CONTENTS

SUB PROJECT ON NORTHERN REGION

On the spot review of Progress

as on 31-12-87

REGIONAL AGRICULTURAL RESEARCH STATION

PILICODE — KASARAGOD

ON THE SPOT REVIEW OF PROGRESS
(As on 31-12-1987)

a) Name of Sub Project : Setting up of the Regional Agricultural Research Station, Pilicode.

b) Date of commencement : 8 August 1980

c) (i) Lead function : State-wide research on coconut

(ii) Verification and testing functions : Verification and testing centre for rice, pulses and oil seeds.

d) Research projects in operation (as on 31st December 1987)

R&RS, PILICOLE

i)	ICAR	--
ii)	NARP	49
iii)	KAU	--
iv)	Others	--
		49

PRS, PANNIYOOR

NARP	3
KAU	2
ICAR (AICSCIP)	10
	15

IAT, TAVANUR

NARP	2
Grand Total	66

I. Incremental Staff as on 31-12-1987

Sl. No.	Category	Sanctioned	In position	Vacant	Category vacant
A.	PILICODE				
	a) SCIENTISTS				
1.	Assoc.Director	1	1	-	
2.	Professor (Agron.Chem.)	2	2	-	

1	2	3	4	5	6
3.	Associate Professor				
	Agronomy	2	-	2	
	Agrostology	1	1	-	Asst.Professor is working in the post
	Breeding	2	2	-	One Asst. Professor against the post
	Genetics	1	-	1	Post shifted to college of Forestry Vellanikkara.
	Engineering	1	-	1	
	Economics	1	-	1	
	Entomology	1	1	-	
	Meteorology	1	1	-	
	Oil Technology	1	1	-	
	Horticulture	1	-	1	
	Pathology	1	1	-	
	Irrigation Engineering	1	-	1	
	Statistics	1	1	-	
	Micro Biology	1	1	-	Asst.Professor is posted
	Total of Associate Professor	16	9	7	
4.	Assistant Professor	1	-	1	
	Horticulture	1	1	-	Jr.Asst.Professor is posted
	Entomology	1	1	-	
	Economics	1	1	-	Jr.Asst.Prof. is posted
	Plant Patholoty	1	1	-	
	Total of Asst.Professor	5	4	1	
B.	PANNIYOOR				
	Professor (Breeding)	1	1	-	Working arrangement at RRS, Moncompu.
C.	TAVANUR				
	1. Assistant Professor	3	2 (Agrl.Engg)	1	(Agronomy, Breeding)
	Total Scientific Staff	28	19	9	67.85%

1	2	3	4	5	6
(b)	Administrative Staff (PILICODE)				
1.	Administive Officer	1	1	-	
2.	Assistant Grade I	1	1	-	KAU share
3.	Typist Grade I	2	2	-	
4.	Typist Grade II	2	-	2	
5.	Peon	1	1	-	
(c)	Paratechnical staff (PILICODE)				
1.	Farm Asst. Grade I	5	5	-	
2.	Lab Attender	6	2	4	
3.	Tractor Driver	1	-	1	
4.	Driver (Gr.II)	2	2	-	
5.	Photographer/Artist	1	-	1	

Whether ICAR approval has been obtained for the staff pattern

Yes

POSITION IN RESPECT OF STAFF PRIOR TO NARP

A. PILICOLE CENTRE

Sl. No.	Category	Sanctioned	In position	Vacant
a)	SCIENTISTS			
1.	Professor	-	-	-
2.	Associate Professor	3	1	2
3.	Assistant Professor	3*	1	2
4.	Junior Asst. Professor	2	1	1
b)	ADMINISTRATIVE AND SUPPORTING			
(i)	Paratechnical			
1.	Farm Supervisor	1	0	1
2.	Farm Assistant (Gr.I)	2	2	-
3.	Driver (L.V) Gr.I)	1	1	-
4.	Peon(Gr.I)	2	2	-
5.	Peon (Gr.II)	1	1	-
(ii)	Administrative			
1.	Section Officer	1	1	-
2.	Senior Gr. Assistant	2	2	-
3.	Typist (Gr.II)	1	1	-
4.	Assistant(Gr.I)	3	3	-

*From 4 posts sanctioned 1 was shifted to College of Forestry, Vellanikkara.

1	2	3	4	5
B.	PANNIYOOR CENTRE			
a)	SCIENTISTS			
1.	Professor	-	-	-
2.	Associate Professor	2	2	-
3.	Assistant Professor	3	1	2
4.	Junior Assistant Professor	-	-	-
b)	ADMINISTRATIVE AND SUPPORTING			
(i)	Paratechnical			
1.	Agrl. Demonstrator (Gr.I)	2	2	-
2.	Laboratory Attender	1	1	-
3.	Driver	1	1	-
(ii)	Administrative			
1.	Administrative Assistant	1	-	1
2.	Assistant (Sr.Gr.)	2	2	-
3.	Typist Grade II	1	1	-
4.	Peon	2	2	-
C.	TAVANUR CENTRE			
a)	SCIENTISTS			
1.	Professor	-	-	-
2.	Associate Professor	2	2	-
3.	Assistant Professor	4	3	1
4.	Jr.Asst.Professor	2	2	-
5.	Research Assistant	1	1	-
b)	ADMINISTRATIVE AND SUPPORTING			
(i)	Paratechnical			
1.	Agrl. Demonstrators Gr.I	2	2	-
	Gr. II	3	3	-
2.	Laboratory Attender Gr.II	1	1	-
3.	Driver Gr.I	1	1	-
4.	Technician Gr.I	1	1	-
	Gr.II	4	3	1
	Gr.III	1	1	-
(ii)	Administrative			
1.	Administrative Assistant	1	1	-
2.	Senior Grade Assistant	4	4	-
3.	Assistant Grade I	5	3	2
4.	Stenographer	1	1	-
5.	Librarian	1	1	-
6.	Peon (Hr.Gr.)	2	2	-
7.	Peon	2	2	-

1	2	3	4	5

Indicate major problems in recruitment

Nil

II. CONSTRUCTION WORK

1. Preliminary requirements

i) Stage of Master Plan Preparation and approval : Approved

ii) Approval of procedure for nomination to Architects : Approved

iii) Supervision arrangements : Construction work is being supervised by an Executive Engineer.

iv) Whether land acquisition has been completed : An area of 30.27 ha. has been acquired additionally during the 39.70 ha at Pilicode and 17.20 ha at Nileswar the total area available for research is 87.17 ha.

(1985 together with

2. Progress of Civil Works:

Sl. No.	Category	Area sanctioned (m^2)	Area completed (m^2)	Area in progress	Present stage
i)	Central facilities				
	Office-laboratory (in 2 floors)	1588	1588		Work completed and handed over.
ii)	Housing facilities				
a)	Quarters (Type V, IV, II)	1188	1188		-do-
b)	Trainees' Hostel (in 2 floors)	948	948		-do-
iii)	Others				
	Green house	200	200		-do-
	Farm house	48	48		-do-
	Threshing floor	258	258		-do-
	Store	39	39		-do-
	Net house	103	103		-do-
	Fencing				

3. Indicate major problems encountered in civil works : Cost escalation

III. PROCUREMENT OF EQUIPMENT AND VEHICLES
(Amount Rs. in lakh)

Sl. No.	Category	Amount sanctioned	Amount spent	Balance
1.	Office and Educational	0.29	0.65	-0.36
2.	Transport	2.10	1.90	0.20
3.	Farm equipments	2.25	1.29	0.96
4.	Meteorological equipments	0.44	0.45	-0.01
5.	Lab. equipments	10.92	10.62	0.3
6.	Others (Library, documentation)	0.40	0.16	0.24
	Total	16.40*	15.07	1.33

*Inclusive of price escalation @ 10 per cent.

Indicate major problems encountered in procurement of equipments.

Delay in obtaining NMI and CDE certificates.

IV. IMPLEMENTATION OF TECHNICAL PROGRAMME

a) Indicate whether scientific staff has been given orientation on NARP objectives, multidisciplinary research, linkages. Also indicate whether they have been given copies of the Research Review Report, appraisal report.

Yes

b) Whether research initiated on all lead/verification/testing functions mentioned in appraisal report.

Yes

c) Whether multidisciplinary technical programme prepared (attach copy).

Two multidisciplinary projects have been formulated and are being implemented.

1. Control of button sheeding in coconut.
2. Control of stem bleeding disease in coconut.

d) No. of Experiments.

I. COCONUT AND COCONUT BASED FARMING SYSTEM:

a) Crop Improvement : 10
b) Nutrient management : 4
c) Moisture conservation and drought management : 3
d) Crop Protection : 5

II. RICE AND RICE BASED FARMING SYSTEMS

a) Crop Improvement : 7
b) Nutrient management : 2
c) Crop Protection : 4

III.	Spices	: 1
IV.	Vegetables, tubers and Banana	: 2
V.	Cashew	: 1
VI.	Miscellaneous crops	: 2
VII.	Microbiology	: 3
VIII.	Crop weather studies	: 2
IX.	Social Sciences	: 2
X.	Processing technology	: 1

PRS, PANNIYUR

Crop Improvement	: 7
Crop Production	: 5
Plant protection	: 3

IAT, TAVANUR

Crop Production	: 1

d) Whether land for experimental purpose adequate

Yes

e) Major problems encountered: Nil

f) Major achievements

Most of the research projects in the research stations of the zone are in various stages of implementation. Some of the salient findings are given below:

The research station is maintaining a unique collection of coconut germplasm consisting of 28 exotic and 34 indigenous cultigars. These are being screened for yield and disease resistance.

Lakshaganga (PHC-1) a product of the cross between Lakshadweep Ordinary and Gangabondam was released as the first hybrid coconut of the Kerala Agricultural University.

Apart from that, Andaman Ordinary x Gangabondam and West Coast Tall x Gangabondam were also found to be quite encouraging for recommendation to cultivators. The zonal workshop reviewed their performance and opined that these are to be released for general cultivation in Kerala.

Tall x Dwarf hybrids of coconut have been found to be superior to their parents. Among the different T x D hybrids, West Coast Tall x Chowghat Dwarf Green and West Coast Tall x Niyurgading having been observed to surpass the rest in growth and yield potential.

Coconut seedlings raised in polybags have been found to be superior to those raised in conventional seed beds with respect to girth at collar, height and number of leaves.

A nursery technique has been developed for raising coconut seedlings. Partial removal of husk of seednuts before planting in nursery has been found to increase germination percentage as well as quality of seedlings.

Trials were conducted to study the effect of application of NaCl and KCl in adult palms belonging to the variety West Coast Tall. The results indicated that application of NaCl and KCl (750 Na_2O: 250 K_2O g/plant) increase the nut yield of palms by 43.91% over the pre treatment yield.

In young Dwarf x Tall hybrids the application of NaCl and KCl is found to promote vegetative growth and early flowering habit.

Young hybrid palms receiving irrigation at IW/CPE 1.0 (376 lit/palm along with NPK @ 0.5, 1.0 and 2.0 kg/palm have produced the maximum girth at collar and height.

A fertilizer trial for coconut in the cultivators' field conducted for seven years has revealed that NPK @ 0.50, 0.32 and 1.20 along with the cultivators' practice of applying 25 Kg green leaf + 10 cow dung per palm per annum is highly economical leading to a cost benefit ratio of 3.96 as against 1.45 in case of cultivators practice alone.

Excessive button shedding in coconut is found to be directly influenced by season. The maximum shedding is observed during south west monsoon (83.02%). Significant positive correlations have been recorded between button shedding and mean monthly minimum temperature, amount of rainfall as well as intensity of rainfall. There is indication that insects, specifically mealy bugs, mites, coreid bugs and inflorescence catterpillars, play a role in the phenomenon of button shedding.

Fungi like Aspergillus sp., Rhizopus sp., Penicillium sp. Phialophora richardsii (Nannf) and Paecilomyces variotii have been isolated from the stem bleeding affected tissues. However, their pathogenecity remains to be established.

Intercropping of coconut gardens with cocoa has been established to be a profitable propostion. The profit per hectare worked out to Rs.7,807.00, Rs.8,999.00 and Rs.6,812.00 with coconut-cocoa (Single hedge), Coconut cocoa (double hedge) and coconut monocrop, respectively.

In an effort to find out the correlation between climate and coconut production, a significant positive correlation between rainfall during October to April and coconut yield in the second year as well as a significant negative correlation between rainfall during June to August and coconut yield in the second year have been observed.

In another study, a significant positive correlation between mean cumulative bright sunshine hours from the initiation of primordium of inflorescence to initiation of spike (28-44 months before harvest) and coconut yield has also been recorded.

The beneficial association of a few microorganisms in the root zone of upland crops including coconut, clove, cinnamon, pepper, oil palm, arecanut, jack fruit, mango and pineapple has been established in this research station. The population dynamics of total heterotrophs and diazotrophs like Azospirillum, Azotobacter and Beijerinkia have been worked out.

Two high yielding cultures of pepper viz., 239 and 331 have been developed at Panniyur. They are now being tested for their yield in different locations in the northern zone.

A number of cultivars of pepper have been screened for shade tolerance. The results so far gethered indicate that Narayakodi is the best variety suited for cultivation in coconut shade.

A comparison of different stem portion of the pepper plant in the nursery has showed that middle one third portion of the runner shoots (stolen) give the maximum percentage of quality seedlings. They are early in germination and vigorous in growth. They also give higher yields when compared to the seedlings raised from the other stem portions.

It has been established that treatment with 3 IBA (dipping the lower cut end in 1000 ppm solution for 45 seconds) will induce profuse rooting in pepper cuttings. Poor rooting is a problem in pepper nurseries. The cost of this treatment works out to Rs.2/- to Rs.2.50 whereas for treatment with Caradix B varieties from Rs.8/- to Rs.10/- for 1000 cuttings.

The phenomenon of spike shedding is found to be a varietal character and the nutritional aspect has no bearing on this. High shade and disease incidence also play a role in this Phenomenon.

Under the comparative yield trial of pepper cultivars, five popular cultivars are being compared foryield. Kuthiravaly and Balankotta are found to be superior to the rest of the entries.

Mulching the basins of pepper in summer months prevents the pepper vines from drying up and it increases the yield also. Among the various mulching materials tried, saw dust, arecanut husk, dry leaves and plastic sheet in that order are the most effective. In order to increase the net return from pepper gardens, various inter crops have been tried. Among them Ginger is found to be the most economical. Banana, though gives a high return of its own, tends to reduce the yield due to its shade effect.

Quick wilt disease of pepper which is caused by Phytophthora Palmivora is a serious malady. Among the various control measures, application of Bordeaux mixture at specific time intervals is found to be the most effective. Further studies in this line has indicated that application of fungicides like Ridomil with a systamic action may be a cheaper control measure for the disease.

For controlling fungal pollu in pepper, fungicidal applications coinciding with the peak periods of infection are effective.

From trials conducted to identify suitable varieties of pulses to be grown as floor crop in coconut gardens, the cowpea variety HG 22 was found to be superior to the rest. In black gram varieties KMU-3 surpassed the rest. Among the 24 entries of green gram DM-3 was found to be superior.

A fertilizer trial on Sweet potato grown as a floor crop in coconut garden has indicated that application of 25 kg N and 50 kg per hectare give themaximum yield for this crop.

Irrigation (@450 litres/palm/week) during the summer months will increase the yield of nuts (more than 50%), quality and quantity of copra. The population fluctuation of cockchaffer beetle was studied in coconut gardens and it was found that the larval population increases with the pre-monsoon showers. A number of species also have been identified. Crops like colocasia, tapioca, pepper, arecanut etc. were found to act as alternate hosts for the grubs.

A large number of accessions of rice, both local tall indicas as well as modern varieties, were screened for disease and pest resistance/tolerance. Mala, high yielding variety of rice was found to be tolerant to sheath blight. Its grain and straw yield were also high.

A strain of Azolla pinnata with high sporulation has been screened out from the rice fields of the northern region of Kerala. This strain PIL-1, has great potentiality of saving nitrogenous fertilisers in paddy fields.

Experiments conducted has revealed that Azospirillum, a potent nitrogen fixing bacteria occur in the root environments of various spices and plantation crops. Root formation and root development in pepper cuttings have also been found to be enhanced by inoculation of the cuttings with Azospirillum. It also favours the formation of more healthy and strong roots and shoots.

Studies conducted at the station revealed that application of Carbofuran did not adversely effect the growth of Azospirillum. However, the chemical was not found to favour its growth. Bordeaux mixture was found to have a deleterious effect on the growth of Azospirillum in the surface soil upto a depth of 4 cm but did not affect at 24 cm depth.

A new disease of black pepper was recorded from this station. For the first time Xylas formicarius was reported to cause severe damage to the pepper vines.

Irrigating with 30 litres of water once in two days is optimum for banana.

Pottan, leaf fall and fruit rot were found to affect the banana severely in Northern Kerala. Preliminary studies were carried out and adhoc recommendations formulated.

A new disease in sesamum caused by a bacteria was reported. Similarly in ginger also a new disease was reported and control measures suggested.

Annual moringa, released by Tamil Nadu Agricultural University was found to be suited for our conditions. Hence its seedlings are being distributed to farmers.

Out of the 100 cultivars of rice tested in a screening trial, 22 Nos. have been promoted for preliminary yield trial.

Evaluation of popular modern varieties of paddy is being carried out with a view to identify the most suitable variety for the region. Studies have revealed that Cul.1999 for viruppu and IR20 and Cul.1065 for the mundakan season are suitable.

Among eight popular local cultivars screened for viruppu season, varieties Allikkannan and Malakkaran were found to be the top yielders. Thowan was found to be better among the short duration varieties. In the mundakan season, variety Chitteni outyielded the other five varieties.

From the varieties tried, Culture 1727 and Culture 23332-2 were found to be suitable for the region.

In an experiment to evolve high yielding saline resistant/tolerant varieties of rice, the local cultivar, Odacheera was subjected to gamma radiation and thefive selected mutant lines have been put under CYT in saline areas.

Studies on the efficacy of flood tolerant cultures of paddy have revealed that BR 51, BR 52 and CR 1018 were superior to others. But CR 1018 has the disadvantage that its duration is 30 days.

In fertiliser trial on direct sown 'viruppu' rice, it was found that P and K can be applied at seeding or with 20 days of germination depending on the weather conditions. The maximum yield was obtained when P and K were applied at seeding. The farmers apprehension that basal dressing of fertilisers will adversely affect the germination and growth of rice is ill based.

A large number of accessions of cucurbitaceous vegetables are being screened for summer fallows of rice of the northern region. Snake gourd (67 accessions), cucumber (108 accessions) bitter gourd (80 accessions) and Ridge gourd (74 accessions) were studied and 5 each were advanced for further investigations.

