade II Farm Assistants	:	Sri. P. Damodaran (from 15-11-85) " T. J. Mathew " M. V. Sasidharan Nair
Gr. II Farm Assistant (Vety)	:	Sri. M. Sukumaran " O. K. Sukumaran
Gr. III Lab Assistants	:	Sri. N. Prakasan " V. K. Vasu Smt. P. S. Rathnam " Mary Sebastian
Artist	:	Sri. P. K. Surendran
Grade II (LDV) Driver	:	Sri. V. Uthaman " T. M. Francis
Driver (HDV) Gr. I	:	Sri. P. C. Kurian
Peon (Higher Grade)	:	Sri. K. K. Thankappan " M. Easo

Watchman	:	Sri. C. G. Mohanan
Fisherman	:	Sri. P. Viswanathan
Sweeper cum Attendant	:	Smt. A. P. Meenakshi
Bus attendant	:	Sri. V. V. Vasu
Duplicator Operator	:	Sri. K. K. Raghavan
Instructional Farm, Vellayani		
Assistant Professor	:	Smt. M. Suharban
Junior Asst. Professor	:	Sri. A. S. Anikumar
		.. Gregory Zachariah
Farm Supervisor Grade I	:	Sri. V. Chakrapani
		.. K. C. Achuthan (reverted to Farm Assistant)
Farm Supervisor Grade II	:	Sri. K. Gopinathan Nair
		.. K. C. Ratnakaran Nadar
		.. N. Govindan
		Smt. B. Indira Bai Amma
		.. A. Belsy
		.. H. Rachel
		.. K. Rosakkal
Farm Assistant	:	Smt. K. S. Sujatha
Technician	:	Sri. V. Gopinatha Kurup
Field Supervisor	:	Sri. V. Krishna Pillai
Administrative Assistant	:	Sri. J. I. Walsalan
Section Officer	:	Sri. S. Bhaskara Pillai
Assistants	:	Smt. J. Remadevi Amma
		.. C. P. Padmakumari
		Sri. Viswakumaran Nair
		.. C. Prabhakaran
		Smt. C. Sherly Mathew
		Sri. N. Valsan
		Sri. S. Raghavan
Typist	:	Sri. K. Thankappan
Tractor Driver	:	Sri. A. Sivasankaran Nair
Peon	:	Sri. G. Parmeswaran Nair
Gardener	:	.. G. Nagappan
		Sri. K. Divakaran Nair
Farm Mali	:	.. Chellayyan Nadar
		.. C. Krishnankutty
Rice Research Station, Moncompu		
Professor (Pl. Br)	:	Dr. C. A. Joseph
(Officer-in-charge)	:	Sri. P. K. Chellappan Nair
Professor	:	.. B. Thomas
		.. K. Chandrasekharan Nair (upto 7-12-85)
		Dr. (Mrs.) L. Rema Devi

Associate Professor	:	Smt. K. S. Remamony
Assistant Professors	:	Sri. Madhusudhanan Nair
		Smt. N. Rema Bai
		Sri. S. Bhaskaran
		(undergoing Ph. D Studies)
		Smt. Suman George
Junior Asst. Professors	:	Smt. Leenakumari
		.. Annie Koruth
		.. T. Sheela Paul
		.. C. A. Mary (from 6-12-85)
Junior Statistician	:	Smt. P. R. Krishnakumari Amma
Farm Supervisor	:	Sri. K. Chellappan
Farm Assistant (Hr. Gr.)	:	Sri. C. N. Raghavan
		.. C. O. Mathai
		.. A. K. Ayyappan Pillai
Farm Assistant (Sr. Gr.)	:	Sri. R. Madhavan Pillai (upto 7-6-85)
.. II Gr.	:	Sri. T. K. Vijayan
Field Supervisor	:	Sri. N. Thankappan
Lab Assistant (Gr. II)	:	Sri. N. Sivadasan
Lab Assistant (Gr. III)	:	Sri. K. Kunju Pillai
		.. G. Vamadevan
Fisherman	:	Sri. T. Venu (upto 19-11-85)
		.. V. Viswanathan (upto 19-11-85)
Administrative Assistant	:	Smt. Mary Amma Eapen
Assistant Gr. I	:	Smt. B. Sarasamma
		.. D. Vijayamma
		Sri. K. P. Rajan
		.. C. V. Govindarajan
		.. Mohammed Basheer
Assistant Gr. II	:	Sri. V. P. Raveendran
Typist Gr. I	:	Smt. H. K. Khadeeja Beevi
Peons	:	Sri. P. K. Thankappan
		.. K. Sankaran
		.. M. G. Thomas
		.. George A Muricken
		(from 17.2.86)
Sweeper cum Attendant	:	Sri. N. Viswanathan
Watchman	:	Sri. K. P. Vidhyadharan
		.. George A Muricken
		(upto 16.2.86)
		.. Joseph Peter
Drivers	:	Sri. M. D. Janardhanan
		.. M. P. Paul
Boat Helper	:	Sri. K. Chandrasekharan Nair
		(upto 28.2.86)

Sugarcane Research Station, Thiruvalla

Professors	:	Sri. Sukumaran Nair Dr. N. N. Potty
Assistant Professor	:	Sri. A. V. Mathew (upto 4.11.85)
Junior Assistant Professors	:	Smt. Jessy M. Kuriakose (from 24.12.85) ,, Suman Susan Varghese (upto 11/85)
Sr. Research Fellow	:	Sri. Babu George
Farm Supervisor	:	Sri. A. E. Mendez (upto 10.6.85)
Grade II Farm Assistants	:	Sri. A. Mohammed kunju (from 11.6.85) ,, M. Kamaruddin ,, K. G. Muraleedharan Pillai
Senior Grade Assistants	:	Sri. M. Abdul Salam
Grade-II Assistant	:	Smt. S. Ushadevi
Senior Grade Typist	:	Smt. C. B. Merlin (upto 24.7.85) Sri. V. Bhagaval Singh (from 25.7.85)
Driver	:	Sri. P. Moideen
Peon	:	Sri. Bhaskaran
Watchman	:	Sri. S. Rajeev

