

206201

NATIONAL AGRICULTURAL RESEARCH PROJECT

SPECIAL ZONE OF PROBLEM AREAS



ON THE SPOT REVIEW OF PROGRESS

(As on December 31, 1987)

KERALA AGRICULTURAL UNIVERSITY

Regional Agricultural Research Station,

Kumarakom - 686 566, Kottayam.



206201

IR RARS/RP 1987

3. R.R.S., Kayamkulam : Rice, rice-based cropping system.
4. R.R.S., Vyttila : Rice.
5. Kole Station : Rice-fisheries.

d) Research Project in operation at the stations

1) R.A.R.S., Kumarakom

1. N.A.R.P. (ICAR)
2. Rice based fish culture (AICARP)
3. Root (wilt) disease scheme (KAU)
4. Integrated research project (KAU)
5. Strengthening the existing farm (KAU)
6. R.A.R.S., Kumarakom (KAU)

ii) R.R.S., Moncompu

1. N.A.R.P. (ICAR)
2. Operational Research Project (ICAR)
3. Special diseases and pest research (ICAR)
4. AICRIP (ICAR)
5. Ecosystem of Kuttanad (KAU)
6. Cultivation of fish in Kuttanad (KAU)
7. Research on rice (KAU)

iii) R.R.S., Kayamkulam

1. N.A.R.P. (ICAR)
2. Research on rice (KAU)
3. Root (wilt) disease scheme (KAU)
4. Development of Improved varieties of sesamum and ground nut (ICAR).

KERALA AGRICULTURAL UNIVERSITY

Regional Agricultural Research Station, Kumarakom

NATIONAL AGRICULTURAL RESEARCH PROJECT

Proforma for on the Spot Review of Progress (As on 31-12-87)

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a) Name of Sub Project : SPECIAL ZONE 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

<u>Station</u>	<u>Lead function</u>
1. R.A.R.S., Kumarakom	: Coconut, coconut based cropping system. Crop-livestock-fishery integrated system.
2. R.R.S., Moncompu	: Rice.
3. R.R.S., Kayamkulam	: Oil seeds, pulses, rice.
4. R.R.S., Vyttila	: Rice, rice-fisheries.
5. Kole station	: Rice in Kole lands.

(ii) Verification and testing functions

<u>Station</u>	<u>Verification and testing functions</u>
1. R.A.R.S., Kumarakom	: Rice, pulses, Oil seeds, vegetables, tuber crops and banana.
2. R.R.S., Moncompu	:

iv) R.R.S., Vyttila

1. N.A.R.P. (ICAR)
2. Research on rice (KAU)
3. Root (wilt) disease (KAU)

v) A.R.S., Mannuthy (Kole land)

1. N.A.R.P. (ICAR)
2. A.R.S., Mannuthy

I. INCREMENTAL STAFF

Sanctioned and appointed

Sl. No.	Category	Sanct- ioned	Appoi- nted	Vac- ant	Remarks
(1)	(2)	(3)	(4)	(5)	(6)
i) <u>R.A.R.S., Kumarakom</u>					
A) <u>Scientific staff</u>					
1.	Associate Director	Nil	-	-	The post of Prof. of Agronomy upgraded to the status of Assoc. Director as on 20-7-87.
2.	Professor	Nil	-	-	
3. <u>Associate Professors</u>					
a)	Agri. Extension	1	1	-	Upgraded to the cadre of Prof. by norms promotion.
b)	Agri. Economics	1	1	-	-do-
c)	Fisheries	1	1	-	Asst. Prof. officiating.
d)	Agri. Chemistry	1	1	-	Shifted from Moncompu.

	(2)	(3)	(4)	(5)	(6)
<u>4. Assistant Professors</u>					
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) Plant Physiology	1	-	1	-	
i) Weed science	1	1	-	-	
5. Junior Asst. Professor	-	-	-	-	
<u>B. Administrative and supporting staff</u>					
1. Administrative Officer	1	1	-	-	
2. I Gr. Assistant	2	2	-	-	
3. I Gr. Typist	3	3	-	-	
4. Lab. Assistants 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	-	

R.A.R.S., Kumarakom -- : 5 : -- sanctioned in position

1	1	1	1	1	1
1	2	3	4	5	6

ii) R.R.S., Moncompu

A. Scientific staff

1. Associate Professors

a) Entomology	1	1			
b) Soil Science & Agrl. Chem.	1	1			Upgraded to the cadre of Prof. by norms promotion & post shifted to Kumarakom
<u>2. Assistant Professors</u>					
a) Extension	1			1	
b) Soil Science	1	1			
c) Plant Pathology	2	1		1	
d) Plant Breeding	1	1			JAP officiating.