Studies on the effect of seed treatment with growth regulators on the germination, growth and yield of bhindi revealed that the germination could be enhanced to 66.6% with IAA (300 ppm). Soaking seeds in water gave a germination percentage of 58.8%. Ethrel at 300 ppm was also found to be effective (65.5%) in enhancing germination.

For vegetables grown in areas of water scarcity, pitcher irrigation is recommended.

Spraying Bordeaux mixture was considered to be phytotoxic to cucurbitaceous vegetables. But experiments conducted in bitter gourd, snake gourd and water melon have showed that Bordeaux mixture if properly prepared is not phytotoxic to them. It checked the disease and increased yield.

Dithane M-45 can be used for controlling sheath blight of paddy. It is cheaper than any other fungicide presently recommended.

Lab to Land:

Four villages namely, Nileshwar, Cheruvathur, Vellur and Kodakkad have been selected under the Lab to Land Programme involving a total of 197 farmers. Based on the farm production plans inputs were supplied to the beneficiaries in order to improve their farm income. The inputs included seeds, fertilisers, supplementary feed for cattle, poultry birds, goats, coconut seedlings, plant protection chemicals and agricultural implements.

Village adoption programme:

The Village Adoption Programme has been conceived as a means to transfer new production technologies to the farmers and to establish close contact with them. With this objective in view two villages have been adopted, Pilicode and Nileshwar. Planting materials were supplied to the farmers on no profit no loss basis which included 4000 coconut seedlings.

Kissan Mela:-

Three Kissan Melas were organised during the period from 1983 to 1985. In these melas the farmers were appraised of newer crop production technologies. They were also taken around the farm.

Krishi Darshan Programme:

This programme was started in 1984 to create an awareness among farmers about the modern trends in agriculture and related subjects. As per this programme, 400 farmers sponsored by banks, farmers' clubs and other voluntary organisations visited the station.

Exhibition:

The station participated in five agricultural exhibitions and highlighted the activities and accomplishments of the University and provided technical information to the farmers who visited the exhibition.

Publications:

Publications of popular articles, books and technical bulletins were carried out for passing on scientific information to farmers. Apart from this, many radio programmes were conducted. A large number of research papers were also published from the station.

National Seminar:

For the first time, a national seminar on Agrometeorology of plantation crops was organised in which scientists from different parts of India participated.

Training Programme:

Pre-service training programme for the demonstrators of the Department of Agriculture is being conducted. Different training programmes of varying durations are also organised in this station.

Distribution of planting materials:

Quality planting materials of coconut, pepper annual moringa, vegetables, ornamental plants etc. are supplied to the farmers.

4. Whether seasonal summary of research results finalised and sent to ICAR/Director of Research.

Seasonal report for Rabi 1986-87 was finalised and sent to ICAR on 11.2.1988 and that of Kharif 1987 has been completed.

i) Extent of participation of research staff in teaching and extension.

The research staff of the station though do not attend to regular teaching work are conducting classes for the students of the vocational higher secondary education of two schools. The research staff of this station are also conducting practical training classes for the D.A.Sc. Students of the Kelappaji College of Agricultural Engineering and Technology, Tavanur.

Pre-service training programme (Six months duration) for the demonstrators of the Department of Agriculture is being conducted. Different training programmes of varying durations were also organised in this station.

Associate Professor (Meteorology) Dr GSLHV Prasada Rao guided one Ph.D. student (Meteorology) of the Cochin University. Assoc.Director, Dr KP Rajaram is guiding one Ph.D student of the KAU Dr RR Nair, Associate Director i/c previously was chairman of the Advisory Committee of one M.Sc. (Agri) Student.

The Scientists of the station regularly participate in T & V Workshops for the district level Agricultural Officers of Calicut, Cannanore and Kasaragod districts. They are also participating in seminars and workshops organised by the Department of Agriculture, banks, co-operative societies, colleges, schools etc.

V. LINKAGE AND CO-ORDINATION

a) Coordination among different disciplines

There is good coordination among various disciplines in the Station.

b) Coordination with other research organisations in the zone or in adjoining zone/state/Agricultural Universities/ICAR.

There is good coordination with other research organisations like CPCRI, CWRDM, CRCRI etc. and other research stations of the University. Discussions with the scientists of these organisations are arranged during Regional Workshops and during other occasions. Collaborative research projects are also being taken up at Pilicode and Tavanur.

For the first time, a national seminar on Agrometeorology of Plantation crops was organised in collaboration with Indian Meteorological Society, Rubber Board, CPCRI CWRDM, Tamil Nadu Agricultural University, Andhra University etc.

c) Extension activities - Adoption of Villages, trials in farmers fields, give number and location.

For villages have been adopted, 2 under NARP and 2 under Lab to Land Programme. Cluster approach is adopted in the selection of farming families under these programmes giving due importance to the families of backward classes. In addition to technical assistance, these families are supplied with necessary inputs also.

Kissan melas were organised in which farmers were appraised of the newer production technologies.

Krishi Darshan Programme was started in 1984 to create an awareness among farmers about the modern trends in agriculture and related subjects . Annually 200 farmers sponsored by banks, farmers clubs and other voluntary organisations used to visit the station under this programme.

The station participated in five agricultural exhibitions and highlighted the activities and accomplishments of the University.

Publications of popular articles, books and technical bulletins were carried out for passing on scientific information to farmers. Apart from this, many radio programmes were conducted. A large number of research papers were also published from the station.

Quality planting materials of coconut, pepper, annual moringa, ornamental plants etc. are supplied to the farmers.

d) Co-ordination with Lepartmental staff (number of meetings with department staff)

There is adequate co-ordination with Departmental staff. The scientists of the station take part in the training programmes of Departmental officers under T & V system at Pilicode and at Calicut every month. The Associate Director always keeps in touch with Principal Agricultural Officers (Joint Director of Agriculture) and SDAOs of the three districts in order to have intimate laision between the SDA and the KAU. The SDA staff render active support in the conduct of adaptive trials and in the implementation of the Lab to Land and Village adoption programmes. Active participation of the SDA staff in the Regional Workshops helps the formulation of research projects in the research station.

e) Six monthly progress report from SAD (March and September - date of submission)

Discontinued after completion of the Phase I.

f) Seasonal workshops - Zonal University officials and SLA subject matter specialists - Date of holding, No. of participants.

Zonal Workshop	Date	No. of participants				Farmers	Input Agencies	Total
		KAU research personnel	CPCRI	CWRDM	Department of Agriculture			
I	May 25, 1981	18	1	2	11	-	-	32
II	May 25, 1982	29	-	1	23	-	-	53
III	Nov. 26, 1982	23	3	3	19	-	-	48
IV	July 27, 1983	30	2	-	22	-	-	54
V	Dec. 5-6, 1983	32	2	-	47	-	-	81
VI	Aug. 24, 1984	35	3	2	45	-	-	85
VII	March 14-15, 1985	33	1	-	47	-	-	81
VIII	Jan. 14-15, 1986	31	5	2	54	-	-	92
IX	Aug. 6-7, 1986	35	6	-	64	3	-	108
X	Aug. 13-14, 1987	29	2	-	29	-	10	70

g) No. of visits made by Director of Research to the sub-project.

1987 : 4

h) No. of visits made by Associate Director to other stations of the zone during 1987.

Pepper Research Station, Panniyur - Thrice

Institute of Agrl. Technology, Tavanur - 1 - Once

i) Training of staff (indicate needs)

The scientists may be deputed to undergo short refresher training courses so as to update their knowledge. The following areas suggested:

a) Tissue culture
b) Biometrical genetics
c) Analytical methods in statistics and cost benefit ratio analysis.
d) Instrumentation
e) Post harvest processing
f) Biofertilisers.

Budget sanctioned and expenditure details (Rs. in lakhs)

Sl. No.	Item	Original outlay	Expenditure from 9-8-1980 to 8-8-1985
NARP			
1.	Incremental Staff (Pay+TA)	25.87	27.12
2.	Operating cost	11.20	8.79
3.	Equipments	16.40	15.07
4.	Civil works	44.22	68.27
5.	Research farm development	2.00	1.00
6.	Library	0.15	0.15
	Total	99.84	120.40
UNIVERSITY			
1.	Land Acquisition	15.25	36.53
2.	Basic cultivation	4.20	3.10
3.	Station utilities and maintenance	4.20	1.47
	Total	23.65	41.10
	Grand Total	123.49	161.50

Whether existing delegation of powers adequate - Adequate

IV. Audit: Whether audit of accounts of previous financial year completed - Audit completed upto 8-8-1985

ON THE SPOT REVIEW OF PROGRESS (AS ON 31-12-1987)

a) Name of the sub Project : NARP High range region; Regional Agricultural Research Station, Ambalavayal and sub centre at Cardamom Research Station, Pampadumpara

b) Date of commencement : 24-11-1983

Lead function : Citrus (Mandarin orange), mango and other fruits like pomegranate Cardamom and Pepper
Hill paddy and paddy based farming system in the high valleys of hill ranges.

Verification and testing functions : Pepper, essential oils and medicinal plants.

Research projects in operation at the station : Ambalavayal

1. ICAR/AICRIP/NARP	:	26
2. State/University	:	6
3. Others	:	-

Pampadumpara

1. ICAR/NARP	:	6
2. University	:	4
Grand total		42

I. INCREMENTAL STAFF SANCTIONED AND APPOINTED

Sl. No.	Sanctioned		Appointed		Remarks
	Ambalavayal	Pam. para	Ambalavayal	Pam. para	
a) Scientists	(1)	(2)	(1)	(2)	
1. Assoc.Director	1	-	1	-	
2. Assoc.Professor	1	-	1	-	Asst.Prof. officiating Ambalavayal
3. Asst.Professor	4	2	2	2	JAPs officiating at Ambalavayal

SUB PROJECT ON HIGH RANGE REGION

On the spot review of Progress

as on 31-12-87

REGIONAL AGRICULTURAL RESEARCH STATION

AMBALAVAYAL — WYNAD

1	2	3	4	5	6	7
b)	Administrative & Supporting staff:-					
1.	Farm Asst.Gr.II	2	2	2	2	
2.	Lab Assistant	1	-	1	-	
3.	Assistant Grade-II	1	-	1	-	
4.	Stenographer	1	-	-	-	
5.	Typist Gr.II	1	1	1*	-	*Provisional
6.	Driver Gr.II	1	-	1	-	
7.	Administrative Officer (University)	1	-	1	-	

Position in respect of staff prior to NARP

	Sanctioned	In Position	Remarks
AMBALAVAYAL			
a) AICFIP (Citrus)			
1. Assoc.Professor (Hort)	1	-	The scheme was terminated with effect from 1-4-86 and the posts were abolished.
2. Asst.Professor (Pl.Patho)	1	-	
3. Junior Asst.Professor	2	-	
4. Farm Asst.Gr.II	2	-	
5. Lab Assistant Gr.II	2	-	
b) University			
1. Asst.Professor (Agron)	1	-	
2. Asst.Professor (Bot)	1	-	
3. Asst.Professor (Ent)	1	-	
4. Section Officer	1	1	
5. Sr.Gr.Assistant	1	1	
6. Assistant Gr.I	2	2	One provisional hand
7. Assistant Gr.II	1	1	
8. Sr.Gr.Typist	1	1	
9. Jeep Driver	1	-	
10. Farm Supervisor	2	2	Sr.Gr.FA officiating.
11. Farm Assistant	6	6	
12. Field supervisor	2	1	
13. Tractor Driver	1	1	
14. Oil Engine Driver	1	1	
15. Peon	3	3	
16. Budder	1	1	
17. Regular Mazdoor	12	10	
18. Record Keeper	1	1	

PAMPADUMPARA

Sl. No.	Designation	Sanctioned posts	Vacant
1.	Associate Professor	3	1
2.	Assistant Professor	2	1
3.	Sr.Assistant Professor	1	1
4.	Administrative Assistant	1	-
5.	Assistant Grade-II	1	-
6.	Farm Supervisor	1	-
7.	Farm Assistants	3	-
8.	Field Supervisor	1	-
9.	Lab Assistant	1	-
10.	Peon	1	-
11.	Watchman	4	-
12.	Driver	1	-
13.	Typist	1	-

II CONSTRUCTION WORK

A. AMBALAVAYAL

1. Preliminary requirements

i. Stage of Master Plan preparation and approval : Approved

ii. Approval of procedure for nomination to Architect : --

iii. Supervision arrangements : --

iv. Whether land acquisition has been completed : Not applicable

2. Progress of Civil Work

Category	Area sanctioned	Area in progress	Area to be started and present stage
1. Construction of a trainees Hostel	400 m^2	50% completed	Plastering, flooring, sanitary fittings and furnishing remains
2. Remodelling and furnishing the existing laboratories	-	25%	-

B. PAMPADUMPARA

1. Preliminary requirements

i.	Stage of Masterplan preparation and approval	: Over
ii.	Approval of procedure for nomination to Architect	: Over
iii.	Supervision arrangements	: Available
iv.	Whether land requisition has been completed (Both for building and laboratories) (indicate area required) if not indicate reason for delay	: Construction in University land hence the question of land requisition does not arise.

2. Progress of Civil Works

Sl. No.	Category	
1.	Central facilities	The construction of Trainees hostel is in progress. Remodelling of the existing laboratory building is over. A 10/20 construction of mist propagation chamber is also in progress.
ii)	Housing facilities	Construction of Quarters by using KAU Funds is almost completed.

3. Indicate major problems encountered in civil works : Nil

III. PROCUREMENT OF EQUIPMENTS AND VEHICLES

(Rs. in lakhs)

Sl. No.	Category	Amount sanctioned	Amount spent.	Balance
A.	AMBALAVAYAL			
	Office equipment			
1.	Typewriter			
2.	Calculator	0.13	0.12	+0.01
	Transport			
	Trekker with body	1.25	0.96	+0.29
	Farm Equipment			
	Power tiller with accessories	0.45	0.46	-0.01
	Meteorological equipment	0.20	0.08	+0.12

1 2	3	4	5
Lab Equipment & Others			
1. Mist propagation Unit	0.50	Nil	+0.50 *
2. Monopan balance	0.08		
3. Calculator	0.06		
4. Audio visual items	0.15	0.57	+0.42
5. Others (item costing Rs.25000)	0.70		
6. Books & periodicals	0.50	0.38	+0.12

* The estimated cost for Mist Propagation unit comes to Rs.1.5 lakh as against the sanctioned amount of Rs.0.5 lakh

B. PAMPADUMPARA	Sanctioned allocation	Expenditure incurred
Office equipment	0.13	---
Farm Equipment	---	.42
Meteorological equipment	1.40	0.18
Lab equipment	0.47	1.31
Vehicle	---	---
Others	0.70	---
Total	2.70	1.91

IV IMPLEMENTATION OF TECHNICAL PROGRAMME:

a) Indicate whether scientific staff has been given orientation on NARP - Objectives - Multi disciplinary research, linkages. Also indicate whether they have been given copies of the research review report, appraisal report : Yes

b) Whether research initiated on all the lead/verification/testing functions mentioned in appraisal report : Yes

c) Whether multi disciplinary technical programme prepared. (attach copy) : Yes

d) No.of experiments

1. Plant Breeding : 6
2. Agronomy : 6
3. Horticulture : 17
4. Pathology : 3
5. Entomology : ---

e) Whether land for experimental purpose adequate : Adequate

f) Major problems encountered : Some posts of Scientists are remaining vacant for want of suitable hands.

Irrigation facilities are not available at Pampadumpara.

g) Major achievements:

Most of the experiments are on perennial crops and in the early stages of implementation. Some of the important achievements obtained so far are given below:

i) Twenty seven mango varieties available in the station have been grouped after studying their bearing habit and yield. Based on that the varieties viz. Olour, Bennet Alphonso, Prior, Amritham, Pairi, Benganappally and Chandrakaran were grouped as early season (flowering in December-January and harvesting in May), Dasheri, Kalappady x Himayuddin, Himayuddin and Nasi Pasand) as mid season (flowering in January-February and harvesting in June) and Neelum and Neelum x Baneshan as late season (Flowering in January/February and harvesting in June/July) varieties. Those varieties have also been grouped as high yielders (above 75 kg - Dasheri and prior), medium yielders (25-75 kg Bennet Alphonso, Neelam, Kalappady x Himayuddin and Pairi) and low yielders (< 25 kg - Olour, Neelam x Baneshan, Himayuddin, Amritham, Chandrakaran, Benganappally and Nasipasand).

ii) Coorg mandarin orange budded on rough lemon root-stock found to be better than other combinations with respect to growth, yield and quality of fruits.

iii) Maximum percentage of success in epicotyl grafting of mango was obtained in the month of August.

iv) Among the three types of planting materials tried in cashew, epicotyl grafts and seedlings were better with respect to establishment and growth than air layers.

v) Evaluation of banana cultivars under irrigated conditions showed that Bodles Alta Fort, Grosmichael and Chenkadali were high yielding varieties possessing comparatively longer duration. Nendran types were shorter in duration.

vi) The bacterial wilt in ginger was found to be reduced significantly by soil drenching and foliar spraying with 1% Bordeaux mixture at monthly intervals commencing from June (two months after planting).

vii) Studies on soft rot disease of ginger indicated that seed treatment with Captain 0.2% a.i. is effective in controlling pre-emergence rhizome rot.

viii) Rice did not respond to the application of lime upto 1000 kg/ha consistently for three years.

ix) The performance evaluation of rice cultivars showed that Edavaka and MO4 possessing higher yield of grain and straw are suitable for cultivation during both (1st and 2nd) the crop seasons.

The cold tolerant cultures 745 and 796 were found to be promising for the second crop season.

x) Among the herbicides tried Basalin + 2-4 DE @ 1.5 kg a.i./ha at 12 DAP was found to be effective in controlling rice weeds.

xi) Control measures of Azhukal disease of cardamon have been worked out and included in the package of practices recommendations of the Kerala Agricultural University.

xii) Cultivation of cardamom under artificial shade has been found to be feasible and economical.

xii) A new type of cardamom namely PV 1 is approved by the variety release committee by KAU.

h) Whether seasonal summary of research results finalised and sent to ICAR/Director of Research. If so, date of despatch; if not seasons for delay:

Seasonal summary report of Kharif 1987 forwarded	I.C.A.	8-2-1988
	Director of Research	12-1-1988

i) Extent of participation of Research staff in teaching and extension:

Staff do not participate in teaching as the Colleges are far away from the stations. However, they actively participate in the extension activities as follows:-

1. Attend T & V monthly workshops
2. Diagnostic team visits along with officers of DOA to cultivators fields.
3. Attend trainings, seminars and farmers meetings organised by Krishi Vigyan Kendra, Department of Agriculture, commodity Boards, Banks etc. and handle classes.
4. Participate in Agricultural exhibitions.
5. Publishing articles on agricultural importance in news papers.
6. Broadcast topics of agricultural importance through All India Radio.