AICRP on Agricultural Drainage—Regional Centre, Karumady

Assistant Professor (Ag. Engg)	:	Sri. E. K. Mathew
Asst. Professor (Agro)	:	Sri. U. Jaikumaran
Jr. Asst. Prof. (Ag.Engg)	:	Sri. T. D. Raju
Senior Grade Farm Asst.	:	Sri. A. K. Ayyappan Pillai ,, K. G. Madhavan Pillai
Gr. II Farm Assistants	:	Sri. K. G. Muraleedharan Pillai ,, V. J. Rajamohan ,, T. J. Mathew ,, K. O. Shahul Hameed
Grade III Technicians	:	Sri. K. Vasudevan ,, K. Aravindakshan
Grade I Typist	:	Sri. P. Nadaraja Pillai (upto 31.5.85) Smt. K. K. Mary (from 15.7.85)
Grade I Assistant	:	Sri. K. Govindan
Peon	:	Sri. G. Vasudevan
Watchman	:	Sri. G. Muhammed Haneef ,, N. Raveendran ,, C. A. Chacko
Grade-II (LV) Driver	:	Sri. M. Xavier ,, K. V. Kumaran

Rice Research Station, Kayamkulam

Professor (Ag. Ento) (in charge of the station)	:	Sri. K. Balakrishna Pillai
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Professor (Ag Bot)	:	Smt. S. Santhakumari
Associate Professor (Bot)	:	Dr. K. Sivan Pillai
Asst. Professor (Pl Path)	:	Sri. M. G. Vasavan
Junior Asst. Professor	:	Smt. P. Sushamakumari Sri. Sunny K. Oommen
Farm Supervisor	:	Sri. G. Raghavan Pilai (upto 30.4.85) " A. E. Mendez (from 17.6.85)
Farm Assistant Grade-I	:	Sri. M. Varghese " R. Satheesan " N. Vasudevan Smt. S. Nazeema
Farm Assistants Grade-II	:	Sri. G. Udayakumar " K. C. Sanubrasad " V. J. Rajamohan
Grade III Lab Assistant	:	Sri. K. J. Joseph
Grade II Lab Assistants	:	Sri. S. Kuttappan Nair " S. Haneefa
Regular Mazdoors	:	Sri. T. Balakrishnan " V. Achuthan (upto 30-10-84)
Administrative Assistant	:	Sri. T. V. Rajasekharan Nair
Senior Grade Assistant	:	Sri. K. P. Rajendra prasad
Grade I Assistant	:	Sri. G. V. Kumar
Grade I Typist	:	Sri. M. K. Muraleedhara Karanavar
Higher Grade Watchman	:	Sri. R. Kunjukrishnan
Watchman (Lower Grade)	:	Sri. K. Sankaran
Peon	:	Smt. Sosamma George Sri. M. G. Thomas " T. Balakrishnan
Part-time Sweeper	:	Smt. N. Rajamma
NARP-Vellayani and Kottarakkara		
Associate Director	:	Dr. N. Mohanakumaran
Associate Professor (S.S)	:	Sri. P. R. Ramasubramonian
" (P.B)	:	Dr. P. Manikantan Nair
" (Ag. Stat)	:	" P. Saraswathy
" (S.S)	:	Sri. P. Abdul Hameed
" (Hort)	:	Sri. M. K. Mammen
Assistant Professor (S.S)	:	Smt. R. S. Shehana
" (Plant. Br)	:	Smt. P. Manju
" (Nematology)	:	Smt. M. S. Sheela (upto 6.5.85)
" (Ag.Extn)	:	Smt. S. Shylaja
" (Ag. Stat)	:	Sri. R. Balakrishnan Asan
" (Hort)	:	Smt. G. R. Sulekha
" (Agro)	:	Smt. S. Chandini (from 30.11.85) " S. Sobhana
" (Ento)	:	Sri. C. Nandakumar
" (P.P)	:	Smt. K. K. Sulochana

Jr. Asst. Professor (Econo)	:	Smt. A. M. Santha
Gr. I (Agri) Farm Assistants	:	Sri. P. A. Sankutty
		.. M. K. Vijayan
		.. V. John George
		.. S. R. Raveevan
		.. K. S. Ajayakumar
Grade I Lab Assistants	:	Sri. J. Dasayyan Nadar
		Smt. S. Saraswathy Amma
Photographer	:	Sri. M. S. Kuriakose
Duplicator Operator	:	Sri. C. Madhusoodan Nair
Administrative Officer	:	Sri. A. P. Lawrence (upto 30.4.85)
		.. P. C. Raveendran Pillai
		(from 16.9.85)
Grade-I Assistant	:	Smt. V. Chandrika
Grade-II Assistant	:	Sri. M. Abdul Nujum (upto 6.8.85)
		.. M. S. Sanal kumar (from 16.8.85)
Gr. I Typists (Steno)	:	Smt. N. Dasamma (upto 31.5.85)
		.. S. Majida Beevi (from 1.6.85)
		Sri. S. Raghavan
		Smt. S. Remani
Driver Grade II	:	Sri. R. Soman Nair
Driver (H. D.)	:	Sri. T. K. Remanan (from 27-2-86)
Tractor Driver (L. D.)	:	Sri. P. S. Vijayakumaran Nair
		(from 2-9-85)
Bus Attendant (Mini Bus)	:	Sri. P. M. Varghese (from 30-7-85)
NARP sub centre, Eruthiampathy		
Associate Professor	:	Sri. M. Oommen
<i>Technical</i>		
Farm Assistant Gr. I	:	Sri. T. R. Sudevan (from 1-6-85)
		.. P. A. Abdul Majeed
		(from 5-12-85)
Cropping Systems Research Centre, Karamana		
Professor	:	Dr. E. Tajuddin
Assistant Professors	:	Sri. S. M. Shahul Hameed
		.. Yageen Thomas
		.. Subramoniya Iyer
		.. K. P. Jagan Mohan
Junior Assistant Professors	:	Smt. P. B. Usha
		Sri. S. Devanesan
Grade I Farm Assistant	:	Sri. D. Sulochanan
		.. K. Justin
		.. A. Sasidharan
		.. Nesamony
		.. D. David Dharmakumar
		.. L. Mohandas

