

EXPERIMENTAL

During the period under report, altogether 6 experiments were conducted at the Model Agronomic Centre, Karamana. The physico-chemical characteristics of the soil of this station is given below.

Major soil group	Laterite.
Mechanical composition	
Sand	70.50 %
Silt	5.15 %
Clay	20.20 %
Texture	Sandy Clay loam.
pH	5.30
Organic Carbon	0.45 %
Available P.kg/ha	24
Available K.kg/ha	100
C.E.C (me %)	3.0
E.C. (m.mhos/cm)	0.25

In this area the average rainfall was found to be 1500 to 2000 m.m per annum with the temperature ranging between 21^oC to 35^oC.

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Experiments conducted during 1975-76 were the following:

1. Production potential experiments under optimum input condition (Experiment No 1(a))
2. Production potential under resource constraints. (Experiment No.1(b))
3. Manurial requirement of fixed crop rotation. (Experiment No.2)
4. Efficiency of potassium schoenite as a source of potassium (Experiment No.3)
5. Fertilizer requirement of new varieties of Cereals (Rice)(Experiment No.4)
6. Nitrogen economy through organic manures. (Experiment No.8)

Out of these trials No.1 (a), 2 and 4 were started during 1972-73 and being continued. Experiments Nos 1 (b), 3 were started in 1973-74 and continued this year.

Experiment No.8 was started during 1974-75 and being continued this year also.

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RESULTS AND DISCUSSION.

1. Production potential experiment under optimum input condition.

Experiment No.1 (a)

The objective of this experiment is to determine the production potential and to study the economics of high intensity cropping system and their effect on Soil when grown continuously. The treatment comprised of six crop rotations having at least 2 rice crops in each rotation. Individual crop is raised according to local practices. The rotations followed are :-

1. Paddy-Paddy-Paddy-Paddy (all short duration varieties)
2. Paddy-Paddy-Paddy (all medium duration varieties)
3. Paddy-Paddy (both long duration varieties)- fallow.
4. Paddy-Paddy ((both short duration varieties).Tapioca.
5. Paddy-Paddy (both short duration varieties)-Colocasia.
6. Paddy-Paddy (both medium duration varieties)-Bhindi.

The test varieties of paddy tried are Annapoorna, (short duration) Jaya (medium duration) and Jagannath (long duration). The variety of tapioca tried is H.165.

The yield under different crop sequence (Table.1) ranges from 9198 kg of paddy in two long duration paddy rotation (rotation No.3) to 8162 kg paddy + 36563 kg of Tapioca tuber (rotation No.4) per annum.

Among the cropping sequences tried three medium duration paddy yielded maximum of 12125 kg/ha whereas four short duration paddy produced 12057 kg/ha per annum. But the maximum production of 44,725 MT/ha of food materials are obtained from two short duration paddy followed by tapioca. The contribution of tapioca alone comes to 36563 kg/ha. From the point of view of gross economic return, the cropping sequence having two medium duration of paddy followed by bhindi is the best as it produced 10714 kg/ha of paddy and 14834 kg/ha of bhindi.

T A B L E. 1 Total Production of High intensity crop rotation. Year 1975-76

Crop rotation (variety - duration)			Total Fertiliser kg/ha			Yield (kg/ha)		Total grain yield kg/ha	
Kharrif	Rabi	Summer	N.	P	K	Kharrif	Rabi		
1	2	3	4			5	6	7	
								8	
Rice (Annapurna-77)	Rice (Triveni-86)	Rice (Triveni-87)	360	180	180	4995	2083	3281	12057
		Rice (Annapurna-71)						1698	
Rice (Jaya-105)	Rice (Jaya-96)	Rice (Jaya-100)	270	135	135	5510	4219	2396	12125
Rice (Jagannath-126)	Rice (Jagannath 99)	Fallow	240	120	120	4771	4427	-	9198
Rice (Annapurna-77)	Rice (Triveni-86)	Tapioca (E.165-141)	255	165	190	5844	2318	36563	8162
Rice (Annapurna-77)	Rice (Triveni-86)	Colocasia (local-165)	220	150	210	6281	2578	14167	8859
Rice (Jaya-105)	Rice (Jaya-96)	Bhindi (P.Savani.95)	240	150	210	5943	4771	14834	10714

2. Production potential under resource constraints.
Experiment No.1 (b)

The objective of this trial is to determine the production potential of a two crop (Rice-Rice) rotation under input constraints. The resources tested are levels of fertilizer and weed control.

In the Kharif season the treatments comprised of four levels of nitrogen, phosphorus and potash, ie 90:45:45, 67.5:33.75:33.75, 45:22.5:22.5, and 22.5:11.25:11.25 kg/ha each being the 100%, 75%, 50% and 25% of the recommended dose of N.P.K for a medium duration rice variety and two methods of weed control, viz Machete @ 1 kg/ha and two hand weedings. In Rabi season, instead of four doses of N.P.K only three doses namely, 100%, 75%, and 50% of the recommended doses were tried. The variety used in the both seasons was IR 20 at a spacing of 15 x 15 c m. The experiments were laid-out in a split plot design with the weed control treatments in the main plots and fertilizer levels in the sub-plots.