V Linkages and Coordination

a) Coordination among different disciplines : Adequate

b) Coordination with other research organisation in the zone or in the adjoining zone/state/Agricultural Universities/ ICAR.

There is close coordination with CPCRI, National Research Centre for Spices, Coffee Research Station, Centre for Spices, Coffee Research Station, Rubber Board, CWRDM, Spices Board, UPASI etc. Scientists from these centres participate in the workshops where the research results are being reviewed and new programmes discussed.

c) Extension activities - Adoption of Villages, trials in farmers fields (give number and location)

Village adoption : Thomattuchal village has been adopted under the Village Adoption programme for the transfer of technology. Front line demonstrations of pulses and oil seeds were also conducted there during 1986-87.

In 1987-88 Ambalavayal village has been selected under the programme. During the year emphasis was given for the cultivation of vegetables, fruits and spices in the homesteads.

Farmers field trials

Crop	Number	Location
Paddy	10	Panamaram (2), Manantoddy, Kenichira, Mullankolly, Thariode, Thirunelly, S.Battery, Vaduvanchal, Muttila.
Pepper	5	Manantoddy, Kenichira, Vythiri, Kottathara, Muttil

d) Co-ordination with departmental staff:

(Number of meetings with department staff)

Regularly the departmental staff and research station staff meet two days a month in the T&V workshops besides the joint diagnostic team visits. Meetings also occur whenever specific field problems arise.

e) Six monthly progress report from SAU (March and September - Date of submission)

March 1987 Forwarded to ICAR on 26-6-1987

September 1987 Forwarded to ICAR on 27-11-1987

f) Seasonal workshops - Zonal University officials and D.D.A., Subject Matter Specialists

Fifth Zonal Workshop : Date of holding - 24-25 September 1987

No. of participants: 40.

g) Number of visits made by the Director of Research to the Project : 6

h) Number of visits made by the Zonal Associate Director to the other stations in the zone: One

i) Training of staff (Indicate needs):

Short term training in the following subjects will be useful.

1. Nursery techniques including rapid multiplication of crop plants.
2. Processing and preservation of fruits.
3. Conducting experiments on irrigation, soil and moisture conservation and recording observations.
4. Analysis, interpretation and presentation of research data.
5. Use of meteorological instruments, collection, analysis and interpretation of data.

...

pv/

VI. FINANCIAL PROGRESS

Budget Sanctioned and Expenditure details - NARP

Items of Expenditure	Sanctioned amount (Rs. in lakhs)	Expenditure incurred upto 31-12-1987
NARP		
Incremental Staff	12.33	8.89
Civil Works	10.40	5.11
Equipments	6.72	4.48
Operating cost)	3.58	2.79
Library)		
	33.03	21.27
University Share		
Salaries	1.74	1.24
Basic cultivation cost	1.25	1.71
Station maintenance	0.50	0.02
Utilities	0.50	0.10
	3.99	3.07

Whether the existing delegation is adequate : Yes

Audit: Whether audit of account of previous year completed : upto 1984-85

SUB PROJECT ON CENTRAL REGION

On the spot review of progress as on 31-12-87

REGIONAL AGRICULTURAL RESEARCH STATION

PATTAMBI — PALGHAT

ON THE SPOT REVIEW OF PROGRESS
(as on 31-12-1987)

a) Name of Sub Project : Sub Project on Central Region

b) Date of commencement : 1-11-1981

c) (i) Lead function : Regional Agricultural Research Station, Pattambi.

Rice, Pulses and oil seeds and rice based farming systems. The station also functions as an advanced centre for studies on laterite soil management.

(ii) Verification function : Sub Centre - Mannuthy

Rice, Pulses, oil seeds and tubers
Designing, fabrication and testing of agricultural implements.

Sub Centre - Eruthempathy

Rice, Pulses and oil seeds
Dry farming.

d) Research projects in operation at the station (RARS, Pattambi)

1. ICAR-AICRIP-NARP etc.	89
2. KAU	18
3. Others	1
	108

I. Incremental staff sanctioned and appointed : Attached as Appendix - I

II. Construction work - Pattambi:

Preliminary requirements:

(i) Stage of Masterplan preparation and approval: Approved as per F.12/1/83/Edn IV. dt. 19-3-83 of Dey. Project Co-ordinator (Admn.) ICAR, New Delhi.

(ii) Approval of procedure for nomination to architects : N.A

(iii) Supervision arrangements : Director of Physical Plant, Kerala Agrl. University.

(iv) Whether land acquisition has been completed (both for building and laboratories) (Indicate area required) if not indicate reason for delay. : Director of Agriculture, Trivandrum has been addressed for the transfer of land of dry farm, Eruthempathy to the control of the University.

MANNUTHY

(i) Stage of masterplan preparation and approval	Masterplan prepared and sent for approval.
(ii) Approval of procedure for nomination of architects	N.A
(iii) Supervision arrangements	Director of Physical Plant, Kerala Agricultural University
(iv) Whether land acquisition has been completed (both for building and laboratories) (Indicate area acquired) if not indicate reasons for delay	N.A

2. Progress of Civil Works

Sl. No.	Category	Area sanctioned	Area Comp.	Area in progress	Area to be started and present stage
1	2	3	4	5	6
(i)	Central Facilities, Pattambi				
1.	Laboratory	780.58m^2	-	-	Building work completed. Electrification work completed Furniture to be procured.
2.	Farm Structures:				
(a)	Glass house	40 m^2	-	-	Work completed
(b)	Green house	75 m^2	-	-	,,
(c)	Net House	40 m^2	-	-	,,
(d)	Seed Store & Drying yard	10.1 m^2	-	-	,,
(e)	Fertilizer-Store	41.5 m^2	-	-	,,
(f)	Sales Counter	40 m^2	-	-	,,
(g)	Implement & Tractor shed	137 m^2	-	-	,,
(h)	Jeep shed	43 m^2	-	-	,,
(i)	Meteorological Lab.	100 m^2	-	-	Building work completed, Electrification work completed. Furniture to be procured.

1	2	3	4	5	6
MANNUTHY:					
	Field Laboratory	175 m^2	-	-	Building work completed. Electrification work completed. Furniture to be procured completed and occupied
2.	Housing facilities				
	Quarters				
	Pattambi				
	Staff Quarters				
	Type V	2 x 165 m^2	-	-	Work completed
	Type IV	2 x 110 m^2	-	-	,,
	Type II	2 x 57 m^2	-	-	,,
	MANNUTHY				
	Type V	1 x 165 m^2	-	-	Completed and handed over

3. Indicate major problems encountered in Civil Works

III. Procurement of Equipments and vehicles:

Sl. No.	Category	Amount sanctioned (Rs.in lakhs)	Amount spent (Rs. in lakhs)	Balance (Rs. in lakhs)
PATTAMBI				
1.	Office & Educational	0.95	0.54	0.41
2.	Transport	2.25	2.70	+ 0.45
3.	Farm & Field equipments	0.23	1.64	+ 1.41
4.	Meteorological equipments	0.32	0.26	0.06
5.	Laboratory Equipments	17.21	16.47	0.74
6.	Others	4.46	2.51	1.95
	Total	25.42	24.12	1.30

Indicate major problems encountered in procurement of equipments --

IV. IMPLEMENTATION OF TECHNICAL PROGRAMME:

(a) Indicate whether Scientific Staff has been given orientation on NARP objective - multi-disciplinary research linkages - Also indicate whether they have been given copies of Research Review Report, appraisal report

The scientific staff has been given orientation on the objectives and implementation of NARP. They were also provided with copies of appraisal report of the Sub Project, NARP Mannual.

(b) Whether research initiated on all lead/verification/ testing functions mentioned in the appraisal report — Yes

(c) Whether multi-disciplinary technical programme prepared (attach copy) — Yes
Copy of the technical programme prepared for one project is enclosed.

(d) No. of experiments:

1. Breeding	-	22
2. Agronomy	-	18
3. Soil Science	-	9
4. Pathology	-	17
5. Entomology	-	18
6. Pulses and oil seeds	-	16
7. Vegetables and tuber crops	-	4
8. Agricultural Engineering	-	4

(e) Whether land for experimental purpose adequate — No. Sufficient garden land not available for crops like pulses and vegetables.

(f) Major problems encountered — Scarcity for irrigation water during the fag end of the second crop season and summer months

Lack of proper fencing around the station.

(g) Major achievements — Appendix - II

(h) Whether seasonal summary of research results finalised and sent to ICAR/ Director of Research? If so, date od despatch, If not, reasons for delay — Yes

Rabi 1982-83	July 1983
Kharif 1983	Feb.1984
Rabi 1983-84	July 1984
Kharif 1984	Feb.1985
Rabi 1984-85	July 1985
Kharif 1985	Feb.1986
Rabi 1985-86	Oct.1986
Kharif 1986	May 1987
Rabi 1986-87	Oct.1987

(i) Extent of participation of Research Staff in teaching and Extension (give details of course taught and students guided

a) Scientists of the sub-centre Mannuthy conducted classes for the following courses
1. B.Sc. (Ag)
2. B.Sc. (C&B)
3. B.V.Sc. and AH.

b) Scientists of the RARS, Pattambi:

i. Diploma Course : D.A.Sc. Students of K Tavanur

ii. Post graduate courses : Ph.D course - 1

c. Training Programmes

	Batches	No. of participants
1. State level Training programme on rice production technology	-1-	29
2. Coconut cultivation	17	336
3. Pulses production	8	130
4. Poultry	13	164
5. Fisheries	25	363
6. Home Science	31	470
7. Biofertilizers	-1-	49
8. Leadership training	-2-	15
9. Social forestry	-7-	170
10. Vegetative propagation techniques	-1-	15
11. Training for tribal welfare in youth	-1-	115
12. Field training course for DASc. Students of KCAET, Tavanur	-3-	45
13. Field training course for final year B.Sc.(Ag) students of College of Horticulture, Vellanikkara.	-1-	9
14. Classes on rice breeding, vegetables, pulses and oil seeds production technology to B.Sc.(Ag) students of College of Horticulture, Vellanikkara and College of Agriculture, Vellayani, post graduate students of St. Peter's College, Kolencherry, Maharaja's College, Ernakulam and Govt. College, Pattambi.	-7-	150
15. Practical classes for vocational higher secondary students	-2-	50

V. LINKAGES & CO-ORDINATION

a) Co-ordination among different disciplines

There is good Co-ordination among the various disciplines in carrying out multi-disciplinary projects.

b) Co-ordination with other Research Organisations in the Zone or in adjoining Zone/State/Agricultural Universities/ICAR.

Personnel from ICAR Institutions, Commercial Crop Boards, State Department of Agrl. etc. are invited for participation in the Zonal workshops and good Co-ordination is achieved in the formulation and implementation of the Research Programmes of the Region Contacts with Tamil Nadu Agricultural University is established in carrying out ICAR Projects and other Projects like BGA multiplication programme.

c) Extension activities adoption of villages

Trials in Farmers fields: give number and location

A. Village Adotpion Programme

Villages adopted

1. Thrithala
2. Keezhayoor

Improved vegetable seeds, high yielding paddy seeds and saplings of fruit trees were distributed in these 2 villages. Group discussion were arranged for conveying message of improved agricultural practices for rice pulses and vegetables.

B. Lab-to-Land programme

The programme was implemented with 50 selected families and inputs were distributed among the beneficiaries.

C. Adaptive trial on the use of cowdung extract against BLB attack on rice were conducted

d) Co-ordination with departmental staff (Number of meetings with department staff)

Six resources personnels from this station and participating in the T&V monthly workshop of Palghat, Malappuram and Calicut District. These are regularly held for two days in every month for each of these three districts. Besides the monthly workshop they are also participating in the District Technical Committee meetings of the T&V Programme. Besides they are also performing joint tours to the farmers with the extension personnel as members of Diagnostic Team.

e) Six monthly progress report: SAU (March and September) Date of submission

March 1982	23-4-1982
September 1982	14-10-1982
March 1983	21-4-1983
September 1983	5-10-1983
March 1984	13-4-1984
September 1984	15-10-1984
March 1985	10-4-1985
September 1985	10-10-1985
March 1986	11-4-1986
September 1986	4-11-1986
March 1987	27-4-1987

f) Seasonal Workshops Zonal University officials and DDA Subject Matter specialists - Date of holding, No. of participants.

No.	Date	No.of participants
1st	4-5-1982	38
2nd	11-1-1983	51
3rd	24-6-1983	44
4th	17th & 18th Jan. 1984	97
5th	17th & 18th Aug. 1984	82
6th	1st & 2nd Feb. 1985	104
7th	22nd & 23rd Jan. 1986	102
8th	5th & 6th Sept. 1986	103
9th	28th & 29th July 1987	81

g) No. of visits made by Director of Research to the project — Fourteen

h) No. of visits made by ZAD to the other stations in the zone — 10

i) Training of staff (indicate needs) — The Scientific staff who have to handle sophisticated instruments are to be trained in handling and maintenance of these equipments. They are also to be trained in Research Management and in areas of modern trends in Agricultural Research.

ii) Budget and equipment of Non - NARP Projects State University etc. contingencies:

Contingencies:

1. Strengthening of Directorate of Research/Workshop/Seminar (NARP)	: 0.02	6388.57	6388.57
Total	0.02	6388.57	6388.57

iii) Whether the existing delegation: is adequate if not list deficiencies- | Adequate

iv) Audit:

Whether audit of account of previous financial year completed | Completed upto 85-86

APPENDIX - I

Incremental Staff - sanctioned and appointed

a) Scientific posts:

Sl. No.	Category	Sanctioned	Appointed	Vacant
1.	Associate Director (Professor of Plant Breeding)	1	1	-
2.	Professor of Soil Science	1	-	1
3.	Associate Professor (Agro) Economics	2	2	Jr.Asst.Prof. working against one post
4.	Associate Professor (Agrl. Economics)	1	-	1
5.	Associate Professor (Engg/Soil Conservation)	1	-	1
6.	Asst. Professor (Agro)	1	1	-
7.	Asst. Professor (Plant Breeding)	1	-	1
8.	Asst. Professor (Entomology)	1	1	Joined duty 20-6-1986
9.	Asst. Professor (Soil Science)	2	2	-
10.	Asst. Professor (Agrl. Economics)	1	1	Jr.Asst.Prof. working against the post on study leave
11.	Asst. Professor (Extn.)	1	-	1
12.	Asst. Professor (Hort.)	1	1	-
13.	Asst. Professor (Bio-Chemistry)	1	-	1
14.	Asst. Professor (Agrl. Engineering)	1	1	Upto 17-7-
	AMBUTHY			
1.	Associate Professor (Agronomy)	1	1	-
2.	Associate Professor (Pl.Br.)	1	1	-
3.	Assistant Professor (Agrl.Engg.)	1	1	-
	BRUTHEMPATHY:			
1.	Associate Professor (Agronomy)	1	1	Upgraded on as Professor
2.	Asst.Professor (Pl.Br.)	1	-	1

b) Administrative and Supporting Posts:

PATTAMBI

1. Administrative Officer	1	1	-
2. Stenographer (Typist Gr.II)	2	1	1
	1*		*One post shifted Mannuthy
3. Duplicator Operator	1	1	-
4. Laboratory Attender	2	2	-
5. Driver	2	2	-
6. Tractor Driver	1	-	1
7. Photographer	1	-	1

MANNUTHY

1. Design Engineer	1	-	1
2. Sr.Gr.Technician	1	-	1
3. Sr.Gr.Draftsman	1	-	1
4. Stenographer (Typist Gr.II)	1	1	Shifted from Patt
5. Technician Gr.III	2	2	-
6. Workshop mate	1	1	-
7. Lab Assistant Gr.III	1	1	-

ERUTHEMPATHY

1. Agr. Demonstrator (Farm Asst.)	2	1	1
2. Peon	1	1	-

Position in respect of Staff prior to NARP

PATTAMBI

a) Scientists:

1. Associate Professor	6	6	-
2. Asst. Professor	11	2	9
3. Jr.Asst.Professor	9	1	8

b) Administrative and Supporting

1. Section Officer	2	2	-
2. Sr.Office Supdt.	1	1	-
3. Office Supdt. (FC&D)	1	1	-
4. Farm Supervisor(Vety)Gr.I	1	1	-
5. Farm ,, (Agri) Gr.II	3	3	-
6. Senior Gr. Asst.	5	5	-
7. Asst. Grade I.	3	3	-
8. Asst. Grade II	1	1	-
9. Technician Grade I	1	1	-
10. Technician Grade III	1	1	-
11. Typist (Sr.Grade)	1	1	-
12. Typist Grade II	1	-	1
13. Farm Asst.(Senior Grade)	3	3	-
14. Farm Asst. Grade I	5	5	-
15. Farm Asst. Grade II	9	9	-
* 17. Laboratory Asst. Gr.I	1	1	-
18. Laboratory Asst. Gr.III (Hr.)	4	4	-
19. Laboratory Asst.Gr.III	4	4	-
* 16. Farm Asst. Gr.I (Vety)	1	1	-

1	2	3	4	5
20.	Peon (Hr.Gr.)(300-450)	3	3	-
21.	Peon (Hr.Gr.)(290-425)	1	1	-
22.	Peon (280-400)	1	1	-
23.	Regular Mazdoor (Hr.Gr.) (300-450)	12	12	-
24.	,, (290-425)	2	2	-
25.	Watchman (Hr.Gr.)(290-425)	1	1	-
26.	Regular Mazdoor (280-400)	6	6	
27.	Watcher/Watchman (280-400)	3	3	-
28.	Sweeper (280-400)	1	1	-
29.	Driver (Hr.Gr.I)	1	1	-
30.	Driver (Gr.II)	1	1	-
31.	Head Peon	4	4	-
	MANNUTHY			
1.	Assoc. Professor (Agro)	1	-	Post shifted to Vellayani
2.	Asst. Professor (Bot.)	1	1	-
3.	Jr.Asst.Professor	4	4	-

APPENDIX - II

Major Achievements

CROP IMPROVEMENT

Red Triveni selection of this station has out yielded Triveni in the trials conducted at Research Station as well as farm trials in Malappuram and Trichur districts.

Culture-871, a derivative from Co-25 x (Triveni x Vella Kulappala), a photosensitive variety is found to yield better than other photosensitive local varieties during the mundakan season.

To high yielding lines (culture 9 & 7) with better grain quality than Krishnamony have been isolated.

The cowpea variety 11HR-61-B has recorded the highest green pod yield of 20,000 kg/ha.

Cowpea variety PTB-1 is found more tolerant to drought situation than 11 TA Cowpea.

Two cultures of sesamum (culture 1&5) were found to be high yielders for uplands of Kerala.