Administrative Assistant	:	Sri. P. R. Sasidharan Pillai
Grade I Assistant	:	Sri. N. Parameswaran Nair
Grade I Typist	:	Smt. B. 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

ECF at Quilon

Associate Professor	:	Sri. G. K. Balachandran Nair
Farm Assistants	:	Sri. John David
		„ George P. Puravath
		„ V. C. M. Das
		„ D. Vighnanathan
		„ G. Shaji
		„ E. N. Ravindran Nair
		„ S. Sukumaran Nair
		„ V. N. Gopi
		„ R. Satheesan
Grade II Assistant	:	Sri. P. S. Mohanan
Jeep Driver	:	Sri. K. Sukumara Pillai
Watchman	:	Sri. Narayana Pillai

ECF at Pattambi

Associate Professor	:	Sri. M. R. C. Pillai
Farm Assistants	:	Sri. C. S. Joseph
		„ A. Vijayan
		„ G. K. Sukumaran
		„ K. Mohammed Ali
		„ T. Mohammed Haneefa
		„ K. V. Natarajan
		„ V. D. Thulasidas
		„ T. P. Ali
Grade II Assistant	:	Smt. S. Sushama
Jeep Driver	:	Sri. K. P. Pakkerkutty
Watchman	:	Sri. KunhIRaman

Operational Research Project, Ozhalapathy

Assistant Professor (Agron)	:	Sri. P. H. Latif
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Coconut Research Station, Balaramapuram

Professor (Agro)	:	Sri. K. Sivasankara Pillai
Assistant Professor	:	Smt. P. Sukumari
Grade I Farm Supervisor	:	Sri. C. Christudas

Gr. II Farm Supervisor	:	Smt. H. Rachel (upto 9-6-85) Sri. N. Madhavan Nair
Administrative Assistant	:	Sri. P. N. Ramachandra Kurup (upto 21-7-85) Smt. B. Rugmini Amma (from 22-7-85)
Sr. Gr. Assistant	:	Smt. N. Sujatha
Gr. I Assistant	:	Smt. J. Jeslet Mercy
Gr. I Typist	:	Sri. K. Gopikuttan Nair
Higher Gr. Peon	:	Sri. P. Velappan Nair (upto 31-8-85) .. N. Prabhakaran Nair (from 19-9-85)
Hr. Gr. Watchman	:	Sri. J. Vijayan .. G. Raghavan Pillai .. K. Mohanan

Livestock Research Station, Thiruvazhamkunnu

Associate Professor (Agri. Rep.)	:	Dr. P. P. Balakrishnan
Assistant Professor (Genetics)	:	Dr. P. Nandakumaran (1-4-85 to 30-4-85) Dr. C. K. Sreedharan Unni (30-9-85 to 31-3-86) Dr. C. B. Manomohan (22-7-85 to 3-9-85)
Junior Asst. Professors	:	Dr. Reji Francis (upto 3-12-85)
Farm Supervisor (Agri) Gr. II	:	Sri. K. Chellappan
.. .. (Vety) Gr. II	:	Sri. K. Raman Menon
Farm Assistant (Agri) Gr. I	:	Sri. M. Ummer Smt. N. Naseema (19-6-85 to 12-12-85) Sri. M. P. George (14-1-86 to 31-3-86)
Farm Assistant (Vety.) Gr. I	:	Sri P. P. Narayana Panicker
Farm Assistant (Agri) Gr. II	:	Sri. V. M. George .. K. C. Sanuprasad .. R. Reghu .. K. G. Mohandas
Farm Assistant (Vety.) Gr. II	:	Sri. O. K. Sukumaran (upto 3-6-85) .. C. Mohammed Usman .. M. Sukumaran (12-6-85 to 31-3-86)
Technician Grade II	:	Sri. A. Sankaran

Administrative Assistant	:	Sri. T. N. Sankunny
Assistant Grade I	:	Sri. N. U. Jayarajan
Assistant Grade II	:	Sri. K. Balachandran Nair (from 22-4-85)
Typist Grade II	:	Sri. M. Mohandas
Driver Grade I	:	Sri. P. M. Mohammed (from 15-2-86)
Driver Grade II	:	Sri. T. Moidu
Maistry	:	Sri. K. Ramakrishnan .. K. Krishnan
Peon Special Grade	:	Sri. K. Muhammed
Peon Higher Grade	:	Sri. P. Bharathan
Watchmen	:	Sri P. Vasudevan .. C. Chami .. M. Ramachandran .. A. Chachunni .. C. Kumaran .. V. Ramachandran .. K. Manukuttan
Field Supervisor	:	Sri. C. Sankaran Nair

AICRP on Agro Forestry, Thiruvazhamkunnu

Special Officer (Forestry)	:	Sri. V. R. Krishnan Nair (HQ at Vellanikkara)
Assistant Professor (Agron)	:	Sri. N. K. Sasidharan
Farm Assistants (Agri) Gr. II	:	Sri. P. S. Sanal Kumar .. Thomas Chirakandathil
Lab Assistant Gr. II	:	Sri. V. Ramachandran (19-11-85 to 1-12-86) .. P. Bharathan (19-11-85)
Typist Gr. II	:	Sri. R. Noel
Driver L. V.	:	Sri. P. S. Kabeen (upto 3-3-86) .. M. P. Unnikrishnan (from 4-3-86)
Peon	:	Sri. Muhammed Kutty (upto 15-5-85) .. P. Narayanan Nair (from 16-5-85 to 31-3-85)

AICRP on Goats for Milk, Mannuthy

Professor (Geneticist)	:	Dr. B. R. Krishnan Nair (upto 21-3-86)
.. (Nutrition)	:	Dr. N. Kunjukutty