B. Administrative & Supporting staff

a) Lab. Asst. Gr. III	4	2		2	
b) Boat Driver	1			1	
c) Sarang	1			1	

iii) R.R.S., Kayamkulam

A. Scientific staff

1. Assistant Professor

a) Agrl. Engineering	1			1	
b) Jr. Asst. Prof. (Ag. Bot.)	1			1	
<u>B. Admn. & Supporting staff</u>	Nil				

iv) R.R.S., Vyttila

A. Scientific staff

1. Assistant Prof. (S.S.)	1			1	
<u>B. Admn. & Supporting staff</u>	Nil				

Updated to
the cadre of
Prof. by norms
& promotion &
post shifted
to Kumarakom

iv) R.R.S., Vyttila
B.Science & Agr. Chem.
B.Admn. & Supporting staff

A. Scientific staff

1. Assistant Prof. (S.S.)

B. Admn. & Supporting staff: Nil

1	2	3	4	5	6
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v) Kolelands (Research Station, Mannuthy)

A. Scientific staff

1. Assistant Prof. (Agro.) 1 1

B. Admn. & Supporting staff Nil

Position in respect of staff prior to N.A.R.P.

R.A.R.S., Kumarakom Sanctioned In position

1. Professor 1

2. Associate Professor 2

3. Assistant Professor 5

4. Junior Assistant Professor 4

R.R.S., Moncompu

1. Associate Professor 3

2. Assistant Professor 7

3. Junior Assistant Professor 10

4. Junior Statistician 1

R.R.S., Kayamkulam

1. Associate Professor 3

2. Assistant Professor 3

3. Junior Asst. Professor 2

R.R.S., Vyttila

1. Associate Professor 2

2. Assistant Professor -

3. Junior Asst. Professor 1

R.A.R.S., Kumarakom

1. Professor

2. Associate Professor

3. Assistant Professor

4. Junior Assistant Professor

R.R.S., Moncompu

S. R. R. S., Moncompu

7

:- :-

AIO AIO AIO

Completed

II. Construction works

1. Preliminary requirements

- i) Stage of master plant 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
1	2	3	4
1. R.A.R.S., Kumarakom			
i) Central facilities			
a) Laboratory Building	1235	1235	Completed and occupied.
b) Farm structure			
Net House	One		
Green House	One each		
Cattle shed	One each	660	
Implement shed	One each	660	
Drying yard			
Fertilizer store			
Seed store			

S. R. R. S., Moncompu

7

:- :-

AIO AIO AIO

Completed

Green house, Net house

Implement shed

Drying yard

Kumarakom

Seed store

Farm structure

the construction of buildings constructed at Moncompu and

Laboratory in getting electric and water connections delayed

S. R. R. S., Moncompu

1	2	3	4
<u>ii) Housing facilities</u>			
Quarters Type V - 1 No.			Completed
Type IV - 2 Nos.	499	499	and occupied.
Type II - 2 Nos.)			
2. <u>R.R.S., Moncompu</u>			
<u>i) Central facilities</u>			
Laboratory	771	771	-do-
<u>Farm structure</u>			
Seed store			
Drying yard	410	410	Completed
Implement shed			
Green house, Net house			
<u>ii) Housing facilities</u>			
Quarters Type V			
Type IV	332	332	-do-
Type II			
3. <u>R.R.S., Kayamkulam</u>			
<u>i) Central facilities</u>			
Laboratory	140	140	Completed and occupied.
4. <u>R.R.S., Vyttila</u>			
<u>i) Central facilities</u>			
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
3.	Farm equipments	3.60		
4.	Meteorological Equipment	0.66		
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

- | | | |
|---|---|---|
| <p>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</p> | } | <p>Yes.
Orientation on NARP has been given. Copies of research review report, appraisal report and status report have also been given</p> |
|---|---|---|

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

c) Whether multidisciplinary technical programme prepared. : Yes

d) Number of experiments

Sl. No.	Disciplines	Total	RARS Kuma-rakom	RRS Monc-ompu	RRS Kayam-kulam	RRS Vyt-tila	ARS Mann-uthy
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. Engineering	-	-	-	-	-	-
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 : Electrification 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 belts of Quilon district of the State is very promising.