Three groundnut varieties TG-3, TG-14 and Spanish Improved are potential yielders than the existing recommended varieties. These three varieties have been approved by the variety Evaluation Committee and recommended for general cultivation.

CROP PRODUCTION

75% of N loss due to ammonia volatilization occured during the first 6 days period and then slowly declined. Among the different sources used Lac coated urea, urea super granules and urea split application helped to reduce N loss. Among various soils collected from the major rice growing tracts of Kerala with varying Physico-chemical characteristics the sandy soils of Onattukara region, recorded the highest ammonia volatilization loss and the lowest was in Kole soils of Trichur District.

Combined application of organic and inorganic fertilizers resulted in a significantly higher rice yield.

Different forms and levels of P did not have any significant influence on rice yield and other ancillary characters.

Application of nitrogen in the form of urea super granules increases grain yield of paddy.

Nitrogen requirement for dry sown Mahsuri was found to be 50:25;25 kg NPK per hectare.

When prilled urea and urea super granules are used as nitrogen source the optimum fertilizer dose was found to be 58 kg N/ha.

Application of NPK @ 75% of the recommended levels provided yields on par to those receiving the full recommended dose with the Rice-Rice-Fallow and Rice-Rice-Kolinji cropping system.

Ploughing twice immediately after second crop rice after incorporation of FYM @ 2 tons/ha during final land preparation improves kharif rice yields.

Butachlor @ 2 kg ai/ha was effective against sedges and broad leaved weeds while Benthiocarb at the same rate was effective against grasses and broad leaved weeds.

Saturn and stomp each @ 1.5 kg ai/ha was found effective in controlling weeds in dry sown rice.

PLANT PROTECTION

Validacin 3 L was the most efficient fungicide in controlling sheath blight disease of rice.

The chemicals Beam 75 WP and Fongorene 50WP at 4 g/kg seed were found to be good seed protectants in controlling seedling blast upto 45 days after transplanting.

Granular fungicidal formulations like Caratop 5G. 17G and Chlobenthiazone 6G showed promise in controlling rice blast.

Monocrotophos was the best insecticide against leaf rollers than Quinalphos and it can be sprayed at eigher low, medium high volume spray.

PTB-20 is a multiple resistant variety with resistance to leaf folder, gall fly, blue beetle, whorl maggot etc.

Seedling root dip in 0.02% Chlorpyrophos for 12 hours before transplanting can effectively control gall midge attack.

AGRICULTURAL ENGINEERING

A paddy winnower-cum-cleaner fabricated under NARP programme can clean 1000 kg of paddy/hour for grain purpose and 600 kg/hour for seed purpose.

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VI. Financial Progress

Sl. No.	Item	Original outlay (lakhs)	Expenditure upto 26-11-86	Expenditure for 27-11-86 to 31-3-1987	Expenditure for 1-4-87 to 31-12-1987	Total expenditure
1.	Staff (Salary & TA)	27.83	32.38	2.12	6.52	41.02
2.	Civil works	32.53	30.86	-	-	30.86
3.	Equipments	25.42	24.12	-	-	24.12
4.	Operating cost	7.40	5.78	0.97	0.67	7.42
5.	Farm Development	-	-	-	-	-
	Total	93.18	93.14	3.09	7.19	103.42
State						In lakhs
1.	Land Acquired	Nil	-	-	-	-
2.	Cost of cultivation	1.05	41000.00	-	594.15	41,594.15	0.415
3.	Station maintenance	0.45	12000.00	1850.90	450.00	14,300.90	0.14
4.	Utilities/overheads	0.25	3000.00	-	580.90	3,580.90	0.035
	Total	1.75	56000.00	1850.90	1625.05	59,475.95	0.59

SUB PROJECT ON WATER MANAGEMENT STUDIES

On the spot review of progress

as on 31-12-87

AGRONOMIC RESEARCH STATION

CHALAKUDY — TRICHUR

ON THE SPOT REVIEW OF PROGRESS AS ON 31-12-1987

a) Name of sub project : Water Management studies in the Central Region of Kerala

b) Date of commencement : 25-5-1983

c) Lead function : Establishment of small verification centres at Alathur and Eruthiampathy for taking up water management studies in addition to continuing the work at Agronomic Research Station, Chalakudy

d) Research projects in operation : 1

1) ICAR-NARP-AICRP : 11

2) State/University : 1

I Incremental staff sanctioned (For Alathur & Eruthiampathy)

Sl. No.	Sanctioned	Appointed	Vacant
a) Scientists			
1. Assistant Professor	4	2	2
b) Supporting staff			
1. Farm Assistant (Agri) Grade-I	3	3	Nil
2. Lab Assistant	1	1	Nil
3. Driver	1	-	Nil
c) Administrative staff			
1. Gypist Gr.II	1	1	Nil
	10	7	3

Position in respect of staff prior to NARP at ARS, Chalakudy

Sl. No.	Designation	Sanctioned	In position
1.	Professor	1	-
2.	Associate Professor		
	Agronomy	1	-
	Soil Physics	1	1
	Agrl.Engineering	1	1
3.	Assistant Professor		
	Agronomy	1	1
	Soil Chemistry	1	1
	Soil physics	1	1
	Agrl.Engineering	1	1
4.	Farm Assistants (Agri) Grade-I	1	1
	Grade-II	2	2
5.	Assistant Grade-I	1	1
6.	Lab Assistant Gr.III	1	1
7.	Jeep Driver	1	1
8.	Messenger	1	1
9.	Administrative Assistants	1	1
10.	Farm Supervisor	1	1
11.	Pump Operator	1	1
12.	Ploughman	1	1

II.Construction work:

1. Preliminary requirements
   1. Stage of master plan preparation & approval: Approved
   2. Approval of procedure & nomination of architects : N.A.
   3. Supervision of arrangements : The DPP supervises the work
   4. Whether land acquisition has been completed (both for building & laboratories) : NA
      Indicate area required : --
2. Progress of Civil works

Sl. No.	Category	Area sanctioned (M^2)	Units	Area completed (M^2)	Area to be started and present stage
1.	Central facilities Laboratory	75	1	75	Completed and occupied
2.	Housing facilities Residential quarters				
	1. Asso.Professor	420		75%	The building will be completed and handed over within two months
	2. Asst.Professor				
	3. Driver				

III. Procurement of equipments and vehicles

Sl. No.	Category	Amount sanctioned (in lakhs)	Amount spent (in lakhs)	Balance (In lakhs)
1.	Office and educational	0.20	0.16	0.04
2.	Transport	1.10	1.10	-
3.	Farm equipments	3.90	2.80	1.10
4.	Meteorological equipments	0.60	0.11	0.49
5.	Laboratory equipments	0.26	0.21	0.05
6.	Others	0.19	0.15	0.04
Total		6.25	4.53	1.72

IV Implementation of technical programme

(a) Indicate whether scientific staff has been given orientation : NIL

(b) Whether research initiated on all lead/verification/testing function mentioned in appraisal report : Initiated at Eruthiampathy, Alathur & Chalakudy

(c) Whether multidisciplinary technical programme prepared (attach copy) : Yes

(d) No. of experiments : 12

(e) Whether land for experimental purpose adequate : No. Since no suitable University/Govt. land is available at Eruthiampathy and Alathur action has been initiated to take up experiments in cultivators' field by paying extra expenditure involved. A Few experiments have already been taken up at Alathur in farmer's field.

(f) Major problems encountered:

1. Non availability of University land at different centres.
2. Non availability of scientific staff sanctioned

(g) Major achievements

MAJOR RESEARCH ACHIEVEMENTS OF THE CENTRE

The major research achievements of the research centre is summerised in the following pages.

/RICE/

The total water requirement of rice during the Rabi season was worked out to 2362 mm for medium duration variety (Jaya) while that during the summer season was 2520 mm for short duration variety (Triveni). Of this, 27.3 and 72.7 percent were accounted for evapotranspiration and percolation during Kharif and Rabi seasons and 19.9 and 80.1 percent during summer season respectively.

The data on daily water consumption indicates that all the components of water requirement increases towards summer season and the mean per day requirement was worked out to 15.53, 19.15 and 34.58 mm during Kharif, Rabi and summer seasons respectively.

Shallow continuous submergence is preferred under normal field condition.

Under limited resources of water phasic stress irrigation can be practiced for summer rice to the advantage of saving substantial quantity of irrigation water without any significant reduction in yield. About 20-30 percent more area can be irrigated with the same water resources by adopting any of the following phasic stress irrigation schedules.

Schedule	Growth phase		
	Rooting to Max.tiller-	Max.tillering to heading	Heading to maturity
1. 5 cm irrigation for attaining	Saturation point	Continuous submergence	Continuous submergence
2. -do-	Continuous submergence	Saturation point	Saturation point
3. -do-	Hair cracking of surfaces	Continuous submergence	Hair cracking of surface

Under shallow ground water table condition, moderate rainfall and low evaporative demand, irrigation for second crop transplanted rice need be scheduled only five days after the disappearance of ponded water. This will save appreciable quantity of irrigation water without any significant reduction in yield.

Application of Oxyflurofen (ghoal)@ 0.24 kg ai/ha as pre-emergent spray was found to be effective for controlling all types of weeds in dry sown rice during first crop season. For transplanted rice during second crop season, benthiocarb @ 2 Kg ai/ha and Oxyflurofen (goal) @ 0.24 Kg ai/ha were found to be the best weedicides.

Application of nitrogen in four splits is better in rice under continuous flow submergence where as three splits will be adequate under continuous stagnant submergence and under 5 cm irrigation one day after the disappearance of ponded water.

Studies on rice based cropping patterns revealed that from the economic point of view, Rice (Semi-medium) - Rice (medium) - groundnut (Average net income Rs.3803/- per ha) and Rice (medium) - Rice (medium) sesamum-Daincha (average net income Rs.3112/- per ha) are the most profitable rice based cropping patterns.

On an average the above said crop sequence use 3428 mm and 3840 mm of water respectively where as the three crops of rice (medium/semi medium duration varieties) use 5224 mm of water and four crops of rice (short duration varieties) use 4677 mm of water. Thus Rice (semi medium) Rice (medium) groundnut and Rice (medium) - rice (medium - sesamum-daincha rotation are most advisable in rice fields in view of the higher net income and less water use.

/BLACKGRAM/

The most economic water management practice for summer grown blackgram is scheduling irrigation at IW/CPE ratio of 0.50. For this either bed or order strip method of irrigation can be successfully followed. Either one hand weeding or one interculture or pre-emergent spray of nitrofen (take-25) is effective in controlling weed growth in blackgram.

/COWPEA/

Cowpea needs irrigation, (50 mm depth) at an IW/CPE ratio of 0.75 (at about 15 days interval) or at critical stages of branching flowering and pod formation for higher yield and water use efficiency when raised in rice fallows during summer season.

/GROUNDNUT/

Scheduling irrigation at 50 mm depth to groundnut grown in summer rice fallows at an I W/CPE ratio of 0.9 ie. at 11 days interval was found to increase pod yield significantly. Application of 25 Kg/ha each of P_2O_5 and K_2O was found to be adequate.

/SESAMUM/

Studies revealed that sesamum responded well to irrigation, surface irrigation at 30 mm depth during the critical stages of 4-6 leaf, branching, flowering and pod formation increases the yield by 15-40%. The best schedule is two irrigation one each at branching (32nd day) and pod formation (45th day) stages. In case of only one irrigation it is to be given at the time of flowering.

Scheduling irrigation to sesamum based on climetological approach is to be done at 0.75 IW/CPE ratio.

/BANANA/ (Low land)

Considering the water use efficiency, total water used and number of irrigations applied, it is recommended that banana variety nendran need be irrigated at IW/CPE ratio of 0.9 i.e. 11 irrigations at an interval of 13 days with 200 litres of water per plant (50 mm) under high water table condition i.e. when the water table is within 1.5 m.

It is also advisable to mulch the basins of banana with poor qua lity paddy straw which could increase yield to the tune of 15%.

/BANANA/ (upland)

Abother study conducted under low water table (upland) condition revealed that it is better to irrigate banana in alternate days at 10 mm depth (40lit/plant for higher bunch yields. This required 69 irrigation and 690 mm of water.

/TAPIOCA/

Considering the number of irrigation and the total water used it is advisable to schedule irrigations to tapioca during summer seasons at IW/CPE ratio of 0.50. Approximate interval between irrigations in this schedule comes to about 24 days. Adoption of such an irrigation schedule could increase the tuber yield over unirrigated control to the tune of 92 and43 percent at 9 months and 11 months harvest respectively.

It was also observed that an irrigated crop harvested at 9 month, yielded equally or better than an unirrigated crop harvested at 11 month, and hence saves two months. This finding is of practical application for farmers who are desirous of raising a short crop of paddy in the single crop paddy lands immediately after the harvest of tapioca.

Intercropping tapioca with groundnut, cowpea, greengram and blackgram will increase the net income per hectare without sacrificing the yield of tapioca. Both the pure and intercropping systems needs 50 mm irrigation at 0.3 IW/CPE ratio.

For better water economy and higher tuber production, it is recommended to irrigate tapioca based on any one of the following two schedules (1) All furrow irrigation with 25 mm water at 100 mm CPE (2) Alternate furrow irrigation alternatively with 50 mm water at 75 mm CPE.

/SWEET POTATO/

Sweet potato, grown in summer rice fallows needs irrigation (50 mm depth) at 1.2 IW/CPE ratio (at an interval of ten days), for higher yield. A dose of 50 Kg/ha each of N and K_2O is sufficient for irrigated sweet potato.

/PINEAPPLE/

Considering the fruit yield of plant crop and first ratoon, it is revealed that pineapple is to be irrigated with 50 mm water at 0.3 IW/CPE ratio and has to be mulched with dried leaves for maximum fruit production and better water use efficiency.

/AMORPHOPHALLUS/

Giving irrigation to amorphophallus considerably enhanced the corm yield and irrigating at 0.9 IW/CPE ratio with 50 mm water ie. 12 irrigation at an interval of 12 days was found to be the best schedule.

It is recommended to mulch amorophophallus with dried leaves and paddy waste to ensure higher corm yield. However, when these materials are not available, coir dust can be successfully used as mulching material.

EXTENSION ACTIVITIES

Lab to Land Programme

The extension activities of the research station are being carried out mainly under the Lab to Land programme. Under this scheme, 75 farm families of Thuravoor area have been adopted by the centre for imparting scientific crop management practices. Assistance will be given in the form of agricultural inputs (seeds, seedlings, fertilizer, P.P.Chemicals, implements etc.) and livestock.

Village adoption programme

Under the village adoption programme, North Kothakulangara Village has been adopted by the centre. It is proposed to conduct kissan mela's, farmers training camps, demonstration plots etc. under this programme.

Operational Research Project on Water Management

With a view to disseminate the scientific water management practices developed at this centre and also to test it's field applicability, an operational research project is being implemented at Thuravoor in co-operation with the Department of Agriculture and CADA. A block of 50 acres of paddy lands has been selected as the treatment area where a suitable cropping pattern with scientific water management practices will be followed. Another 50 acres have been taken as the central area where the farmers' practice will be followed.

EDUCATION

Training on Water management

A massive training programme on water management was organized by the centre to transfer the latest water management technology to the field staff of the department of Agriculture and Irrigation and CADA. The course was of seven working days duration. 79 officers in six batches during 1983-84 and 312 officers in 18 batches during 1984-'85 participated in these training courses. Of the participants, 302 officers were Agrl.Demonstrators, 93 overseers, 23 Draftsman and 23 work superintendents.

Another training programme on water management has been organixed for the Junior Agricultural Officers of the Department of Agriculture.

Academic

Final year B.Sc.(Ag) students are given field training at this centre every year.

Teaching staff of this centre are guiding post graduate students for their work on water management studies.

Linkage and Coordination

a) Co-ordination among different diciplines — ()

b) Coordination with other research organization in the zone or in adjoining Zone/State/Agrl.Universities/ICAR	The centre is cooperating with the centre for Water Resources Development and Management, Calicut in different research and extension activities. Apart from this, the research station has also taken up two colloborative studies with the State Soil Survey department on the hydro-physical properties of the command area soils of Chalakudy and Idamalayar irrigation projects. The Command Area Development Authority and the Department of irrigation is actively cooperating in the implementation of the 'Operational Research Project in water management' in the Chalakudy command.
c) Extension activities:	The extension activities of the centre is undertaken under the lab to land and village adoption programmes. The lab to land programme was implemented last year at Palissery with 75 participant farmers. In line with the lead function of the centre, the main emphasis of the lab to land programme was on the efficient use of irrigation water in rice culture. Under the village adoption programme, North Kothakulangara village was selected as the adopted village and demonstration plots on scientific cultivation of sesamum during summer season in rice fallows was taken up.
d) Coordination with departmental staff (No.of meeting with departmental staff)	The centre is cooperating with the Departments of Agriculture and Irrigation and Command Area Development Authority in transferring scientific knowhow in water management to the farming community. The Professor of Agronomy of the centre is the nominee of the Kerala Agricultural University in the various committees of the state constituted for formulating suitable cropping patterns for the different command areas. The centre is also cooperating with the department of Agriculture in laying out farm trials in various aspects of water management.

e) Six monthly progress report from SAU (March and September) Date of submission : 6-11-87

f) Seasonal Workshops - Zonal University officials & DDA, SMS, Date of holding, No.of participants : Ø Ø Ø Ø

g) No.of visits made by Director of Research to Sub centre :

h) No.of visits made by ZAD to other station in the zone :

i) Training of staff (indicate needs): N.A.

pv/

207500

VI. Financial Progress

Budget sanctioned and expenditure details

Sl.No. Item (2)	Original outlay approved (Rs. in lakhs)	Expenditure upto 31st December 1987
ICAR		
1. Staff	6.91	2.46
2. Civil works	7.12	1.92
3. Equipments	6.25	4.54
4. Research Operating cost	1.44	0.71
5. Library	0.10	0.05
Total	21.82	9.68
University/State		
1. Basic cultivation cost	2.11	0.13
2. Station maintenance and utilities	1.23	0.14
3. Land acquisition	5.00	-
Total	8.34	0.27
Total project cost	30.16	9.95

ii) Budget and Equipment of Non-NARP Projects, State/University contingencies

Sl. No.	Item	Original outlay approved	Expenditure upto 31st December 1987
1.	Recurring contingencies	2.1	1.76
2.	Non-recurring contingencies	2.0	-

iii) Whether the existing delegation adequate if not list deficiencies : Yes

iv) Audit: Whether audit of account of previous financial year completed : Audit upto 1984-85 complete

ON THE SPOT REVIEW OF PROGRESS (AS ON 31-12-87)

a) Name of Sub Project : SPECIAL REGION OF PROBLEM AREAS

Strengthening of Regional Research Station, Kumarakom and Sub stations at Moncompu, Kayamkulam, Vyttila and Kole land.