Assistant Professor (Pathology)	:	Dr. C. B. Manomohan (upto 1-1-86)
.. (Animal Reprodn)	:	Dr. V. Vijayakumaran Dr. K. N. Aravinda Ghosh (upto 16-4-85)
.. (Animal Management)	:	Dr. K. C. Raghavan
.. (Statistics)	:	Smt. T. K. Indirabai
Junior Asst. Professors	:	Dr. P. Gangadevi .. Stephen Mathew .. Koshy Varghese (from 1-7-85) .. Lucy Jacob (from 29-6-85)
Technical Assistant	:	Smt. V. M. Sarada
Assistant Grade I	:	Smt. M. Baby (upto 25-1-86) Sri. M. Abdul Samath Smt. P. R. Sreedevikutty
Assistant Grade II	:	Smt. V. R. Chandrika (upto 7-10-85)
Typist Grade II	:	Smt. Meble Philip .. Salomi Silas (9-4-85 to 14-1-86) .. P. B. Radha (5-10-85 to 30-11-85)
Driver	:	Sri. C. T. Louis
Class IV employee	:	Sri. A. G. Rajendran
University Pig Breeding Farm, Mannuthy		
Assistant Professor	:	Dr. K. S. Sebastian
Farm Supervisors (Vety)	:	Sri. K. M. Neelakantan Kartha
Farm Assistant (Vety)	:	Sri. K. K. Sasidharan Nair
Administrative Assistant	:	Smt. V. V. Radhamma (upto 22-11-85) .. S. Vanaja (23-11-85 to 4-12-86) .. P. N. Sudha Devi (from 5-12-85)
Assistant Grade-II	:	Sri. V. Kunjambu (upto 28-5-85) Smt. T. Lakshmikutty (from 6-6-85)
Watchman	:	Sri. T. M. Kesavan
Peon Hr. Gr.	:	Smt. K. Karthiayani
Pig Attendants	:	Sri. P. B. Velayudhan (from 9-8-85) .. Joseph Peter (23-8-85 to 11-2-86)

Veterinary Hospital, Kokkalai

Professor	:	Dr. K. Ramadas
Assistant Professor	:	Dr. K. Rajankutty (upto 11-85) Dr. M. Saseendranath (from 11-85)
Farm Supervisor s (Vety)	:	Sri. C. K. Lakshmanan Sri. M. Chinnavan
Assistant Grade-I	:	Sri. K. K. Sadeesan
Attendants	:	Sri. M. K. Shaik Abdul Rahiman ,, K. O. Varghese
Permanent Servant	:	Sri. N. K. Sankaran
Sweeper	:	Sri. K. N. Saraswathy

Cattle Breeding Farm, Thumburmuzhi

Assistant Professor	:	Dr. M. Mukundan
Farm Supervisor (Agri)	:	Sri. R. Chandran Pillai (upto 13-8-85) ,, C. M. Jainulabdeen (from 13-8-85)
Farm Supervisor (Vety)	:	Sri. P. P. Sankaran
Farm Assistant (Vet.) Sr. Gr. I	:	Sri. V. Sukumaran Nair
Pharmacist	:	Sri. C. K. Alias
Assistant Grade-I	:	Sri. K. K. Kuttappan
Pump Operator	:	Sri. M. P. Joseph
Peon	:	Sri. K. V. Bhaskaran
(Special Grade)	:	
Herdsmen	:	Sri. A. O. Thomas ,, V. A. Kannan ,, P. K. Velayudhan ,, T. K. Thomas ,, N. K. Ramakrishnan

Livestock Farm, Mannuthy

Associate Professor	:	Dr. P. A. Devassia
Junior Assistant Professors	:	Dr. Stephen Mathew (1-4-84 to 1-8-84) ,, P. Kuttynarayanan (20-7-84 to 31-3-85) ,, George T. Oommen (1-8-84 to 31-3-85)
Farm Supervisor (Vety)	:	Sri. C. K. Ramakrishnan
Farm Assistant (Vety) Gr. I	:	Sri. K. P. George
Farm Assistants (Vety) Gr. II	:	Sri. N. Sugathan ,, L. Devarajan Potty ,, K. V. Louise

Administrative Assistant	:	Sri. Pius Fernandez
Assistant Grade-I	:	Smt. D. Sreekumari
Assistant Grade-II	:	Smt. V. Chellamma
		(1-4-84 to 1-9-84)
	..	T. C. Latha
		(1-9-84 to 31-3-85)
	..	P. Kousallia
		(16-7-84 to 31-3-85)
Typist	:	Smt. S. Leelamony Amma.
		(1-4-84 to 6-6-84)
Pump Operator	:	Sri. C. C. Velayudhan
Permanent Servant Higher Grade	:	Sri. M. Krishnankutty
Permanent Servant Gr. II	:	Sri. K. P. Jose
		Smt. P. C. Leya
AICRP on Poultry for Eggs		
Senior Scientist	:	Dr. A. Ramakrishnan
		(upto 31-10-85)
	..	A. K. K. Unni (from 1-11-85)
Nutritionist (Asst. Professor)	:	Dr. T. V. Viswanathan
Junior Poultry Geneticist (Assistant Professor)	:	Dr. C. R. Lalithakunjamma
Farm Manager (Asst. Professor)	:	Dr. P. A. Peethambaran
Statistician (Asst. Professor)	:	Smt. Gracemma Kanan
Junior Research Assistants	:	Dr. Leo Joseph (upto 9-5-84)
	..	K. O. Kurian
	..	Mary K. Abraham
	..	K. P. Sreekumar (from 3-7-85)
Chick sexer	:	Sri. M. K. Vijayakumar
Computer	:	Smt. K. G. Kamalamma
Egg Grader	:	Sri. V. S. Bhaskaran (upto 31-12-85)
		Smt. P. K. Ammini (from 1-1-86)
Lab Assistant	:	Sri. P. A. Francis
	..	M. R. Siyaraman
	..	M. G. Vasu
Electrician	:	Sri. E. T. Paul
Driver	:	Sri. A. M. Abdul Khader
		(upto 17-4-85)
	..	M. J. Joseph (from 19-4-85)
Assistant Gr. I	:	Sri. V. S. Skandakumar
Assistant Gr. II	:	Sri. K. S. Paul
Typist Gr. II	:	Smt. P. K. Easwary
Peon	:	Smt. P. D. Annamma
Poultry Attendants	:	Smt. K. Chandrika
		Sri. C. R. Antony (upto 25-2-86)