The variety Vytttila-3 (culture 4-4) was released in 1985 from the Rice Research Station, Vytttila. This is a hybrid derivative for the cross Vytttila 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. Vytttila-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 plant hopper, these varieties are widely accepted by farmers. An area of 15,000ha 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 R.R.S., 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 R.R.S., Kayamkulam.

The programme for breeding BPH resistant varieties initiated at Moncompu have 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 ^{of} 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, Vyttila-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 R.R.S., 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 ie. 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 trials 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 Benthocarb @ 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 edaptic conditions. In this system, 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 $CuSO_4$ (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 for 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/l), JK Stein 50 WP (2.5 g/l), Kitazin 48 EC (1 ml/l), Hinosan (1 ml/l) 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 same disease. In the case of sheath rot incidence the disease was heavy during periods of high temperature.

Application of carbofuran at 0.75 kg ai/ha in an junction 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 rise 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 Chlorpyrifos 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% Chlorpyrifos 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: Coleoptera) which kills the weed by nibbling 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.

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 lesions.

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. The 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 per cent) is the best. The Organophosphores fungicides viz., Hinosan and Kitazin are next in the order of merit.

Red palm weevil, Rhynchophorus ferrugineus 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.

The screening trials conducted over a period of 3 years have resulted in the identification of a superior type (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 resulted, led to the identification of 3 superior varieties, S-856 (24.5 t/ha), Ramanthala (23 t/ha) and Ambakadan (23.0 t/ha).

FISHERIES

A study on fish egg pathology at the station has revealed that common carp eggs are invariably infected by a fungus saprolegnia sp. in the acidic water conditions prevailing in Kuttanad. Polythene sheds were found to be a superior device 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 per cent 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 earthen 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 per cent. 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 pH 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

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 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 obtained 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/ D.R. 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 institutions like CPCRI, CTCRI, Rubber Board, CMFRI, FICT 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 September 1987.

Zonal workshop number	Date	No. of participants						Total
		KAU	CTCRI	ICAR	CPCRI	DOA	Rubber Board	
I	May 7, 1982	44	-	1	-	14	-	59
II	March 3, 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, '84 (Fisheries only)	26	-	-	-	-	-	26
VI	March 5,6, 1985	49	-	-	-	37	-	86
VII	Feb.17,18, '86	44	-	-	-	45	-	89
VIII	Sept.25,26, '87	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 Assoc. 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 of staff (indicate needs)

Young scientists require periodical short term training in their fields of specialisation. The areas include: Agrl. Meteorology, Computer programming, Instrumental methods of analysis, Biotechnology culturing and isolation of mycoplasma.

VI. OVERALL FINANCIAL PROGRESS
as on 31.12.1987
(Rupees in lakhs)

Stations		Items of Expenditure					Total
		Sala- ry & T.A.	Civil works	Equip- ment	Farm Deve- lop- ment	Operating cost, library	
1. RARS Kumarakom	S	18.88	38.89	17.06	-	5.60	80.43
	E	18.84	43.90	17.43	-	4.85	85.02
2. R.R.S. Moncompu	S	8.27	18.48	8.20	-	3.20	38.15
	E	7.44	27.16	4.60	-	1.62	40.85
3. R.R.S. Kayamkulam	S	1.36	1.54	2.84	-	0.80	6.54
	E	0.08	4.21	0.99	-	0.83	6.11
4. R.R.S. Vytilla	S	0.81	2.41	0.80	-	0.40	4.42
	E	0.33	3.92	0.77	-	0.35	5.37
5. A.R.S. Mannuthy	S	1.49	-	-	-	0.80	2.29
	E	2.09	-	-	-	0.28	2.37
6. TOTAL	S	30.81	61.32	28.90	-	10.80	131.83
	E	28.78	79.19	23.82	-	7.93	139.72

S = Sanctioned amount (Original outlay approved)

E = Expenditure incurred up to 31.12.87.