b) Date of commencement : 30-11-1981

c) (i) Lead Functions

Station	Lead function
1. RARS, Kumarakom	: Coconut, coconut based cropping system. Crop-livestock-fishery integrated system
2. RRS, Moncompu	: Rice
3. RRS, Kayamkulam	: Oil seeds, pulses, rice
4. RRS, Vyttila	: Rice, rice-fisheries
5. Kole station	: Rice in Kole lands

(ii) Verification and testing functions

Station	Verification and testing functions
1. RARS, Kumarakom	: Rice, pulses, oil seeds, vegetables, tuber crops and banana
2. RRS, Moncompu	: --
3. RRS, Kayamkulam	: Rice, rice-based cropping system
4. RRS, Vyttila	: Rice
5. Kole station	: Rice-fisheries

d) Research Project in operation at the stations

i) RARS, Kumarakom

1. NARP (ICAR)
2. Rice based fish culture (ICARP)
3. Root (wilt) disease scheme (KAU)
4. Integrated research project (KAU)
5. Strengthening the existing farm (KAU)
6. CRS, Kumarakom (KAU)

SUB PROJECT ON SPECIAL REGION OF PROBLEM AREAS

On the spot review of progress

as on 31-12-88

REGIONAL AGRICULTURAL RESEARCH STATION

KUMARAKOM-686 566 — KOTTAYAM

ii) RRS, Moncompu

1. NARP (ICAR)
2. Operational Research Project (ICAR)
3. Special diseases and pest research (ICAR)
4. ICRIP (ICAR)
5. Ecosystem of Kuttanad (KAU)
6. Cultivation of fish in Kuttanad (KAU)
7. Research on rice 9KAU)

iii) RRS, Kayamkulam

1. NARP (ICAR)
2. Research on rice (KAU)
3. Root (wilt)disease scheme (KAU)
4. Development of Improved varieties of sesamum and groundnut (ICAR)

iv) RRS, Vyttila

1. NARP (ICAR)
2. Research on rice (KAU)
3. Root (wilt) disease (KAU)

v) ARS, Mannuthy (Kole land)

1. NARP (ICAR)
2. ARS, Mannuthy

I. INCREMENTAL STAFF

Sanctioned and appointed

Sl. No.	Category	Sanctioned	Appointed	Vacant	Remarks
	/RARS, KUMARAKOM/				
	A) Scientific Staff				
1.	Assoc.Director	Nil	-	-	The post of Prof. of Agronomy upgraded to the status of Assoc.Director as on 20-7-87.
2.	Professor	Nil	-	-	
3.	Assoc.Professors				
	a) Agrl.Extension	1	1	-	Upgrated to the cadre of Prof.by norms promotion
	b) Agrl.Economics	1	1	-	-do-
	c) Fisheries	1	1	-	Asst.Prof. officiating.
	d) Agrl.Chemistry	1	1	-	Shifted from Moncompu

1	2	3	4	4	6
4.	Assistant Professors				
	a) Plant Breeding	1	1	-	JAP officiating
	b) Entomology	1	1	-	
	c) Microbiology	1	1	-	
	d) Bio-chemistry	1	1	-	
	e) Agrl.Engineering	2	1	1	
	f) Fisheries	1	1	-	
	g) Horticulture	2	2	-	
	h) Pl.Physiology	1	-	1	
	i) Weed Science	1	1	-	
5.	Junior Asst.Prof.	-	-	-	
B.	Administrative and supporting staff				
	1. Admn.Officer	1	1	-	
	2. Gr.I Assistant	2	2	-	
	3. Gr.I Typist	3	3	-	
	4. Lab Asst.Gr.III	6	4	2	
	5. Peon (Hr.Gr.)	1	1	-	
	6. Peon ,,	1	1	-	
	7. Duplicator Operator	1	1	-	
	8. Driver	1	1	-	
	9. Boat Driver	1	1	-	
	10. Sarang	1	1	-	
	11. Artist	1	1	-	
	12. Tractor Driver	1	1	-	
	13. Photographer	1	-	1	
	/RRS, MONCOMPU/				
A.	Scientific Staff				
1.	.. Assoc.Professors				
	a) Entomology	1	1	- *	Upgraded to the cadre of Prof.by norms promotion & post shifted to Kumarakom
	b) Soil Science & Agrl.Chemistry *	1	1	-	
2.	Assistant Professors				
	a) Extension	1	-	1	
	b) Soil Science	1	1	-	
	c) Plant Pathology	2	1	1	
	d) Plant Breeding	1	1	-	JAP officiating

1	2	3	4	5	6
B.	Administrative & Supporting staff				
	a) Lab Asst.Gr.III	4	2	2	
	b) Boat Driver	1	-	1	
	c) Sarang	1	-	1	
/RRS, KAYAMKULAM/					
A.	Scientific Staff				
1.	Assistant Professor				
	a) Agrl.Engg.	1	-	1	
2.	Jr.Asst.Professor				
	a) Ag.Botany	1	-	1	
B.	Administrative & Supporting staff				
		Nil			
/RRS, VYTTILA/					
A.	Scientific Staff				
1.	Asst.Prof.(SS)	1	-	1	
B.	Administrative & Supporting Staff				
		Nil			
/KOLE LANDS (RESEARCH STATION, MANNUTHY)/					
A.	Scientific Staff				
1.	Asst.Prof.(Agro)	1	1	-	
2.	Jr.Asst.Professor	1	1	-	
B.	Admn.& Supp.Staff	Nil			
Position in respect of staff prior to NARP					
/RARS, KUMARAKOM/					
	1. Professor	1	1		
	2. Assb.Professor	2	2		
	3. Asst.Professor	5	3		
	4. Jr.Asst.Professor	4	3		
/RRS, MONCOMPU/					
	1. Assoc.Professor	3	3		
	2. Asst.Professor	7	2		
	3. Jr.Asst.Prof.	10	1		
	4. Jr.Statistician	1	1		

1	2	3	4	5	6
	/RRS, KAYAMKULAM/				
1.	Assoc.Professor	3	3		
2.	Asst.Professor	3	2		
3.	Jr.Asst.Professor	2	-		
	/RRS, VYTTILA/				
1.	Assoc.Professor	2	1		
2.	Asst.Professor	-	-		
3.	Jr.Asst.Professor	1	1		

II Construction works

1) Preliminary requirements

i) Stage of master plan preparation and approval : Prepared and approved

ii) Approval of procedure for nomination to architects : Not applicable

iii) Supervision arrangements : -do-

iv) Whether land acquisition has completed (Both for building and laboratories) (indicate area required) if not indicate reasons for delay. : -do-

2) Progress of Civil Works

Sl. No.		Area sanctioned(m^2)	Area (m^2)	Area in progress
	/RARS, KUMARAKOM/			
i)	Central facilities			
a)	Laboratory building	1235	1235	Completed & occupied
b)	Farm structure			
	Net House, Green House, Cattle shed, Implement shed, Drying yard, Fertilizer store, seed store (One each)	660	660	All the farm structures completed and occupied.
ii)	Housing facilities			
	Quarters Type V - 1 No. Type IV- 2 Nos. Type II- 2 Nos.	499	499	Completed and occupied
	Trainees' Hostel	375	375	-do-

1	2	3	4	5
	/RRS, MONCOMPU/			
i)	Central facilities			
	Laboratory	771.46	771	Completed and occupied
	Farm structure			
	Seed store Fertilizer store Drying yard, Implement shed Green house & net house	410	410	Completed
ii)	Housing facilities			
	Quarters Type V - One Type IV - each Type II -	332	332	Completed
	/RRS, KAYAMKULAM/			
i)	Central facilities			
	Laboratory	140	140	Completed and occupied
	/RRS, VYTTILA/			
i)	Central facilities			
	Laboratory	225	225	-do-
	Farm structure	50	50	-do-

3. Indicate major problems encountered

Delay in getting electric and water connections delayed the occupation of buildings constructed at Moncompu and Kumarakom.

III. Procurement of equipments and Vehicles

Sl. No.	Category	Amount sanctioned (lakhs)		Amount spent (lakhs)	Balance (lakhs)
1.	Office and Educational	5.75		3.25	2.50
2.	Transport	5.87	9.47	8.70	0.77
3.	Farm equipments	3.60			
4.	Meteorological Equipment	0.66		0.37	0.29
5.	Lab equipment	13.02		11.50	1.52
6.	Others	--		--	--
Total		28.90		23.82	5.08

Note:-

Two boats were originally sanctioned at a total cost of Rs.1.75 lakh. This was later revised to one boat at an actual cost of Rs.4.62 lakh. The scientific equipments were centrally procured (at Kumarakom) and later released to the sub-stations. Some of the sophisticated equipments could not be procured in time due to non-receipt of NMIC and CDEC from the Government of India and also due to the reluctance of the firms concerned.

IV. Implementation of Technical Programme

a) Indicate whether scientific staff has been given orientation on NARP objective, multidisciplinary research linkages. Also indicate whether they have been given copies of the research review report, appraisal report

: Yes. Orientation on NARP has been given. Copies of research review report, appraisal report and status report have also been given.

b) Whether research initiated on all lead/verification/testing functions mentioned in the appraisal report

: Yes

c) Whether multidiciplinary technical programme prepared

: Yes

d) Number of experiments

Sl. No.	Disciplines	Total	RARS Kumarakom	RRS Moncompu	RRS Kayamkulam	RRS Vyttila	RRS Mannuthy
1.	Breeding	46	14	10	10	6	6
2.	Agronomy	43	11	11	11	5	5
3.	Soil Science	14	4	10	-	-	-
4.	Pathology	26	9	8	8	1	-
5.	Entomology	24	11	9	3	1	-
6.	Physiology	2	2	--	--	-	-
7.	Agrl.Engg.	--	--	--	--	-	-
8.	Agrl.Economics	2	2	--	--	-	-
9.	Extension	5	--	5	--	-	-
10.	Statistics	2	--	2	--	-	-
11.	Fisheries	8	7	1	--	-	-
12.	Bio-chemistry	1	1	--	--	-	-
Total		173	61	56	32	13	11

e) Whether land for experimental purpose adequate

: Adequate

f) Major problems encountered

: Construction of laboratory was delayed. This affected the analytical work.

g) Significant achievements

/RICE/- Crop Improvement

Three rice varieties namely Bhagya, Onam and Lekshmi were released from the Rice Research Station, Kayamkulam in the year 1985 to suit the conditions prevailing in the Onattukara tract of the special zone of problem areas.

Bhagya and Onam are high yielding short duration varieties (Table 1) suited for the first crop season (virippu) of Onattukara and coastal sandy areas where tall varieties are traditionally grown. Bhagya is a progeny evolved, from the cross Thadukkan x Jaya and 'Onam' from the cross Cul.16 x Triveni. These varieties have a fair degree of tolerance to drought.

The rice variety 'Lekshmi' has been specifically evolved for the second crop season (Mundakan). A hybrid derivative from the cross Kottarakkara 1 x Poduvi, Lekshmi is photosensitive and reaches maturing in 165-180 days. The performance of this variety in the "Cheradi" areas of the eastern lateritic belt of Quilon district of the State is very promising.

The variety Vyttila-3 (culture 4-4) was released in 1985 from the Rice Research Station, Vyttila. This is a hybrid derivative from the cross Vyttila 1 and Taichung (Native)1. The variety is specifically suited for cultivation in the Pokkali situations of Ernakulam and Alleppey districts where saline conditions prevail. Vytilla-3 is a tall indica type having a duration of 115 days with an yield potential of 2500 t/ha.

Two medium duration high yielding rice varieties were released from Moncompu in 1982 (Pavizhom) and 1985 (Karthika). These varieties are suitable for both the cropping seasons of Kuttanad and they are fairly tolerant to Brown Plant hopper. Kuttanad being an endemic area for brown planthopper, these varieties are widely accepted by farmers. An area of 15,000 ha in Kuttanad is now under Pavizham and Karthika.

With the aim of evolving a long duration photosensitive variety having high yield, red rice, medium tallness and pest tolerance hybridisation work was initiated at RRS Kayamkulam. Several crosses were made, promising cultures were selected and they were put under yield trials. One promising culture each from the crosses Jaya x Ptb-20, Jaya x Ptb-4, and Ptb-4 x TR-17 are in the pre-release stage.

The coastal line of Onattukara region is fringed with marshes to an extent of 6000 ha. This area is prone to sea water inundation. Only one crop of rice is raised in this tract, using the traditional variety "Oorumundakan" which is photosensitive. Work on genetic improvement of this variety by pure line selection has been initiated at the RRS, Kayamkulam.

The programme for breeding BPH resistant varieties initiated at Moncompu has yielded 6 cultures belonging to two duration groups, early (100-120 days) and medium duration (120-130 days) as detailed below. They are now in the pre-released stage. These cultures are now under farm trials and minikit trials. The culture 204 was included in PVT-3 (IET 9382) of AICRIP in kharif 1985 and 1986. The culture 153-1 was included in BPHRVT of AICRIP in kharif 1985 and 1986. During 1985, it ranked fifth in mean yield in 8 locations and ranked first in mean yield in six locations.

In the project for "Development technologies suited for koottumundakan cultivation", twenty varietal combinations have been tested for the Koottumundakan areas of Alleppey district particularly Thuravoor, Muhamma and Shertallai. Among them, Vyttilla-2, Ptb-9, H4 and MO.7 (first crop) and Mundakan, Resmi and Ptb-20 for the (Second crop) are found promising.

A very early duration rice culture 24-20 has been yield tested in 12 locations (farmers' fields and State Seed Farm, Kozha) during 1985-86 and 1986-87 and found promising for the kole lands of Trichur. A derivative from cross T.140 x IR.8, Culture 24-20 has a duration of 75-85 days during the summer season and it gives comparable yields with other short duration varieties of about 90-100 days. It is superior to the available early duration varieties in per day productivity. It has bold grains with red kernal. In the adaptive trials conducted in the kole area, the culture 24-20 recorded a mean grain yield of 3075 kg/ha while Annapurna, the local check (90-100 days) yielded 3020 kg/ha, the per day production being 41 and 31.7 kg, respectively. Culture 24-20 can be recommended as a variety suitable for situations where an extra short duration variety is required. It is specifically suited for kole lands where scarcity of water is usually experienced during the fag end of the cropping season.

(2) Crop Management

The results of permanent manurial trial on rice conducted at the RRS Kayamkulam representing the Onattukara situation revealed that application of NPK @ 80:40:45 kg/ha where 60 kg N was supplied in the form of inorganic fertilizers and 20 kg N as organic manures raised the grain yield to a significant level. It was also found that continuous application of nitrogenous fertilizers without P and K was deleterious to rice crop in that situation. The results have been passed on to extension agencies.

In an experiment conducted at Moncompu (Kuttanad) with the objective of developing a suitable schedule for nitrogen management for direct sown medium duration rice during the additional crop season, it was found that (1) application of 90 kg nitrogen per ha. in 3 splits at 15 DAS, 35 DAS and 55 DAS resulted in significantly higher grain yield. A similar trend in yield was obtained in the 'puncha' season also although the treatment differences did not touch the level of statistical significance.

Studies conducted on the combined application of urea and carbofuran as basal dose in BPH endemic areas in influencing rice growth and yield and mineralisation and uptake of soil Nitrogen indicated that application of urea @ 90 kg N/ha gave significantly higher yield of grain when applied in combination with Carbofuran @ 0.75 ai/ha.

The fertilizer management trials for rice in kole lands indicated the need for increasing the dose of N for early (Annapurna) and medium duration (Jaya) rice varieties. The present recommended doses of N are 70 kg and 90 kg respectively, for the 2 duration groups. For higher grain yields and better economic returns these doses have to be increased to 90 kg and 110 kg per ha (respectively) under conditions prevailing in kole lands.

In a field trial conducted at Moncompu to study the effect of calcium peroxide coating of rice seeds, it was found that this practice controlled wild rice as well as grassy weeds effectively. Further, this practice resulted in more grain yield.

The fertilizer management trials on rice grown in Pokkali lands indicated that application of 20 kg N and 40 Kg P_2O_5 per hectare at the time of dismantling and distribution of seedlings registered a 30 per cent increase in grain yield. This finding has been included in the Package of Practices Recommendation of the Kerala Agricultural University.

Application of Benthiocarb @1 kg ai/ha 6 DAS followed by hand weeding 30 DAS has been found to be the most effective weed control practice in kole lands. This finding has been included in the Package of Practices Recommendation for kole land rice.

'Koottumundakan' is a system of rice cultivation prevalent in Ernakulam and Alleppey districts of the problem zone where a mixture of seeds of a non-photosensitive rice variety (virippu season) and a photosensitive variety (mundakan season) is sown in 1st crop season (Virippu). In these areas sowing or planting of second crop (Mundakan) is not possible due to adverse climatic and edaphic conditions. In this sytem, it is very important that the seeds are in a specific proportion to get higher yields. The results of the trials conducted at Rice Research Station, Vyttila during 1981-83 revealed that the seeds of Virippu and Mundakan varieties should be mixed in the ratio 70:30 (W/W) for getting maximum grain yield in both seasons. The technology has been included in the Package of Practices Recommendations of the Kerala Agricultural University.

Studies conducted at Moncompu over a period of 27 years (3 seasons) on the effect of soaking rice seeds in nutrient solutions prior to seeding revealed that a net profit of Rs.604.00 per ha. could be obtained by treating the seeds in a solution of $ZnSo_4$ (1%) and $Cu\ So_4$ (0.25%). In an investigation on the availability of phosphorus to rice from water soluble (water soluble superphosphate) and insoluble sources (rock phosphate) it was found that addition of Pyrite (1:1 W/W) improved the availability of P from rock phosphate. This practice also resulted in higher grain yield.

In an experiment conducted at Moncompu to test the efficacy of fungicidal formulations for the control of sheath blight disease, it was found that spraying Validamycin 3% liquid at the rate of 2 ml/litre of water was the most effective in controlling the disease when compared to other fungicides like Bavistin 50 WP (1 g/1), JK Stein 50 WP (2.5 g/1), Kitazin 48 EC (1 ml/1), Hinosan (1 ml/1) etc. under the conditions prevailing in Kuttanad, Kerala.

Epidemiological studies conducted at Moncompu to assess the influence of weather factors like temperature, rainfall and relative humidity on important rice diseases like sheath blight and sheath rot suggest that sheath blight is inversely correlated with rainfall while high ratings of humidity and temperature significantly aggravated the incidence of the disease was heavy during periods of high temperature.

Application of carbofuran at 0.75 kg ai/ha in conjunction with urea at the rate of 10 kg N/ha 20 days after planting has been found to significantly increase rice yield in the kole lands. The absorption of carbofuran is hastened by urea and this prevents the incidence of pests in the initial stages of crop growth.