Appendix V

LIST OF PUBLICATIONS

A. FACULTY OF AGRICULTURE

I. SCIENTIFIC ARTICLES/BOOKS

a) RARS Pilicode

- Govindan, M. and Purushothaman, D. (1985) Association of Nitrogen fixing bacteria with certain plantation crops. *National Acad. Sci. Letters* 8,(6)
- Govindan, M. and K. C. Chandy (1985) Utilization of the diazotroph, *Azospirillum* for inducing rooting in pepper cuttings (*Piper nigrum L*) *Curr. Sci.* 54 (22):1186-1188
- Govindan, M. and Radhakrishnan, T. C. (1985) Association of *Fumago vaucans* on coconut leaves. *Curr. Sci.* 54 (19):1003-1004
- Govindan, M. and Nair, R. R. (1985) PIL-1 A sporulating typing of *Azolla pinnata*. Paper presented XXVI Annual Conference of the Association of Microbiologists India, Madras 10th to 12th October 1985
- Govindan, M. and Purushothaman, D. (1984). Production of Phytohormones by the Nitrogen fixing bacterium *Azospirillum*. *Agri. Res. J. Kerala.* 22 (2):133-138
- Govindan, M. and Nair, R. R. (1986). *Azospirillum rhizocoenosis* in pepper. Paper presented in National Seminar on Microbial ecology, Jan. 21-23 held at Coimbatore
- Govindan, M. and Nair, R. R. (1988). Effects of *Azospirillum* inoculation in black pepper cuttings. Paper presented in the National Symposium on current status of Biological Nitrogen fixation Research held at Haryana Agricultural University, Hissar, 6-8 Feb. 1986
- Jayaprakash Naik, B. and Vijayakumar, N. K. (1986). Cytotoxic and Clastogenic effects of some of the insecticides in *Allium cepa*. Paper presented at the National Conference on environmental mutagens and carcinogens held at Madras, Feb. 20-22, 1986
- Prasada Rao, G. S. L. H. V. (1985). Drought and coconut palms. *Indian Coconut Journal* Vol. XV, No. 12

- Prasada Rao, G. S. L. H. V. and Ravindran Nair, R. (1985). Irrigation requirement of crops in the Kasaragod district of Kerala by climatic water balance approach. Proceedings of the IV Annual convention and seminar on Hydrology (under press)
- Prasada Rao, G. S. L. H. V. and Nair, R. R. (1986). Weather interaction in Rice. Presented at the Second agrometeorological congress, held at GAU, Anand during 10-12 March, 1986
- Ranjith, A. M. (1985). First report of *Cylas formicarius* on black pepper. *Curr. Sci.* 54 (16):810
- Ashokan, P. K., Vikraman Nair, R. and Sudhakara, K. (1985). Studies on cassava-legume intercropping systems for the oxisols of Kerala State, India. *Tropical Agriculture (Trinidad)*. 62:313-318
- Ashokan, P. K., Vikraman Nair, R. and Sudhakara, K. (1985). Dissolution rate of urea and muriate of potash packed in perforated polybags. *Agricultural Research Journal of Kerala* 23 (1)
- Sudhakara, K. and Prasad R. (1986). Ammonia volatilization losses from prilled urea, urea supergranules (USG) and coated USG in rice fields. *Plant and Soil* 94:293-295.
- Sudhakara, K. and Prasad, R. (1986). Relative efficiency of prilled urea, urea supergranules (USG) and USG coated with neem cake or DCD for direct seeded rice. *Journal of Agricultural Sciences, Cambridge*, 106:185-190
- Samuel Mathew, Jose, A. I., Narayanan Nambiar, P. K. and Kannan, K. (1984) Sodium chloride nutrition of coconut palms. *Agri. Res. J. Kerala* 22 (1) 17-21

Pepper Research Station, Panniyur

- Sukumara Pillai, V., Abi Cheeran and Sasikumar, S. *Krishi Vigyan Manjeri* -Book No. 13, KAU Mannuthy
- Ibrahim, K. K., Sukumara Pillai, V. and Sasikumaran, S. (1985). Path coefficient analysis of some yield component in black pepper (*Piper nigrum* L) *Indian Spices* Vol. XXII (3) p 21-25
- Ibrahim, K. K., Sukumara Pillai, V. and Sasikumaran, S. (1985). Discriminant functions in distinguishing between Travancore and Malabar cultivars of black pepper (*Piper nigrum* L.) *Indian Spices* Vol. XXI (4) & XXII (1) combined issue p. 3-9
- Ibrahim, K. K., Sukumara Pillai, V. and Sasikumaran, S. (1985). Variability Heritability and Genetic advance for certain quantitative characters in black pepper (*Agricultural Research Journal of Kerala* XXIII (1) p. 45-48

Ibrahim, K. K. and Unnikrishnan Nair, P. K. (1984). The bolder berries of Panniyur I pepper are heavier too. *Indian Cocoa, Arecanut & Spices Journal* Vol. VIII (2) p. 37

Ibrahim, K. K., Sukumara Pillai, V. and Sasikumaran, S. Inheritance of anthocyanin pigmentation on stipules in black pepper (*Piper nigrum* L). *Indian Cocoa, Arecanut and Spices Journal* Vol. IV (1) p. 12-13

Unnikrishnan Nair, P. K., Sasikumar, S., Sukumara Pillai and Ibrahim, K. K. (1935). Etiological studies on anthracnose disease of pepper. *Indian Cocoa, Arecanut and Spices Journal* Vol. IX. No. 2. p. 37-39