NATIONAL AGRICULTURAL RESEARCH PROJECT
 Zone : Special Zone of Problem Areas

Incremental staff position under NARP Sub - Projects

Stations	RARS Kuma- rakom		R.R.S Monco- mpu		R.R.S. Kayam- kulam		R.R.S. Vytti- la		A.R.S. Mannuthy	
	S	V	S	V	S	V	S	V	S	V
<u>Staff positions</u>										
Associate Director										
Professor										
Associate Professor	4		1							
Assistant Professor	6		4		1	1	1		1	
Other Research Staff (SRA, RA etc.) JAP	4	1	2		1					1
Other Staff	22	6	6	2						
<u>Total</u>	<u>36</u>	<u>7</u>	<u>13</u>	<u>2</u>	<u>2</u>	<u>1</u>	<u>1</u>		<u>2</u>	
% Vacancies	19.4		15.38		50		NIL		NIL	

S = Sanctioned
 V = Vacant

Overall vacancy position

Total positions = 54
 Total vacancies = 10
 % Vacancies = 18.52

NATIONAL AGRICULTURAL RESEARCH PROJECT
Zone : Special Zone of problem areas

Progress of Civil works in Sub-projects (Physical)

(Date of reporting) : 11.4.1985

Stations (Date of Start)	RARS Kumarakom 30.11.81	R.R.S. Moncompu 30.11.81	R.R.S. Kayam- kulam 30.11.81	R.R.S. Vyttila	R.R.S. Mannuthy
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Sanctioned
Civil Works

1. Research labo- ratory/office	Completed	Completed	Com- pleted	Completed	--
2. Trainees' hostel	Completed	--	--	--	--
3. Farmers' hostel	--	--	--	--	--
4. Staff resi- dences	Completed	Completed	--	--	--
5. Glasshouse	--	--	--	Completed	--
6. Net house	Completed	Completed	--	--	--
7. Green house	Completed	--	--	--	--
8. Manure store	Completed	Completed	--	--	--
9. Implement shed	Completed	Completed	--	--	--
10. Seed Store	Completed	--	--	--	--
11. Cattle shed	Completed	--	--	--	--

N.A.R.P.
Special Zone of Problem Areas

Progress of Civil Works in Sub-Project
(Financial) as on December 31, 1987
 (Station-wise - Rs. in lakhs)

Station (with date of start)		Sanctioned items of Civil works				Total
		Labo- rato- ries/ Office	Trai- nees Hos- tel	Far- mers Hos- tel	Staff re- sidence Glasshouse etc.	
1. RARS, Kumarakom 12.11.84	S	17.50	5.25	-	16.14	38.89
	E	21.00	7.46	-	15.44	43.90
2. R.R.S. Moncompu 30.4.84	S	11.00	-	-	7.48	18.48
	E	14.13	-	-	13.03	27.16
3. R.R.S. Kayamkulam 21.5.84	S	1.54	-	-	-	1.54
	E	4.21	-	-	-	4.21
4. R.R.S. Vytilla 8.3.84	S	2.41	-	-	-	2.41
	E	3.18	-	-	0.74	3.92
Total	S	32.46	5.25	-	23.61	61.32
	E	42.52	7.46	-	29.21	79.19

S = Sanctioned amount

E = Expenditure incurred as on December 31, 1987

NATIONAL AGRICULTURAL RESEARCH PROJECT
Zone : Special Zone of problem areas

Status of Equipment Procurement under NARP Sub-Projects
 (Rs. in lakhs - as on December 31, 1987)

Stations	Date of start	Sanctioned amount (Rs. in lakh)	Expenditure incurred (Rs.)	% Utilization
Kumarakom	30.11.81	17.06	17.43	102.17 *
Moncompu	"	8.20	4.63	56.46
Kayamkulam	"	2.84	0.99	34.86
Vyttila	"	0.80	0.77	96.25
Mannuthy		-	-	-

* Most of the equipments were centrally procured and later distributed amongst the stations.

NATIONAL AGRICULTURAL RESEARCH PROJECT
Zone : Special Zone of problem areas

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

Station	Date of start	Amount sanctioned (Rs.)	Expenditure up to June 30, 1986 (Rs.)	Percentage Utilized
Kumarakom				
Moncompu				There was no provision in the appraisal estimate for farm developments.
Kayamkulam		N I L		
Vyttila				
Mannuthy				
Total		N I L		



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