Gall midge, stem borer and BPH are serious pests in the Kuttanad tract. The traditional plant protection operations are costly due to rice in wage rates. Efforts are, therefore, being made at Moncompu to evolve cheap but effective techniques to combat these pests. It is found that transplanting seedlings dipped in Chlorpyriphos solution 0.02% for 12 hrs. effectively checks incidence of gall midge, stem borer and brown plant hopper during the early stages of crop growth.

Soaking sprouted seeds in 0.2% Chlorpyriphos solution for 3 hrs. prior to sowing prevents incidence of gall midge, stem borer and thrips during the early stage of crop growth.

The people of Kuttanad has witnessed an outstanding biological suppression of 'African Payal' (Salvinia molesta Mitchell) since 1985. The agent being used is a tiny weevil namely Cyrtobagous salviniae Calder and sands (Curculionidae: Coleoptesa) which kills the weed by nibbing the bud and tunnelling into the stem. The weevil has suppressed the weed menace over about 1,000 sq. kilometers in Kuttanad within a short period of two years.

COCONUT

Studies conducted at Kumarakom on the management of root (wilt) affected palms indicated a general decrease in disease intensity due to incorporation of green manure crops in the basins of palms. The green manure crops found ideal for sandy and laterite soils are cowpea and sesbania, respectively.

The role of nematodes in root (wilt) disease expression has been studied in depth. These studies indicate that (i) no single species of plant parasitic nematode is constantly associated with coconut palm (ii) there is no relationship between the total population of parasitic nematode and intensity of disease incidence and (iii) inoculation of parasitic nematodes does not result in root injury or lessions.

Studies on the nature and intensity of damage caused by mealy bugs (Psuedococcus spp.) to coconut palms, showed that quinalphos, phosalone and carbaryl are equally effective in controlling the pest.

Root excavation studies in alluvial and sandy soils indicated that decay is more in root (wilt) infected coconut palms than in apparently healthy ones in both the soil types. The total number of roots in diseased palms was only one fourth of that in apparently healthy palms. The administration of oxytetracycline and penicillin in root (wilt) affected palms has indicated a general decline in root (wilt) intensity irrespective of treatments. These findings do not support the mycoplasmal etiology of Root (wilt) disease. Tissue isolation and inoculation studies indicate that a species of Cephalosporium, possibly C.Sacchari is constantly associated with the leaf rot disease of coconut caused by Bipolaris halodes. In vitro and in vivo screening of fungicides against B.halodes, the leaf rot pathogen, have shown that Bordeaux mixture (1 percent) is the best. The Organo-phosphorus fungicides viz., Hinosan and Kitazin are next in the order of merit.

Red palm weevil, Rhynchophorus ferrugeneus F, is a very serious pest, especially of young coconut palms, in Kerala. In an attempt to control the pest by insecticidal application, it was found that the root application of monocrotophos (75 ml per palm in 75 ml. water) did result in complete control of the pest.

/INTERCROPS/

The screening trials conducted over a period of 3 years have resulted in the identification of a superior type of cowpea (Manjeri Red plain) with an yield potential of 13.5 t/ha. This cultivar is tolerant to shade also.

In another breeding experiment, Ptb 1 (Kanakamony) has been adjudged as the best grain type cowpea for cultivation in the partial shade of coconut gardens. It recorded an average yield of 2842 Kg/ha.

Screening for early duration (6 months) tapioca varieties to be grown in the partial shade of coconut gardens led to the identification of 3 superior varieties, S 856 (24.5 t/ha), Ramanthala (23 t/ha) and Ambakadan (23 t/ha)

/FISHERIES/

A study on fish egg pathology at Kumarakom has revealed that common carp eggs are invariably infected by a fungus saprolegnia sp in the acidic water conditions prevailing in Kuttanad. Polythene shreds were found to be a superior devide as egg collectors for common carps. This method was shown to reduce fungal contamination and egg infection as compared to the conventional method of using aquatic weeds for egg collection.

A cheap indigenous carp hatchery has been developed at Kumarakom capable of increasing the hatching rate of carps to 85-90 percent and at the same time reducing hatching time from 27 to 20 hrs. The system was demonstrated to be useful to small and marginal farmers engaged in fish seed production. The system was fabricated using earthern pots, bamboo splits and other indigenous materials.

Studies on prawn culture in channels surrounding land in which coconut have shown that an average production of 805 Kg/ha of fresh water prawns could be produced in 220 days, fetching a profit of Rs.21,050/ha. The fresh water prawns grow to a maximum size of 200 g during this period with a recovery of 97%.

/PRAWN/

Tiger prawn, Penaeus monodon has been successfully grown in the pokkali fields of Vyttila during the low saline phase with a survival rate of 80.5 percent. The average size of the prawn at the end of 3 months was 38.3 g. The total production was 768 Kg/ha. The results reveal that it is highly profitable to raise tiger prawn.

Trials on simultaneous farming of rice and fish have been found to be a viable technology for the Kuttanad region. A record yield of 600 Kg/ha of fish has been obtained in 220 days when raised along with rice. The yield of fish recorded from this experiment is much higher than that reported elsewhere in India.

/PADDY FISH/

Rotational, cropping of rice and fish resulted in the production of 1005.6 Kg/ha of table sized fish in 184 days in addition to rice grain yield of 2127 Kg/ha at Kumarakom. The study highlights that fish culture in rice fields after the Kharif crop of rice is more profitable than a second crop (rabi) rice. The study also showed that by a cyclic conversion of rice fields for fish culture, table sized marketable fishes could be produced even in a short interphase period of a six months without additional expenditure on feeds or fertilizers.

The trials on fish cum duck farming resulted in significant achievements. By raising ducks in a cage over the fish pond, an yield of 5370 Kg/ha of fish could be harvested in 302 days. The yield thus obtained was significantly higher than that of the control system where no duck was maintained. It has been demonstrated that duck droppings substantially enhanced the pond productivity. The yield of fish registered from this experiment is higher than that reported elsewhere from India.

Studies conducted on natural, artificial or synthetic substitutes for fish pituitary gland for use in induced breeding of carps indicated that human Chorionic Gonadotropin (HCG) was effective as a suitable substitute for fish pituitary gland. A combination of fish pituitary gland and HCG has also been found to induce breeding in Rohu and Mrigal. The method is cheaper in the process of commercial production of fish fingerlings.

Trials conducted in cultivators' fields in the pokkali tract of Ernakulam have conclusively showed that fresh water fishes like grass carp, rohu, mrigal, catla and common carp could be successfully raised. The average yield is 3900 Kg/ha/year. The optimum stocking density for these fishes is found to be 5000 Nos.per ha in the ratio 1:1:4:4:3:3.

h. Whether seasonal summary or research results finalised and sent to ICAR/DR If so, date of despatch, if not reason for delay — Yes

i. Extent of participation of research staff in teaching and extension (give details of course taught and students guided)

a) Teaching: Senior members of the scientific staff (4 Nos) act as Chairman/Members of Advisory Committee of P.G. students.

b) Extension

Training: Periodical training for village level extension workers, farmers, U.G. & P.G. students and for officers of Dept.of Agriculture were conducted regularly in all the stations on specified subjects.

V LINKAGES AND CO-ORDINATION

a) Co-ordination among different discipline

Inter disciplinary approach was followed in all research programmes. The different related disciplines have been brought under 5 major divisions viz., Crop improvement, Crop production, Crop protection, Social Sciences and Livestock-Fishery sciences.

b) Co-ordination with research organisation in the zone or in the adjoining zone/state/University/ICAR

In addition to the co-ordination with the research stations in the zone and other University stations in the State there was good co-ordination between the regional stations and other central institutionslike CPCRI, CTCRI, Rubber Board, CMFRI, CIFT etc.

c) Extension activities-Adoption of Village, Trials in Farmers fields, Give number and locations

Six villages have been adopted. Five crop demonstrations were conducted in addition to the farm trials in the cultivators' fields in different parts of the zone. T&V training programme and monthly workshops were regularly held in all the research stations of the zone.

d) Co-ordination with departmental staff (Number of meetings with departmental staff)

Periodical meetings with departmental officers were conducted by the researchers of all the stations in the zone.

e) Six monthly progress report from SAU-March and September (Date of submission)

The report for the period ending 31-3-86 was submitted on 29-4-86.

f) Seasonal workers, zonal University officials and DDA, SMS Date of holding and number of participants

So far 8 zonal workshops have been held from May 1982 to Sepetmber 1986.

Zonal Workshop Number	Date	No. of participants						
		KAU	CTCRI	ICAR	CPCRI	DOA	RUBBER BOARD	TOTAL
I	May 7, 1982	44	-	1	-	14	-	59
II	March, 1983	42	-	-	-	51	-	93
III	Sept.7, 1983	44	2	-	5	81	1	133
IV	April, 3, 4, '84	55	1	-	-	56	-	112
V	August 21, 1984 (Fisheries only)	26	-	-	-	-	-	26
VI	March 5, 6, 1985	49	-	-	-	37	-	86
VII	February 17, 18, 1986	44	-	-	-	45	-	89
VIII	Sept.25, 26, 1986	55	-	-	-	47	-	102

g) No.of visits made by Director of Research to the Sub project

Director of Research visited two times in the year. The Associate Director (M&E) at the Headquarters visited the sub-project centres 4 times a year for monitoring and evaluation of the project.

h) No.of visits made by Z.A.D to the other stations in the zone

Once in a month

i) Training staff (indicate needs)

Young scientists require periodical short term training in their field of specialisation. Two members of the teaching staff were given training on handling sophisticated instruments at the College of Agriculture, Vellayani.

pv/

VI. Overall Financial Progress (Rs. in lakhs) as on 31-12-1987

Stations / Date of start	RARS Kumarakom		RRS Moncompu		RRS Kayamkulam		RRS Vyttila		ARS Mannuthy		Total	
Items of expenditure	S	E	S	E	S	E	S	E	S	E	S	E
Salary & T.A.	18.88	18.84	8.27	7.44	1.36	0.08	0.81	0.33	1.49	2.09	30.81	28.78
Civil Works	36.48	44.76	19.59	26.30	2.18	4.21	3.07	3.92	-	-	61.32	79.19
Equipment	17.06	17.43	8.20	4.63	2.84	0.99	0.80	0.77	-	-	28.90	23.82
Farm development	-	-	-	-	-	-	-	-	-	-	-	-
Operating cost } Library }	5.60	4.85	3.20	1.62	0.80	0.83	0.40	0.35	0.80	0.28	10.80	7.93
Total	78.02	85.88	39.26	39.99	7.18	6.11	5.08	5.37	2.29	2.37	131.83	139.72

S - Sanctioned amount (original outlay approved)

E - Expenditure incurred upto 31-12-1986

SUB PROJECT ON SOUTHERN REGION

On the spot review of progress

as on 31-12-87

NARP (SR) LEAD STATION

VELLAYANI -- TRIVANDRUM

ON-THE-SPOT REVIEW OF PROGRESS
(as on 31-12-1987)

a) Name of sub-project : "Sub-project for strengthening of Regional Research Station, Vellayani and a Centre at Kottarakkara".

b) Date of commencement : 30-11-1981

c) Date of completion of Phase I : 29-11-1986

d) i) Lead functions : Vellayani - Tapioca and other tubers
Kottarakkara - Homestead farmin

ii) Verification & testing functions : Vellayani - Rice, Homestead farming, coconut etc.

Kottarakkara - Tubers, Rice, Coconut

e) Research projects in operation at the Station :
- NARP
- ICAR ad hoc scheme on rice cyst nematode and its control.
- AICRP (Nematology)
- AICRP (Forage Improvement)
- AICRP (Pesticide Residue)
- AICRP (Oil seeds)
- Science & Technology Project on mushroom flora of Kerala
- Science & Technology Project on Pleurotus
- USDA Scheme on tissue/apical meristem culture

I. Incremental staff - sanctioned and appointed

Category	Sanctioned	Appointed	Vacant
(i) NARP			
Lead Station at Vellayani			
Associate Director	1	1	Nil
Professor	-	-	-
Associate Professor	3	3*	Nil
Assistant Professor	6	6@	Nil
Administrative & Supporting Staff	14	14	Nil

*One post held by norms promotee Professor

@Two posts held by Jr.Asst.Professor.

Special Station at Kottarakkara

Associate Professor	2	2**	Nil
Assistant Professor	5	4@@	1 (Path.)
Administrative & Supporting Staff	4	3	1 (Lab Asst)

**One post held by norms promotee Professor
One post held by an Assistant Professor

@@Two posts held by Jr.Asst.Professors

ii) ICAR ad hoc Scheme on rice cyst nematode

Assistant Professor	1	1	Nil
Jr.Research Fellows	2	1	1

iii) AICRP on nematodes

Associate Professor	1	1*	Nil
Assistant Professor	2	2	Nil
Farm Asst. (Grade II)	1	1	Nil
Lab.Asst.(Grade III)	1	1	Nil

Iv) All India Co-ordinated Forage improvement project

Associate Professor	1	1*	Nil
Assistant Professor	2	2**	Nil
Jr.Asst. Professor	2	2	Nil
Farm Assistant (Gr.I)	1	1	Nil
Farm Assistant (Gr.II)	2	2	Nil
Assistant (Grade II)	1	1	Nil
Typist (Grade II)	1	1	Nil
Peon	1	1	Nil
Lab. Assistant (Grade III)	1	1	Nil

v) AICRP on Pesticide Residue

Associate Professor	1	1*	Nil
Assistant Professor	3	2	1***
Lab. Assistant (Grade III)	2	Nil	2

vi) AICRP (oil seeds)

Assistant Professor	2	2	Nil
Farm Assistant (Gr.II) (Agri.)	1	1	Nil
Lab. Assistant (Gr.III)	1	Nil	1

* Post held by norms promotee Professor
** One post held by norms promotee Associate Professor
*** Post sanctioned only w.e.f. 1-4-1988.

vii)	DST Project on Mushrooms			
	Research Fellow	1	1	Nil
viii)	Science and Technology Project on Pleurotus			
	(No incremental staff sanctioned)			
ix)	USDA Scheme on tissue/apical meristem			
	Assistant Professor (Hort)	1	1	Nil
	Jr.Asst.Professor (Hort)	1	1	Nil
	Typist (Senior Grade)	1	1	Nil
	Lab. Assistant (Grade I)	1	Nil	1
x)	Coconut Research Station, Balaramapuram			
	Associate Professor	1	1*	Nil
	Assistant Professor	1	1	Nil
xi)	CSRC, Karamana			
	Professor	1	1	Nil
	Asst. Professor	4	4	Nil
	Jr.Asst.Professor	5	4	1 (Path.)

Position in respect of staff prior to NARP

Category	Sanctioned	Appointed	Vacant
i) AICRP (Nematology)			
Associate Professor	1	1	Nil
Jr.Asst. Professor	2	2	Nil
ii) All India Co-ordinated Forage Improvement Project			
Associate Professor	1	1	Nil
Asst. Professor	2	2	Nil
Jr.Asst.Professor	2	1	1
iii) Coconut Research Station, Balaramapuram			
Associate Professor	1	1	Nil
Assistant Professor	1	1	Nil
iv) CSRC, Karamana			
Professor	1	1	Nil
Asst.Professor	3	3	Nil
Jr.Asst.Professor	5	4	1

*Post held by norms promotee Professor

II. Construction work

(I) Preliminary requirements:

(i) State of master plan approval: The detailed masterplan has been approved by the ICAR.

(ii) Approval of procedure for nomination of Architects : Directorate of Physical Plant with a team of Engineers and Architects attend to the item of construction work.

(iii) Supervision arrangements: : Under the Director of Physical Plant, KAU one Executive Engineer, two Asst. Exe.Engineers and two Asst. Engineers supervise the work.

iv) Whether land acquisition has been completed, indicate area acquired. If not, indicate reasons for the delay : Suitable land (10.19ha) for establishing the Special Station sanctioned for Kottarakkara has been located at Sadanandapuram (5 km. South of Kottarakkara on the MC Road). The land was taken advance possession off on 26-4-1986. The entire complement of staff sanctioned for the Special station has been moved to the Station.

The items of civil works have been completed, except electrification. Items of electrification work have been awarded.

2. Progress of civil works

Category	Area sanctioned	Area completed	Area in Progress	Area to be started and the present stage
i) Central Instrumentation Laboratory				
ii) Departmental Laboratories				
Soil Science & Agrl. Chemistry	Modifications only sanctioned All items have been completed			
Agronomy				

1	2	3	4	5
Entomology Plant Breeding Botany Extension Home Science Statistics Horticulture Plant Pathology	Modifications only sanctioned All items have been completed			
iii) Green House	25m^2	25m^2	-	-
iv) Glass House	75m^2	75m^2	-	-
v) Reclamation of Kayal land and development of additional garden land	Kayal land The bund and the sluice have been completed. Ground level tank and the distribution lines have been completed. Installation of the pumpset completed. Garden land Well sinking and ground level tanks completed. Fencing work completed. Installation of the pumpset completed.			
vi) Housing facilities for Kottarakkara:				
Field lab.	225m^2	225@m^2	-	-
Quarters (1)	196m^2	196@m^2	-	-
Quarters (1)	120m^2	120@m^2	-	-

3. Indicate major problems encountered in civil works

Since the land for the Special Station at Kottarakkara could be taken possession only on 26-4-1986, the extension was required.

III. Procurement of equipment and vehicles

Category	Amount sanctioned (Rs.in lakhs)	Amount spent (Rs.in lakhs)	Balance (Rs.in lakhs)
Office equipment	2.15	1.16	0.99
Transport & farm equipment	4.35	5.14	(-) 0.79
Lab. equipment	18.90	15.95	2.95
Total	25.40	22.25	3.15

Indicate major problems encountered in procurement of equipment

An amount of Rs.7.17 spent by the NARP (SR) for the purchase of an Atomic Absorption Spectrometer was disallowed by the Council.

IV. IMPLEMENTATION OF TECHNICAL PROGRAMME

a) Indicate whether Scientific staff has been given orientation in NARP objective, multi-disciplinary research, linkages. Also indicate whether they have been given copies of the Research Report, appraisal report: — Yes. The Scientists have been given orientation to the objective and Philosophy of NARP through discussions in Regional workshops, monthly meetings of the technical st[illegible] of NARP. Copies of the Repo[illegible] have been given.

b) Whether research initiated on all lead/verification/ testing functions sanctioned in I Appraisal report — Yes. Fortyeight research projects are in progress.

c) Whether multi-disciplinary technical programmes prepared — Yes

d) No. of Experiments

Plant Breeding	- 11
Agronomy	- 6
Soil Science	- 5
Pathology	- 5
Entomology	- 14
Statistics	- 2
Extension	- 1
Economics	- 1
Horticulture	- 3

e) Whether land for experimental purpose adequate — With the reclamation of the required paddy lands and development of garden lands, the land has become adequate.

f) Major problems encountered : Nil

g) Major achievements

Technological aspects identified for transfer through the Department of Agriculture

The following technologies generated under the project were presented in the "mini-workshop on Package of Practices" held at Vellanikkara on 23-1-1985. These were identified as worthy for presentation in the "State Level Workshop on Package of Practices". The State Level Workshop accepted these for inclusion in the "Package of Practice Recommendations". The 1986 edition include these recommendations.