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Appendix VI

PROJECT CO-ORDINATION GROUPS

AGRICULTURE

Rice

Project Co-ordinator: Prof. T. F. Kuriakose

Members : Prof. P. N. Pisharody, Dr. V. Gopinathan Nair,
Mr. N. Rajappan Nair, Dr. K. Karunakaran, Mr. K. I. James,
Mr. P. J. Tomy, Dr. V. K. Sasidhar, Mr. P. K. G. Menon,
Dr. R. S. Aiyer, Mr. N. N. Ramankutty, Dr. C. C. Abraham,
Dr. M. J. Thomas, Dr. M. C. Nair

Coconut, Arecanut & Oil Palm

Project Co-ordinator: Prof. K. Kannan

Members : Mr. B. Thomas, Mr. E. P. Koshy, Dr. P. K. Narayanan
Nambiar, Dr. C. Sreedharan, Dr. R. Vikraman Nair, Dr. A. I. Jose,
Dr. T. S. Venkitesan, Dr. M. C. Nair, Dr. K. M. Rajan

Spices

Project Co-ordinator: Dr. Abi Cheeran

Members : Officer i/c. RARS Ambalavayal, Officer i/c. PRS Panniyur;
Officer i/c. CRS Pampadumpara, Mr. S. Sasikumaran,
Dr. T. S. Venkitesan, Mr. D. Joseph, Dr. K. Karunakaran,
Dr. A. I. Jose, Dr. C. C. Abraham, Dr. N. Mohanakumaran

Cocoa & other Beverage crops

Project Co-ordinator: Dr. R. Vikraman Nair

Members : Dr. K. Kumaran, Dr. C. K. Panthambaran, Dr. P. J. Joy,
Dr. N. Mohanakumaran, Dr. Abi Cheeran, Dr. P. C. S. Nair,
Dr. C. C. Abraham

Cashew

Project Co-ordinator: Prof. K. K. Vidyadharan

Members : Professor of Horticulture (Cashew),
Mr. P. G. Veeraraghavan, Dr. K. I. James, Dr. C. C. Abraham,
Dr. Abi Cheeran, Dr. M. Aravindakshan

Fruit Crops & Floriculture

Project Co-ordinator: Dr. M. Aravindakshan

Members : Professor K. Kannan, Mr P. C. Jose Professor of Horticulture, (College of Agriculture, Vellayani), Officer i/c. BRS Kannara, Officer i/c. RARS Ambalavayal, Officer i/c. AICRP on Floriculture, College of Horticulture, Dr. G. Madhavan Nair

Vegetables & Tuber Crops

Project Co-ordinator : Dr. K. V. Peter

Members : Professor of Horticulture, College of Agriculture, Vellayani, Dr. N. Mohanakumaran, Dr. T. S. Venkitesan, Dr. C. Sreedharan, Dr. K. I. Wilson, Dr. G. Madhavan Nair, Asst. Professor i/c. AICRP on Tuber Crops, College of Horticulture, Scientist i/c. AICVIP College of Horticulture

Pulses & 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, Prof. T. F. Kuriakose, Mr. M. R. C. Pillai, Dr. R. S. Aiyer, Dr. V. K. Sasidhar, Dr. P. J. Joy, Dr. Abi Cheeran, Dr. S. K. Nair

Essential Oils & Medicinal Plants

Project Co-ordinator: Mr. E. V. G. Nair

Members : Dr. A. I. Jose, Dr. C. C. Abraham Dr. M. K. Rajagopalan, Dr. P. Varadarajan Nair, Officer i/c. RARS Ambalavayal, Mr. Joseph Philip, Dr. G. Sreekantan Nair

Post Harvest Technology & Nutrition

Project Co-ordinator: Prof. K. K. Vidyadharan

Members : Mr. Luckins C. Babu, Dr. K. V. Mammen, Mr. Jacob John, Dr. K. V. Peter, Mr. V. P. Sukumara Dev, Dr. Susamma Philip, Dr. S. K. Nair, Dr. L. Prema, Associate Professor, AICRP on Agrl. By-products, College of Vety. and Ani. Sciences, Mannuthy.

Sugarcane & Miscellaneous Crops

Project Co-ordinator: Dr. K. M. N. Namboodiri

Members : Prof. A. I. Thomas, Dr. R. Vikraman Nair, Mr. S. Sukumaran Nair, Mr. R. Ravindran Nair, Mr. P. K. Chellappan Nair, Dr. M. C. Nair, Mr. A. V. Mathew

Fodder Crops

Project Co-ordinator : Dr. C. Sreedharan

Members : Dr. V. Gopinathan Nair, Mr. G. Raghavan Pillai, Mr. K. P. Madhavan Nair, Prof. T. F. Kuriakose, Dr. M. C. Nair, Associate Professor (Nomination by designation) LRS Thiruvazhamkunnu

Plant Protection

Project Co-ordinator : Dr. N. Mohandas

Members : Mr. K. P. Vasudevan Nair, Mr. K. P. Madhavan Nair,
Dr. C. C. Abraham, Dr. K. I. Wilson, Dr. M. C. Nair, Dr. T. S. Venkitesan,
Dr. Abi Cheeran, Dr. K. M. Rajan, Mr. K. K. Ravindran Nair,
Dr. James Mathew, Dr. S. K. Nair, Dr. M. J. Thomas

Soils & Agronomy

Project Co-ordinator : Dr. P. Padmaja

Members : Dr. C. Sreedharan, Dr. R. Vikraman Nair, Dr. V. K. Sasidhar,
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

Farm Economics, Extension & Statistics

Project Co-ordinator : Dr. V. Radhakrishnan

Members : Prof. of Agrl. Extn., College of Agriculture, Vellayani,
Mr. K. S. Karayalar, Mr. E. R. Narayanan Nayar, Dr. K. Mukundan,
Dr. T. Prabhakaran, Mr. P. Ramachandran Nair, Dr. C. A. Jose,
Dr. N. Rajan Nair, Mr. M. Mohandas

Soil Conservation & Farm Mechanisation

Project Co-ordinator : Prof. T. P. George

Members : Dr. A. N. Remadevi, Dr. P. Balakrishna Pillai,
Mr. John Thomas, Mr. K. P. Madhavan Nair, Mr. C. P. Muhammed,
Mr. Jippu Jacob, Officer i/c. AICRP on Agrl. Drainage. Karumady