The results show (Table 2) that the reduction in the fertilizer dose at all stages from 100% to 25% significantly reduces the yields during the Kharif season. Similarly, during the Rabi season also maximum yield is obtained with 100% of the manurial application and subsequent reduction in manurial dose significantly reduces the yield also. In the case of weed control treatments higher yield has been recorded in the treatments having hand weeding and chemical (Machete application) weed control produced lesser yields in both the seasons. The same trend has been noticed during the previous year also thus proving the superiority of hand weeding over chemical weed control.

TABLE -2 Grain yield as affected by rates of fertilizer application and methods of weed control. Kharif and Rabi 1975-76

No	Fertilizer applied.	Grain yield kg/ha	
		Kharif.	Rabi.
1.	100% of the recommended dose (90:45:45 kg/ha)	5281	2948
2.	75% of the recommended dose (67.5:37.75:37.75 kg/ha)	4875	2662
3.	50% of the recommended dose (45:22.5:22.5 kg/ha)	4591	2609
4.	25% of the recommended dose (22.5:11.25:11.25 kg/ha)	4205	-
5.	Weed control.		
	i. Mache te 1.0 kg a.i/ha	4434	2673
	ii. Hand weeding twice,	4770	2881
	C.D. for fertilizer treatment.	459	394
	C.D. for weed control:	110	562

3. Manurial requirements of a fixed crop rotation.

Experiment No.2

The direct, residual and cumulative effects of the application of phosphorus, potassium and farm yard manure on the yield of a two crop rotation (rice-rice) are studied in this experiment. The treatments included all combinations of three levels of phosphorus (0,30 and 60 kg/ha), two levels of potassium(0,30 kg/ha) and two levels of farm yard manure (0 and 15tonnes/ha) to each crop. The treatments were given in three phases, namely, manuring in every season, manuring in alternate season starting from Kharif season, and manuring in alternate season starting from Rabi season. The experiment is conducted using a split plot design with combinations of phosphorus, potash and farm yard manure in the main plot and phases of manuring in the sub-plots. The variety used in the trial is IR 8 for both the season. The results of the experiment are presented in the following tables:-

TABLE-3. Response of rice to applied phosphorus kg/ha.

Levels of P ₂ O ₅ kg/ha.	Direct effect		Residual effect		Cumulative effect.	
	Kharif	Rabi.	Kharif	Rabi	Kharif	Rabi.
0	5746	2764	5735	3010	5642	2798
30	5725	2737	5587	2810	5780	2753
60	5648	2694	5421	2766	5657	2878
Standard Error	N.S 168	N.S 182	N.S 159	N.S 166	N.S 217	N.S 162

N.S - Not significant.

The yield data indicates that generally the application of Phosphorus has a negative response for rice at Karamana. This tendency of decreasing the yield of rice by the application of phosphorus is evident from the results of direct residual and cumulative effects in both the seasons. Similar results have been observed in the previous years also.

Table-4. Response of rice to applied potash(Kg/ha)

Levels of K ₂ O (kg/ha)	Direct effect		Residual effect		Cumulative effect.	
	Khariif	Wabi	Khariif	Wabi	Khariif	Wabi.
0	5740	2688	5596	2861	5735	2742
30	5672	2776	5566	2863	5651	2877
Standard Error	N.S 138	N.S 149	N.S 129	N.S 135	N.S 177	N.S 132

The data in the above table show that application of potash in the Karamana soil has no significant response for increasing the grain yield of rice. This is the case for direct, residual and cumulative effects for this nutrition during both the seasons.

Table - 5. response of rice to farm yard manure (kg/ha)

Levels of FYM kg/ha	Direct effect		Residual effect		Cumulative effect.	
	Khharif	Rabi	Khharif	Rabi	Khharif	Rabi
0	5370	2478	5339	2748	5480	2704
15000	6042	2985	5823	2976	5905	2915
Standard Error	H.Sig. 138	H.Sig. 149	H.Sig. 129	N.S 135	Sig. 177	N.S 132
C.D	280	302	263	-	361	-

The yield data of rice shows highly significant direct response for the application of farm yard manure in both the seasons in Karamana soils. Similarly, the yield response is significant in Khharif season for both residual and cumulative effects and an increasing trend is noticed for the same in the Rabi season. This result is in concurrence with the results of the previous years.