Residue analysis of carbaryl (0.2%), Fenthion (0.05%), Fenitrothion (0.05%), Quinalphos (0.05%) and Malathion (0.05%) sprayed to brinjal, bittergourd and bhindi, during both dry and rainy seasons, indicated the waiting periods to be between one and five days, except in the case of Carbaryl sprayed to bittergourd, where it ranged between 6 and 10 days.

Sevin (0.2%) gave the best control against the coreid bug infesting coconuts. BHC 0.2%, Endosulfan 0.1% and Sevin 0.1% were on par with Sevin 0.2% in their effectiveness. The relative cost of the insecticides per coconut palm for one spraying worked out to 36 ps. for sevin 0.2%, 7.5 ps. for BHC 0.2%, 18 ps. for Sevin 0.1% and 35 ps. for Endosulfan 0.1%.

The results so far obtained indicated that sheath blight and sheath rot diseases of rice could be minimised by the application of Furadan (at nematicidal doses) and higher potash(50% more than the recommendation). Inclusion of the fungicide Vitavax further increased the efficiency of Furadan and higher potash.

Six species of mushrooms Termitomyces robustus, Termitomyces mammiformis, Termitomyces microcarpus, Pleurotus Cornuconiae, Pleurotus squarrogulus and Boletus edulis were identified, characterised and described as edible species.

The long term fertilizer trial at the Coconut Research Station, Balaramapuram indicated that 680 g N, 230 g P_2O_5 and 900 g K_2O/ coconut palm/year would give optimum yield under the red loam soils of southern Kerala.

The following recommendations generated by the "All India Coordinated Project on Nematode Pests of Crops and their Control" have already been included in the Package of Practice Recommendation of KAU.

Treat the nursery with Carbofuran @ 1 kg ai/ha and dip the seedlings in 0.2% Dimethoate for six hours before transplanting, for the control of rice-root nematode.

Apply saw dust or paddy husk at 500 g per plant or neem leaves or eupatorium leaves at 250 g per plant three weeks prior to planting and water daily, for the control of root-knot nematode on bhindi.

The VII Zonal Workshop conducted during February, 1986 identified the following technologies for transfer through the Department of Agriculture.

Based on the farm trials conducted in the districts of Trivandrum, Quilon and Pathanamthitta, the workshop identified Jyothi and Triveni as the best suited short duration rice varieties for the three sub divisions of Trivandrum district and Onam & Bhagya for the sub-divisions of Pathanamthitta. The best suited medium duration varieties were identified as Joythi and Bharathi for Neyyattinkara and Attingal sub divisions of Trivandrum District. In the Nedumangad sub division, Bharathi was best medium duration variety. In the modan areas of Quilon and Pathanamthitta, Suvarnamodan was identified as the best (modan) variety.

The farm trials conducted in six locations showed that "2, 4-D 1 kg ai/500 litres of water/ha, one month after sowing" was effective in the control of striga.

For the control of major pests of bhindi and brinjal, "Carbofuran at 0.05 kg ai/ha or Phorate at 1 kg/ha along with need based application of Carbaryl 0.2% or Bkalux 0.05% or Malathion 0.1% was found to be very effective.

The farm trials conducted in the three sub divisions of Trivandrum district indicated that application of lime (as per soil test data) would increase the yield of tapioca).

The project entitled "Selection of superior types of Capsicum annuum with economic attributes" gave rise to ten elite lines. These were from Pant-C 1 x Purple Cluster, C4 x Pusa Jwala and Vellanotchi Pusa Jwala. Out of these, Culture 33, Culture 47 and culture 57 have been identified as promising. Farm trials have been conducted and the culture 47 and 57 have been released as Jwalamukhi and Jwalasakhi.

The rice culture 25100 was found to be a better yielder than the local Cheradi, although it did not out-yield Kayamkulam-1.

The rice isolates of Rhizoctonia solani did not infact cowpea and vice-versa. The cowpea isolates infected several cowpea varieties. The varieties V-59, V-87, V-214, V-37, KBC-1, S-488 and CC-104 were not infected by Rhizoctonia solani cowpea isolate.

The six soil series in Trivandrum district, viz. Amaravila series, Kunnathukal series, Kuttichal series, Marukil series, Poovar series and Vembayam series were found to have overall productivity percentages of 47.3, 44.8, 13.5 and 30.1, respectively. Work on similar lines are programmed for the other districts in the region.

Taluk-wise crop suitability maps indicating the areas suitable for different crop-groups (based on the mappable soil properties fixed for each crop-group and soil capability) were prepared for Trivandrum district. Similar approach is programmed for the other districts of the region.

In the preliminary observations on the screening of 12 cowpea varieties for shade tolerance coupled with nigh yield potential for cultivation in coconut gardens indicated that varieties V-26 and HG 22 are promising.

For the identification of suitable cowpea varieties as companion crop with tapioca (Var M4) field trials were laid out to screen out suitable cowpea varieties with ideal plant type to suit the interspace of tapioca during the early growth phase of the latter. V-26 was found promising.

The cowpea variety CG-28 which recorded the maximum yield among the 12 varieties tried, has been identified as suitable for homestead gardens.

Preliminary observations on screening trials with eight groundnut varieties and 30 horsegram varieties indicated that the groundnut varieties EC 119704 and TC. 14 and the horsegram variety HPK 2 were high yielders under partially shaded conditions.

A trial with 12 guinea grass varieties conducted indicated that the guinea grass variety FR 600 gave the highest yield, followed by PMER 5 53 and Mackueni.

The basic survey of the Southern Region was conducted, to obtain information on the cropping pattern, soils etc. in this region, during 1985. A two stage stratified random sampling design was adopted for identifying the farmers in the sample. The farming situations in the region (as given in the Status Report) were taken as basic strata for the survey; 25% of the total No. of Panchayats (98 out of 392 Panchayats in all the districts under NARP (SR) were covered and a random sample of 3 to 7 holdings per Panchayat were included for the survey. A minimum number of 20 holdings per farming situation was fixed and proportionate number of holdings under under each farming situation were included so as to make the sample size equal to 331. The report is under preparation.

Extent of adoption and constraint in the adoption of improved agricultural technologies was assessed through a sample survey in Trivandrum district. The data collection was done during 1984 in Trivandrum district by personal interview method. A stratified random sample of 246 holdings were visited for collecting the data. The crops selected for the study were paddy, coconut, tapioca, banana and pepper. The report was discussed in the VII Zonal Workshop. Revision of the status report based on these results is in progress and accordingly priorities will be fixed afresh.

The following technologies generated under the project were accepted by the Mini Workshop on Package of Practices held at Vellanikkara on 29-1-1988.

Integrated measures for control of sweet potato weevil

Removal and destruction of the residues from the previous crop. Use of healthy and weevil-free setts for planting.

Application of leaves of Eupatorium odoratum (Chromolaena) as mulch (@ 3 t/ha at 30 DAP)

Drenching with 0.05% Endosulfan, Fenthion or Fenitrothion at 65 DAP and re-ridging at 80 DAP.

Trapping adults using sweet potato cut tubers (size-6cm diameter in the central portion) of 100 g size, kept at 5m apart during 50 to 80 DAP at 10 days interval. (For this purpose, sweet potato tubers may be cut and kept inside wire mesh cages to avoid rat damage)

Control of the 'Pollu' beetle

Spray any of the following insecticides, namely, Endosulfan, Dimethoate, Quinalphos or Monocrotophos all at 0.05% concentration at the time of spike emergence, at berry formation and once again, at berry maturing stage, if needed.

TG 3, TMV-2 and TMV-7 have been found to be suitable for intercropping under partially shaded situations in coconut plantations.

h) Whether seasonal summary of Research results finalised and sent to ICAR/Director of Research. If so, date of despatch, if not reasons for delay:

Yes - Seasonal Reports for the Kharif (82), Rabi (82-83), Kharif (83), Rabi (83-84). Kharif (84), Rabi (84-85), Kharif (85) and Rabi (85-86). Kharif (86) and Rabi (86-87) have been despatched.

1. Extent of participation of research staff in teaching and Extension (give details of course tought and students guided)

Designation	Weekly contact hours (average/ trimester)	Students (No.) guided (for the year)			
		Ph.D.		M.Sc/PG	Diploma
		Chair-man	Member	Chair-man	Member
1. Associate Director	Nil	1	4	2	3
2. Professor, Soil Science & Agrl. Chemistry	4	-	-	3	2
3. Associate Professor, Plant Breeding	4	-	-	2	-
4. Associate Professor, Statistics	4	-	13	2	48
5. Assistant Professor, Soil Science & Agrl. Chemistry	-	-	-	-	-
6. Assistant Professor, Plant Breeding	-	-	-	-	-
7. Assistant Professor Nematology	-	-	-	-	-
8. Assistant Professor Agrl. Extension	15	-	-	1	2
9. Assistant Professor Agrl. Statistics	4	-	-	-	4
10. Assistant Professor Horticulture	6	-	-	-	1

V. Linkage & Co-ordination

(a) Co-ordination among different disciplines:

Research projects formulated are of inter-disciplinary nature. The activities are co-ordinated by the Associate Director, Continuous monitoring is done. Periodically, the Heads of Departments are consulted on important issues. The Associate Director of Research (M&E) conducts quarterly monitoring.

(b) Co-ordination with other research organisation in the zone or in adjoining zone/state Agrl. Universities/ICAR

CPCRI Regional Station, Kayamkulam, Central Tuber Crops Research Institute (ICAR), Trivandrum; State Soil Survey Wing, Department of Agriculture and Regional Research Laboratory (CSIR), Trivandrum

are the other research organisation in the zone. The Directors of the ICAR Institutes, the Director of the Regional Research Laboratory (CSIR) and Heads of other organisations involved in agricultural research in the zone are invited to participate in the Zonal Research Workshop and to highlight the research activities of their institues. In the Zonal Research Workshops conducted so far, their participation has been very effective. Invariably, two or three Senior Scientists who are conversant with the problems of the zone from each of the institutes participate in the Zonal Workshops. This not only helps avoid duplication of research efforts but also promotes synergistic acti to draw mutual benefits.

c) Extension activities : Adoption of villages, trials in farm fields.

Adopted villages : Muttacaud and Kalliyoor

Farm Trials : Three series of farm trials are on.

d) Co-ordination with Departmental Staff (No.of meetings with department staff)

Nine Zonal Workshops conducted so far. Regular monthly workshops (T&V) are being conducted in which the NARP Scientists also participate effectively. The Associate Director is the Chairman of the monthly workshop for Trivandrum district. Training Seminars have been conducted in Trivandrum and Quilon districts on "Status Report".

e) Six monthly progress report from KAU (March & September)

Date of Submission: Six monthly progress reports relating to March, 1982, September 1982, March 1983, September 83, March, 84, September 84, March 85, September 1985, March 1986, September '86 and March 1987 were submitted respectively on 30-4-1982, 25-10-1982, 23-4-1983, 29-10-1983, 26-4-1984, 1-10-1984, 1-4-1985, 9-10-1985, 6-5-1986, 25-10-1986 and 20-4-1987.

f) Seasonal workshops - Zonal University officials and DOA subject matter specialists - Date of holding with number of participants.

First Regional Workshop on 1-3-1982	(90 participants)
Second Regional Workshop on 8-2-'83	(75 ,,)
Third Regional Workshop on 19-7-'83	(103 ,,)
Fourth Regional Workshop on 6th & 7th March, 1984	(120 ,,)
Fifth Regional Workshop on 12th & 13th September 1984	(110 ,,)
Sixth Regional Workshop on 26th & 27th March, 1985	(126 ,,)
Seventh Regional Workshop on 14th & 15th February, 1986	(89 ,,)
Eighth Regional Workshop on 9th & 10th September, 1986	(85 ,,)
Ninth Regional Workshop on 29th & 30th June, 1987	(122 ,,)

g) Number of visits made by the Director of Research to the sub project (during the last three months) - Three

h) No. of visits made by Associate Director to the other station in the zone (during the last three months):

Four to the Special Station at Kottarakkara, two to the CSRC, Karamana and two the CRS, Balaramapuram.

i) Training of staff (indicate needs)

Training of selected scientists in the operation and maintenance of the imported items of scientific equipment was organised for the scientists of the College of Agriculture and the CSRC, Karamana from 21-1-1985 to 25-1-1985, and for the Scientists from other stations from 23-6-1986 to 28-6-1986.

Financial Progress

Details of expenditure during Phase I from 30-11-1981 to 29-11-1986

(Rs. in lakhs)

Item	NARP (SR) - RARS, Vellayani & Special Station, Kottarakkara				RARS, Vellayani		Spl.Station, Kottarakkara	
	Sanctioned outlay for the entire period	Total expenditure for the entire period from 30.11.81 to 29.11.86	Budget sanction for the period from 30.11.86 to 31.3.87	Expenditure 30.11.86 to 31.3.1987	Budget for 1987-88	Expenditure till 31-12-1987	Budget for 1987-88**	Expenditure 1.5.87 to 31.12.87@
NARP Share								
Salaries	29.72	29.90	3.84	2.73	4.45	3.34	1.55	1.93
T.A	0.80	1.12	0.10	0.10	0.17	0.13	0.03	0.03
Research) Operating) cost)	6.00	5.99	0.50	0.50	1.30	0.98	0.50	0.51
Equipments	25.40	22.25	-	-	-	-	-	-
Civil works	23.77	37.49	-	-	-	-	-	-
Total	85.69	96.75						
University share								
Normal cost of cultivation	9.74	0.86	0.40	0.40	0.10	0.80	0.45	0.46
Station maintenance	4.20	1.84	0.20	0.20	0.20	0.15	0.05	0,05
Equipment	-	7.17*	-	-	-	-	-	-
Total	103.92	99.47	5.04	3.93	6.22	4.68	2.58	2.98

* On account of the cost of the Atomic Absorption Spectrophotometer being charges to the University account.
** A provision of Rs.55 lakhs has been made for land acquisition.
@ From 1.5.1987 the Special Station, Kottarakkara functioning as a separate unit.

ii) Budget and equipment of non-NARP projects state/ University etc. contingencies.

	Budget for 1987-88 (Rs. in lakhs)	Contingencies (Rs. in lakhs)
ICAR ad hoc scheme on cyst nematode.	0.544	0.240
AICRP on Nematode pests and their control, Vellayani(ICAR)	1.553	0.480
AICRP for research on forage crops, Vellayani (ICAR)	1.950	0.610
AICRP (Oil Seeds)	0.858	0.390
DST Scheme on mushroom flora of Kerala	0.588	0.184
AICRP on Pesticide Residue	4.373	3.360
AICRP on cropping pattern (Karamana) CSRC, Karamana	9.808	4.775
Coconut Research Station, Balaramapuram	5.374	2.645
Scheme on Pleurotus (KSC on S&T)	0.250	0.200

iii) Whether the delegations adequate, if not list deficiencies:

Adequate, except in the case of photographic items.

iv) Audit: Whether audit of account of previous financial year completed:

Audit by Local Fund Audit for 1983-84 & 1984-85 completed. Audit for 1985-86 in progress.

sr.

SUB PROJECT ON STRENGTHENING THE DIRECTORATE OF RESEARCH

On the spot review of progress as on 31-12-87

KAU MAIN CAMPUS

VELLANIKKARA — TRICHUR-680 654

ON THE SPOT REVIEW OF PROGRESS
(As on 31-12-1987)

a) Name of Sub Project : Strengthening of the Directorate of Research

b) Date of commencement : 13--8--1980

c) Objective : To undertake short term and perspective planning, resource allocation, coordination, monitoring and evaluation of research activities in the various NARP Sub projects.

d) Research projects in operation at the Station: N.A

I. POSITION OF INCREMENTAL STAFF

Sl.No.	Designation	Sanctioned	In position	Vacant
a)	Scientists			
	Associate Director	3	3	-
b)	Administrative & Supporting			
	Typist Gr.I	1	1	-
	Typist Gr.II	1	1	-
	Duplicator Operator	1	1	-
	Photographer cum-Artist	1	-	1
	Driver (L.D.V)	1	1	-
	Peon	1	1	-
	Position in respect of staff prior to NARP			
	Director of Research	1	1	-
	Associate Director (Vety.&A.S)	1	1	-
	Section Officer	2	2	-
	Typist(Sr.Grade)	3	3	-
	Typist (Grade II)	1	1	-
	Office Superintendent	1	1	-
	Senior Grade Assistant	2	2	-
	Assistant Grade I	4	2	2
	Driver (L.D.V)	2	2	-
	Peon (Hr.Grade)	2	2	-
	Lab. Assistant Grade III	1	1	-

II. Construction Work : Nil

III. Procurement of Equipment and vehicles

Sl.No.	Category	Amount sanctioned	Amount Spent
1.	Office	1.03	0.84
2.	Transport	0.55	0.55
		1.58	1.39

IV. Monitoring and Evaluation of Project work

On-spot monitoring of research project implementation in the ZRS and Sub stations have been streamlined and made effective by alloting the stations to the Associate Directors of Research for such work. The Associate Director of Research (M&E) is conducting this work in the Southern and the Region of Problem Areas. The Associate Director of Research (Plg) is monitoring work in the High Range Region while work in the northern and Central Regions are attended to by the Associate Director of Research (AR&T). Detailed monitoring reports are prepared after each review for continued follow up action on the project implementation. The concluded projects have been reviewed in depth and the emerging recommendations of adaptive value identified for transfer through the Extension machinery. Two mini workshops on Package of Practices recommendation have been conducted as a result of such evaluation in 3/86 and 1/87 and a total of over 50 new recommendations identified.

PLANNING

The work on the preparation of the Annual plans of the University in the light of changing priorities and new thrust areas is being attended to by the Planning Cell, besides the work on perspective planning for the VIII Plan. After careful appraisal of the agricultural scenario, the thrust areas in research have been identified.

Adaptive Research and Training

Identification of technologies for adaptive trials/farm trials and training programmes have been continued. A training on the use of radio isotopes was conducted in the RTL on 8-10 March 1988. The conduct of farm trials was kept under close supervision through Diagnostic Teams constituted for all the Districts.