Cropping Pattern & Farming System

Project Co-ordinator : Dr. V. K. Sasidhar

Members : Prof. P. N. Pisharody, Dr. K. P. Rajaram, Mr. N. Rajappan Nair,
Mr. K. I. James, Mr. K. Kannan, Dr. N. Mohanakumaran,
Mr. K. P. Madhavan Nair, Dr. C. C. Abraham, Dr. Abi Cheeran,
Dr. V. Radhakrishnan, Dr. C. R. Ananthasubramaniam,
Dr. K. Karunakaran, Dr. R. Vikraman Nair, Mr. P. J. Tomy

Agro Meteorology

Project Co-ordinator : Dr. P. Balakrishna Pillai

Members : Dr. C. Sreedharan, Dr. G. Madhavan Nair, Dr. P. C. Jose
Dr. G. S. L. H. V. Prasad Rao.

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. Noelakanta Iyer, Professor & Head, Animal Reproduction; Dr. K. Pavithran, Professor & Head, Dairy Science; Dr. P. A. Ommer, Professor & Head, Anatomy; Dr. G. Mukundan, Professor & Head, Ani. Breeding & Genetics; Dr. T. Prabhakaran, Professor, Animal Production Economics; Dr. Abraham C. Varkey, Assoc. Professor, Surgery; Dr. P. P. Balakrishnan, Assoc. Professor, L. R. S. Thiruvazhamkunnu; Dr. V. Jayaprakasan, Asst. 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. Kunjikutty, Professor, Nutrition; Dr. B. R. Krishnan Nair, Geneticist, Ani. Breeding & Genetics; Dr. N. M. Aleyas, Professor, Clinical Medicine; Dr. C. S. James, Assoc. Professor, Nutrition; Dr. P. C. James, Assoc. Professor, Microbiology; Dr. A. D. Joy, Asst. Professor, Small Animals; Dr. N. Gopakumar, Asst. 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, Assoc. Professor, Breeding & Genetics, Dr. A. M. Jalaludin, Assoc. Professor, Breeding & Genetics, Dr. K. P. Surendranathan, Assoc. 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 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. Neelakanta Iyer, 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 Improvement)
Dr. K. T. Punnoose, Assoc. Professor, Microbiology.
Dr. K. P. Sadanandan, Assoc. Professor, Physiology
Dr. T. Sreekumaran, Assoc. Professor, Pathology, Dr. T. Saradamma,
Asst. 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. Rajamohanam, 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, Asst. Professor, Cattle Breeding Farm.
Thumburmuzhi

7 Animal Products Technology

Project Co-ordinator: Dr. R. Padmanabha Iyer, Professor & Head, Vet.
Public Health

Members : Dr. K. I. Maryamma, Professor, Pathology
Dr. Zacharias Cheriyan, 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, Assoc. Professor, Surgery,
Dr. K. Madhavan Pillai, Associate Professor, Parasitology,
Dr. M. T. Jose, Asst. Professor, Vet. Public Health,
Dr. Francis Xavier, Asst. Professor, Animal Management.

Economics, Statistics & Extension

Project Co-ordinator: Dr. T. Prabhakaran, Professor, Animal Repro-
duction 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, Vet. Public Health
Dr. P. T. Georgakutty, Professor, Prev. Medicine, Dr. G. Venugopal,
Professor, Physiology, Dr. Lucy Paily, Professor, Anatomy
Dr. K. V. Valaala, Assoc. Professor, Pathology, Dr. V. Raju,
Superintendent, Extension, Sri. N. Ravindranathan, Asst. Professor
Statistics.

Appendix VII

LIST OF ICAR CO-ORDINATED AND ADHOC RESEARCH PROJECTS

FACULTY OF AGRICULTURE

ICAR Adhoc Schemes

<i>Title of the scheme</i>	<i>Location</i>
Studies on the strains of rhizobia of pulses, the effect of nutrient on them and standardisation of mass culturing technique	College of Agriculture Vellayani
Research on <i>Cymbopogon flexuosus</i> and other cymbopogon species	Aromatic and Medicinal Plants Research Station, Odakkali
Development of improved varieties of sesamum and groundnut suited to the rice fallows in the Onattukara region	Rice Research Station, Kayamkulam
Survey, appraisal and control of major diseases of sugarcane	Sugarcane Research Station, Thiruvalla
Cyst nematode, <i>Heterodera oryisicola</i> infesting rice in Kerala	College of Agriculture, Vellayani
Marketing of coconut and cocoa in Kerala	College of Horticulture, Vellanikkara
Tapioca consumption and Goitre incidence in Kerala	College of Agriculture, Vellayani
Post harvest technology in perishable foods	College of Agriculture, Vellayani
Investigations on the etiology of yellow diseases of arecanut	College of Horticulture, Vellanikkara

FACULTY OF AGRICULTURAL ENGINEERING

Mechanical control and utilisation of floating type aquatic weeds	College of Horticulture, Vellanikkara
Design and development of wind	Institute of Agricultural

turbines and its feasibility studies in Kerala	Technology, Tavanur
AICRP on Farm Implements and Machinery	Kelappaji College of Agri. Engineering and Technology, Tavanur
ICAR Co-ordinated Research Projects	
AICRP on Agro-forestry	Livestock Research Station, Thiruvazhamkunnu
AICRP on Nematode pests	College of Agriculture, Vellayani
AICRP on Agri. Drainage	Karumady
AICS & CIP—Research on Pepper	Pepper Research Station, Panniyur
.. Research on Cashew	Cashew Research Station, Madakkathara
.. Research on Ginger	College of Horticulture, Vellanikkara
.. Research on Cardamom	CRS, Pampadumpara
AIC Floriculture Improvement Project	College of Horticulture, Vellanikkara
AICRP on Fruit—Research on Banana	Banana Research Station, Kannara
NSV—Breeder Seed Production Unit	RARS, Pattambi
AICRIP—Pattambi	RARS, Pattambi
.. Mannuthy	ARS, Mannuthy
.. Moncompu (BPH & GSV merged)	RRS, Moncompu
.. Moncompu (Spl. Disease & Pest Research)	RRS, Moncompu
AIC Pulses Improvement Project	RARS, Pattambi
AIC Vegetable Improvement Project	College of Horticulture, Vellanikkara
AICRP on Biological Control of Crop Pests	College of Horticulture Vellanikkara
AICRP on Forage Crops	College of Agriculture, Vellayani
AICRP on Sugarcane	SRS, Thiruvalla
AICRP on Water Management	ARS, Chalakudy
AICRP on Chemistry of submerged soils	RARS, Pattambi
AICARP & ECF Units	CSRC, Karamana, Quilon

Fate and Efficiency of Urea based fertilizer in India MSCRP AICRP on Weed Control	CSRC, Karamana Madakkathara College of Horticulture, Vellanikkara Ozhalappathy, Palghat Dist.
Operational Research Project for Resource Development on Watershed basis ORP on Rice Pests, Kuttanad	Rice Research Station, Moncompu

FACULTY OF VETERINARY & ANIMAL SCIENCES

ICAR Adhoc Schemes

Karyological studies in cattle of Kerala State with special reference to infertility and sterility	College of Veterinary & Animal Sciences, Mannuthy
Breeding rabbit for meat production	..
Nutrient requirement of caged layers	..
Toxic effects of Industrial effluents on animals	..
Studies on Blood groups and bio- chemical polymorphism in cattle	..
Mycotoxicosis in domestic animals and poultry	..
Assessment of the economic losses resulting from commonly prevalent diseases in specified areas	..
Efficiency of white pekin ducks, desi ducks and their crosses for meat production	..
Progeny testing of cross bred bulls in rural areas	..
ICAR Co-ordinated Projects	
AICRP on Poultry	Mannuthy
AICRP on Goat	..
AICRP on Agrl. By-Products	..

Appendix VIII

LIST OF SCHEMES SENT FOR SANCTION

<i>Title of the scheme</i>	<i>Funding Agency</i>	<i>Amount proposed (in lakhs)</i>
Germplasm enhancement and evaluation of Indian Pepper, Egg plant and tomato lines for sources of disease resistance	ICAR	5.80
Preservation and nutritive quality of miscellaneous fodders with special reference to subabul (<i>Leucena leucophala</i>)	ICAR	4.95
Preparation of alcoholic and non-alcoholic beverages from Cashew apple	ICAR	2.72
Survey of edible mushroom flora of Kerala and exploring the possibilities of standardising techniques	ICAR	5.04
Biogas Research and development Adhoc project proposal	ICAR	4.83
Estimation of damage due to pests, diseases and drought in black pepper in Calicut district of Kerala	ICAR	6.62
Ad hoc scheme—Quail farming	ICAR	4.64
Feed, protein evaluation and expression of protein requirements of cattle based rumen degradable nitrogen	ICAR	20.00
Microbial control of major pests of coconut palm	ICAR	7.18
Economics of mixed farming and resources use efficiency. A study of typical farming situations in Kerala	ICAR	3.04
Impact of land reforms on Agrarian structure and agricultural production in Kerala	ICAR	2.63

Survey, collection and evaluation of off season bearing varieties of mango	ICAR	5.30
Nitrogen fixing bacteria associated with plantation and orchard crops of Kerala	ICAR	11.00
Developing monosomics and trisomics in cucumber (<i>C. sativus L</i>) and locating genes on chromosomes	ICAR	4.90
Soybean processing and utilization Research	ICAR	29.50
Estt. of a Regional Research-cum Diagnostic Pathology Centre	ICAR	12.85
Investigations regarding aetiology, pathogenesis and line of treatment of Degna disease in livestock	ICAR	23.54
Genetic improvement of groundnut	ICAR	3.67
Standardisation of tissue/apical meristem culture techniques in horticultural crops of Kerala	ICAR	52.17
Investigations on the post harvest deterioration of common fruits in Kerala	ICAR	14.23
Utilization of mycoparasites in the control of diseases caused by <i>Rhizoctonia solani</i>	Science & Technology, GOI	7.50
Research on design, fabrication and testing of floating rafts for raising crops	ICAR	16.45
Standardisation of agro-techniques for the cultivation of crops on rafts	ICAR	7.34
Endemic ethmoid carcinoma in livestock	DARE	9.22
Shade studies on coconut based inter-cropping situations	ICAR	5.55
Possibilities of using cassava stem as fuel in rural households in Kerala	State Committee on Science & Tech., GOK, Trivandrum	0.41
Induced mutation in tuber crops	International Atomic Energy Agency, Vienna	0.40
Scheme for post harvest technology as a part of the World Bank Scheme	PPM Cell Govt. of Kerala, Trivandrum	75.00

Appendix IX

STATUTE AND AMENDMENT ISSUED DURING 1985-86

1. Amendment to statute. SRO No. 476/72 dt. 14-9-1972 relating to the appointment, salary and allowances and duties of the registrar as assented to by the Chancellor with effect from 5-3-1985
2. .. as per notification G. O. MS. No. 34/82/AD dt. 15-1-82 as assented to by the Chancellor with effect from 28-9-83 on the method of appointment for the post of Driver Gr. II.
3. .. as per notification GA/A3/10768/84 dt. 26-11-85 to SRO No. 293/72 dt. 15-6-1972 as assented to by the Chancellor with effect from 8-11-1985 on the application of General Provident Fund Kerala Rules"
4. .. as per notification G. O. (MS) No. 36/86 AD dated 7-3-1986 to first statutes prescribing the method of appointment, qualifications, salary and allowances, age limit and duties in respect of the post of School Assistant (L. P. School) under Kerala Agricultural University.
5. .. as per GC/15933/85 dt. 11-10-1985 Dr. Velayutham, Assistant Director General, ICAR, Krishi Bhavan is nominated to the General Council and Executive Committee of the KAU in place of Dr. R. M. Acharya for the remaining period of the General Council and Executive Committee constituted as per the GC/40397/82 dt. 31-1-1983.

□