Processing of New Research Project and Implementation of ongoing Projects

The Director of Research continued to process numerous project proposals for external funding from diverse sources. After approval the proposals are further followed up and administrative sanction accorded. A total of 32 AICRPs and 16 Cess fund projects are being closely monitored in the Directorate of Research and their implementation controlled effectively.

Publications

The Research Report of the University for 1984-85 has been brought out during the period. The matter for 85-86 has been edited and this is now in press. The 1986-87 report is now being edited. The publication on the Research High lights for 1985-87 was published in November 1987.

The Annual Administration Report of the University for 1985-86 and 1986-87 have been compiled and brought out from the Directorate of Research.

A compilation of the Inventory of the Farms and Research Stations of the University has been prepared for publication.

Matter on the sophisticated and major equipment items available in the University stations and Departments has been compiled for publication.

A brochure on the Radio Tracer Laboratory and its capability for investigations involving radio tracer techniques has been released

Research Council/FRC.

The Director of Research arranged the meeting of the IXth Research Council on 11th November 1987 and reviewed a total 272 ongoing research projects under implementation in the University.

The Faculty of Research Committee meetings were conducted in the constituent faculties for clearance of new research projects. Faculty Research Committee for the Agri. Faculty met on 28-29 August 1986 at Vellayani and cleared 73 projects. It also met at Vellanikkara on 27-28 October 1986. The Faculty Research Committee also met on 11-12 June 1987. The Faculty Research Committee of the Faculty of Fisheries met on 18-12-1987. The Directorate of Research also kept tract of the functioning of the PC groups in the Faculties of Agriculture and Animal Sciences.

Financial Progress

Budget sanctioned and Expenditure

	Outlay approved	Expenditure
1. Staff salary + TA	5.96	8.92
2. Equipment	1.58	1.39
3. Workshop/Seminar/ Training	1.65	0.42
4. Operating cost + Library	1.64	1.34
Total	10.83	12.07

Proforma 1

Overall Financial Progress as on December 31, 1987
(Rs. in lakhs)
(expenditure booked under NARP Phase - I only included)

Zone		Name of sub-project - date of commencement - items of expenditure						
		Staff (Salary + TA)	Civil works	Equipment	Operating cost + Library	Farm Development	Training/Seminar/Study tour etc.	Total
Directorate of Research 13-7-80	S	5.96	-	1.58	1.64	-	1.65	10.83
	E	8.92	-	1.39	1.34	-	0.42	12.07
Pilicode 9-8-80	S	25.87	44.22	16.40	11.35	2.00	-	99.84
	E	27.12	68.27	15.07	8.94	1.00	-	120.40
Ambalavayal 24-11-83	S	12.33	10.40	6.72	3.58	-	-	33.03
	E	8.89	5.11	4.48	2.79	-	-	21.27
Pattambi 1-11-81	S	27.83	32.53	25.42	7.40	-	-	93.18
	E	32.38	30.86	24.12	5.78	-	-	93.14
Kumarakom 30-11-81	S	30-81	61.32	28.90	10.80	-	-	131.83
	E	28.78	79.19	23.82	7.93	-	-	139.72
Vellayani 30-11-81	S	30.52	23.77	25.40	6.00	-	-	85.69
	E	31.02	37.49	22.25	5.99	-	-	96.75
Chalakudy Water Management (25-5-83)	S	6.91	7.12	6.25	1.54	-	-	21.82
	E	2.46	1.92	4.54	0.76	-	-	9.68
Total	S	140.23	179.36	110.67	42.31	2.00	1.65	476.22
	E	139.57	222.84	95.67	33.53	1.00	0.42	402.81

S - Sanctioned outlay

E - Expenditure up to 31-12-87 unless otherwise mentioned.

Proforma 2

Incremental Staff position under sub projects

Subproject Staff position	Directorate of Research		Sub Project Pilicode		Ambalavayal		Pattambi		Kumarakom		Vellayani		Chalakudy		Total (KAU	
	S	V	S	V	S	V	S	V	S	V	S	V	S	V	S	V
Assoc.Director	3	-	1	-	1	-	1	-	-	-	1	-	-	-	7	-
Professor	-	-	3	-	-	-	1	1	-	-	-	-	-	-	4	1
Assoc.Prof.	-	-	16	6	1	-	7	2	5	-	5	-	-	-	34	8
Asst.Professor	-	-	8	1	6	4	12	5	13	1	11	1	4	2	54	14
Other Res. Staff (JAP, RA,etc)	-	-	-	-	-	-	1	1	8	1	7	1	-	-	16	3
Other staff	6	1	22	8	7	1	20	6	28	8	11	-	6	1	100	25
Total	9	1	50	15	15	5	42	15	54	10	35	2	10	3	215	51
Vacancy (Per cent)		11		30		33		36		19		6		30		23.7%

PROGRESS OF CIVIL WORKS IN SUB PROJECTS (PHYSICAL)

Proforma - 3

Zone	Northern		High Altitude		Central				Special (Problem)					Southern	
Station	Pili	Panni-	Amb.	P.Para	Ptb.	Mny.	Eru.	Chal	Kum.	Mon.	Kym	Vyt.	Kol.	Vly.	Kot.
SANCTIONED CIVIL WORKS															
1. Lab./Off.	Com-pleted		Remo-delling 30% com-pleted	Remodel-ling com-pleted	Comp-leted	Comp-leted	Not star-ted	Extn. comp-leted	Com-plet-ed	Com-plet-ed	Extn-Com-pleted	Com-plet-ed	-	Remod-elling com-pleted	Civil work com-pleted ele.work arranged
2.Trainees/ Hostel	,,		50% com-pleted	75% com-pleted	-	-	-	-	,,						
3. Farmers Hostel	-		-	-	-	-	-	-	-	-	-	-	-	-	
4.Staff re-sidence	Comple-ted		-	-	,,	com-ple-ted	Not star-ted	95% com-ple-ted	com-ple-ted	Com-ple-ted					75% com-pleted
5. Glass house	-		-	-	comp-leted	-	-	-	-	-	-	-	-	com-ple-ted	
6. Net house	Com-pleted		-	-	,,	-	-	-	com-ple-ted	com-ple-ted				-	
7. Green House	,,				,,				,,	,,				,,	

Contd...

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
8.Seed store/ store	Com-pleted	-	.		-	-	-	com-pleted	Com-pleted	-	completed				
9.Seed store/ drying yard	-	-	-	-	com-pleted										
10.fertilizer store/dry-ing yard					,,				com-pleted	com-pleted					
11.Sales coun-ter					,,										
12.Implement/ tractor shed					,,										
13.Jeep shed															
14.Implement shed/ room					,,				com-pleted						
15.Meterolo-gical lab					com-pleted										
16.Farm Office	Com-pleted														
17. Threshing floor/ drying yard															

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
18. Compound wall, retaining wall, fencing	com-pleted												completed	completed	
19. Water supply arrangements														90% comple-ted	
20. Furniture for Hostel	com-pleted								com-pleted						
21. Kayal land reclamation													completed		
22. Cattle shed									com-pleted						

Proforma-4

NATIONAL AGRL. RESEARCH PROJECT

Kerala Agricultural University

PROGRESS OF CIVIL WORKS IN SUB PROJECTS(FINANCIAL) AS ON DECEMBER, 31, 1987 (Rs. in lakhs)

		Lab/Office.	Trainees Hostel	Farmers Hostel	Staff Qtrs.	Others	Total
NORTHERN							
Pilicode	S	22.00	8.55		8.62	5.05	44.22
	E	31.28	13.49		15.27	8.23	68.27
Panniyur	S	-	-	-	-	-	-
	E	-	-	-	-	-	-
HIGH ALTITUDE							
Ambalavayal	S	1.00	4.80	-	-	-	5.80
	E	-	1.54	-	-	-	1.54
Pampadum-para	S	2.00	2.60	-	-	-	4.60
	E	2.03	1.54	-	-	-	3.57
CENTRAL							
Pattambi	S	11.62	-	-	8.31	5.47	25.40
	E	11.07	-	-	8.96	6.30	26.33
Mannuthy	S	2.56	-	-	2.16	-	4.72
	E	2.27	-	-	2.26	-	4.53
Eruthempathy	S	0.84	-	-	1.57	-	2.41
	E	-	-	-	-	-	-
Chalakudy (WM)	S	1.24	-	-	5.88	-	7.12
	E	1.92	-	-	-	-	1.92
SPECIAL (PROBLEM)							
Kumarakom	S	22.04	6.42	-	5.84	4.59	38.89
	E	21.00	7.22	-	10.15	5.53	43.90
Moncompu	S	10.81	-	-	3.93	3.74	18.48
	E	14.79	-	-	8.36	4.01	27.16
Kayamkulam	S	1.54	-	-	-	-	1.54
	E	4.21	-	-	-	-	4.21
Vyttila	S	2.16	-	-	-	0.25	2.41
	E	3.18	-	-	-	0.74	3.92
Kole (Mannuthy)	S	-	-	-	-	-	-
	E	-	-	-	-	-	-
SOUTHERN							
Vellayani	S	11.23	-	-	-	7.48	18.71
	E	18.80	-	-	-	13.36	32.16
Kottara-kkara	S	2.53	-	-	2. 53	-	5.06
	E	1.96	-	-	2.16	1.21	5.33
Total	S	91.57	22.37	-	38.84	26.58	179.36
	E	112.51	23.79	-	47.16	39.38	222.84

S - Sanctioned outlay E - Expenditure incurred

Proforma 5

Status of Equipment procurement under Sub project
(as on December 31, 1987)
(Rs. in lakhs)

Sub Project	Date of Start	Sanctioned amount	Expenditure incurred	Utilisation (percent)	Remarks
Pilicode	9-8-1980	16.40	15.07	91.90	
Ambalavayal	24-11-1983	6.72	4.48	66.66	The equipments were centrally procured in all the zones and distributed to the stations
Pattambi	1-11-1981	25.42	24.12	94.90	
Kumarakom	30-11-1981	28.90	23.82	82.42	
Vellayani	30-11-1981	25.40	22.25	87.59	
Chalakudi (WM)	25-5-1983	6.25	4.54	72.60	
Total		109.09	92.37	84.40	

Proj. area

Farm Development Expenditure as on December 31, 1987
(Rs. in lakhs)

Sub project	Date of start	Amount sanctioned	Expenditure incurred	Utilization (per cent)
Pilicode	9-8-1980	2.00	1.00	50.00
Ambalavayal	24-11-1983	-	-	-
Pattambi	1-11-1981	-	-	-
Kumarakom	30-11-1981	-	-	-
Vellayani	30-11-1981	-	-	-
Chalakudy(WM)	25-5-1983	-	-	-
Total		2.00	1.00	50.00

REPORT ON THE FOLLOW UP ACTION TAKEN ON THE VARIOUS RECOMMENDATIONS GIVEN BY THE PREVIOUS IDA/ICAR SUPERVISION MISSION (AUGUST, 17-22, 1986)

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Item No.1

Steps have been taken to conduct an impact study of the NARP Phase-I, on the basis of data generated in the M&E Cell of the Department of Agriculture, and also on the basis of a field survey.

Item No.2

The Directorate of Physical Plant has taken up the matter of regularisation of excess expenditure incurred on various items of civil works. The observation of the Mission that the overall quality of Civil works will have to be improved has been brought to the notice of the Director of Physical Plant.

Item No.3

The critical vacancy positions of Scientific and Administrative staff in the ZRSs and Sub-stations have been reviewed. The positions of Associate Directors of Research at the RARS, Pilicode and RARS, Kumarakom have been filled up and the charge arrangements have been dispensed with. There has been considerable improvement in the Staff positioning. The details of vacancies as on 31-12-1987 in the various ZRSs, Directorate of Research and Sub-Stations are as follows:

Zone	S	P	V	% Vacancy
1. NORTHERN REGION				
Scientific	28	19	9	32.1
Admn. & Supporting	22	14	8	36.4
2. HIGH RANGE REGION				
Scientific	8	6	2	25.0
Admn. & Supporting	11	9	2	18.2

3. CENTRAL REGION				
Scientific	21	14	7	33.3
Admn. & Supporting	22	14	8	36.4
4. WATER MANAGEMENT				
Scientific	4	2	2	50.0
Admn. & Supporting	6	5	1	16.7
5. SOUTHERN REGION				
Scientific	17	16	1	5.9
Admn. & Supporting	18	17	1	5.6
6. DIRECTORATE OF RESEARCH				
Scientific	3	3	-	Nil
Admn. & Supporting	6	5	1	16.7
GRAND TOTAL: Scientific	81	60	21	25.90
Admn. & Supporting	85	64	21	24.10

There is considerable improvement in the Faculty positions in the discipline of Agricultural Engineering. Very close interaction has been established between the Heads of Departments and Senior Scientists of the main campus and those who are located at the ZRSs, to ensure that there is adequate guidance in the technical programme implementation in the Stations. The Ph.D scholars are being encouraged to take up research projects on the various constraints that are identified from time to time.

Item No.4

Steps have been taken to impart training to Junior Scientists working in the Regional Stations to improve their professional competence and to acquire additional skills in their fields of specialisation. A training programme on the use of various equipment items in the Radiotracer Laboratory was conducted for the benefit of the JAPs of the Regional Agricultural Research Stations and the College Departments. This training was conducted at the Radiotracer Laboratory, Main Campus, Vellanikkara during 8-10, March, 88 and a total of ten candidates

attended the programme. Steps have been taken to conduct other trainings on need-based manner.

Item No.5

The question of re-deploying more experienced scientists evenly over the ZRSs and Sub-stations is under active consideration. Senior Scientists have been positioned already in many critical positions. eg. Central Regional Sub-project at Eruthempathy. Further redeployment in the ZRSs in order to obtain a balanced blend of various relevant disciplines is being considered.

In the NARP Phase-II, Animal Husbandry, Agricultural Engineering, Horticulture and Post-harvest technology areas have been decided to be strengthened. Sanction for the Phase-II component has already been received from the Council.

Item No.6

The design of the laboratory furniture has been reconsidered and for the sub-station at Kottarakkara the redesigned furniture items are being provided to ensure better working conforts and space economy. At the Kayamkulam station one large concrete work bench has been dispensed with, to provide more space. In the RARS, Ambalavayal also the laboratory furniture has been redesigned on the above lines, following the pattern adopted at the CPCRI Regional Station, Kayamkulam.

Item No.7

Appropriate action has already been taken to ensure full utilisation of allocation for libraries. Since the expenditure on the procurement of books/journals was booked under the ROC, the details of actual expenditure under this item is not readily forthcoming at Headquarters. The details will however be made available to the Mission during their visit.

The fund utilisation position on this has certainly recorded improvement.

Item No.8

Status reports of the ZRSs have been considerably revised and enlarged after a series of workgroup meetings involving the scientific staff concerned. Dr AR Seshadri of the World Bank Resident Mission rendered valuable guidance and technical assistance in the revision of the Status report. A detailed review of the revised draft of the Southern Region was made by Dr AR Seshadri at the RARS Pattambi during 29-12-86 to 3-1-87. Thereafter a seminar was conducted at the KAU Headquarters involving all the concerned persons in the University and the JDAs of Agriculture on 7-9, January, 1987, at the KAU Headquarters, Vellanikkara. Later, review meetings were held at the KAU Headquarters to monitor the progress of revision of the Status reports for the various regions.

Item No.9

The Supervision proformae for expenditure, staffing, civil works etc., will be computerised for updating and easy retrieval.

Item No.10

The experimental fields at the Vellayani centre have been laid out properly. At the Special Station Kottarakkara soil survey work is in progress. The anti-erosion works and terraces will be laid out at the Kottarakkara stations along the contours, making use of the funds provided under NARP Phase-II

Item No.11

Rainfall probability studies have already been conducted for the Southern Region following Markov Chain model. Such studies have also been conducted at the RARS, Pilicode.

Item No.12

The necessity for recording the various parameters of the ecological micro-environment of the experimental fields has been brought to the notice of all the researchers.

Item No.13

Studies on the land use and water management have since been initiated with stress on investigation involving soil moisture conservation on the higher slopes of the toposequence and means of intercepting and storing run-off at the lower part of the toposequence. Such a study of adaptive value to the Eucalyptus based Tankiya system of farming followed in the plantations has recently been completed in the Central region. In this study the relative efficiency of different types of fodder grasses to check run-off has been worked out.

Item No.14

Long term fertilizer experiments have since been commenced at the CSRC, Karamana and RRS, Moncompu both on rice.

Item No.15

Wherever possible nutrient response curve analysis is being developed for rainfed and irrigated crops under varying levels of major nutrient availability.

Item No.16

At the RARS, Kumarakom studies are in progress for the recycling of poultry manure (Duck droppings) as food for fishes. The results of this trial conducted at the Kumarakom centre are found to be promising. In this system, duck pens are erected to project into the water canals such that the droppings are collected in the canal. This system of recycling duck waste for successful rearing of Indian major carps appears to be promising. On completion of this project, a few model type farms can be laid out integrating homestead and mixed garden crops with duck farming. At the Kumarakom centre, studies are already on hand to develop a technology for multi-tier level of cropping in the terrestrial and aquatic eco-system, and also in the aquatic eco-system.

Item No.17

Steps have been taken to strengthen the links with the Department of Fisheries.

Item No.18

A Practical Manual on the seed production technology giving details of varietal identification and methods of conducting of rouging could be published by the University.

Item No.19

Regarding the launching of an adaptive trial in the 'R' block Kayal in the Kuttanad region, steps are being taken.

Item No.20

A diagnostic analysis of the Command Area of the Chalakudy project will be conducted to assess water availability, irrigation practices and cropping patterns followed in this command area. As suggested, up-lands, middle lands and low level lands will be stratified and selected for this field survey.

Item No.21

All the suggestions have been brought to the notice of the team responsible for the implementation of the ORP on water management at Chalakudy.

Item No.22

The Directorate of Extension has already planned a series of trainings for the benefit of the Subject Matter Specialists of the University. Central Training Institute has been established under the Directorate of Extension with the above intention.

Item No.23

Strong linkages are being sustained between the KAU on the one hand and CPCRI, CTCRI, NRCS on the other. Steps are being taken to avoid possible duplications in research efforts. But it is difficult to completely avoid such

cuplications. The interaction between the KAU, DOA and the ICAR institutes in the State is being ensured mainly through Zonal Workshops, where representatives from all these organizations are taking part.

Item No.24

Regarding the extension impact of NARP Phase-I, this can probably form subject matter for research by the Scientific staff in the Discipline of agricultural extension. Alternatively, this can be alloted as problems for investigation by the Post-graduate students.

Item No.25

The curriculum for the B.Tech programme in Agricultural Engineering includes modern concepts in water management and watershed management. In the curriculum for the B.Sc. (Ag) programme stress has been given for cropping systems research and integrated pest management.

Item No.26

The status of the Moncompu, Chalakudy and other smaller research centres of the KAU is being retained without any change.

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