4. Efficiency of potassium schoenite as a source of Potassium. (Experiment No.3)

The main objective of the experiment is to study the relative efficiency of potassium schoenite as a source of potassium as compared to potassium sulphate and potassium chloride on different soils. The treatment consisted of three levels of potassium, namely, 40, 80 and 120 kg/ha applied over a basal dose of 120 kg nitrogen and 60 kg phosphorus/ha. Based on the amount of magnesium in potassium schoenite on corresponding to the three levels of potassium, another set of three treatments of potassium sulphate with magnesium sulphate is also tried to see the effect of magnesium. In addition, the effect of zinc sulphate is also studied over some selected treatments of potassium and magnesium at a dose of 25 kg/ha. The experiment is laid out in the Kharif and the residual effect is studied in the succeeding crop in rabi. The variety used is Jaya.

The results of the experiment conducted both in Kharif and rabi are given in table No. 6.

The yield data indicate that the sources of potassium viz, schoenite, chloride, and sulphate have as such no significant variation on the grain production. However, a definite progressive trend is shown by potassium schoenite at all levels in the direct and residual effects. In the case of magnesium, though there is no significance in the yield results, a positive trend is observed in all treatments.

Zinc application does not show any additional advantage.

Table- 6. Influence of source of potassium of the yield of rice.

No.	Treatment	Grain yield kg/ha	
		Direct effect Kharif	Residual effect Rabi
1.	Control (Unmaured)	3666	3333
2.	N-120, P-60 (kg/ha)	5458	5468
3.	Tr-2 + Pot.schoenite @ 40kg potsh/ha	4791	5208
4.	Tr-2 + Pot.schoenite @ 80kg potsh/ha	5458	5208
5.	Tr-2 + Pot.schoenite @ 120kg potsh/ha	5562	5624
6.	Tr-2 + Pot.sulphate @ 40kg potash/ha to the first crop	4791	5156
7.	Tr-2 + Pot.sulphate @ 80 kg potash/ha to the first crop	5208	5531
8.	Tr-2 + Pot.sulphate @ 120 Kg potash/ha to the first crop.	5520	5520
9.	Tr-2 + Pot.chloride @ 40kg potash/ha to the first crop	4895	5531
10.	Tr-2 + Pot.chloride @ 120 kg potash/ha to the first crop	5104	5354
11.	Tr-6 + Magnesium sulphate equalising Mg.content in tr.3 to the first crop.	4812	5583
12.	Tr-7 + Mg.sulphate equalising the Mg.content in tr.4 to the first crop.	5187	5145
13.	Tr-8 + Mg.sulphate equalising Mg.contents in tr.5 to the first crop.	5798	5562
14.	Tr-5 + Zinc sulphate at 25 kg/ha to the first crop	5312	5708
15.	Tr-8 + Zinc sulphate @ 25 kg/ha to the first crop	5312	4989
16.	Tr-13 + Zinc sulphate @ 25 kg/ha to the first crop	5187	5624
S.E		314	258
C.D (0.05)		633	520

5. Fertilizer requirement of new varieties of cereals.
(rice) (Experiment No.4)

The objective of this experiment is to study the relative response of new high yielding varieties of rice to nitrogen and phosphorus. The treatments consisted of all combinations of five varieties (Jaya, Aswathi, 79/60, 1065 and A.P.4-14), three levels of nitrogen (0, 60 & 120 kg/ha) and three levels of phosphorus (0, 30 & 60 kg/ha). A basal dose of 60 kg K_2O /ha is applied in all plots. The trial is conducted during rabi season 1975-76.

Table- 7. Response of five varieties of rice to nitrogen and phosphorus.

Variety	Grain yield kg/ha	Nitrogen kg/ha	Grain yield kg/ha	response over successive levels of N(kg grain per kg of N)	Phos- kg/ha	Grain yield kg/ha
V1 Jaya	3460	0	2332		0	2863
V2 Aswathi	3057	60	3020	11.47	30	2858
V3 79/60	2417	120	3187	2.78	60	2818
V4 1065	2439					
V5 A.P.4-14	2859					
S.E	231		155			155

From the above table it is evident that the varieties produced significant differences in grain yield, Jaya proved to be the best, out yielding all the other varieties and the next in order is Aswathi and then A.P.4-14. The varieties 1065 and 79/60 are on par giving the poorest yield.

Among the different doses of nitrogen and Phosphorus, Nitrogen alone significantly increased the grain yield, whereas, phosphorus has got no effect. The percentage of increase in grain yield is maximum between 0 and 60 kg N/ha amounting to 11.5 kg grain per kg of nitrogen, whereas, between 60 and 120 kg N/ha the ratio decreased to 2.8 kg grain per kg of Nitrogen. Similar results are noticed in the previous years also.

6. Nitrogen economy through organic manures. (Experiment No.8)

The objective of this experiment is to study the possibility of economising nitrogenous fertilizers through application of organic manure in a crop sequence. The trial is conducted in a split plot design. The treatments consisted of 10 main plots each divided into 3 sub plots. The main plots are the combinations of farm yard manure plus fertilizers. There is no difference among the sub-plots within the main plots.

In the second season the same plots in each main plot are given a treatment of 90, 60 and 30 kg Nitrogen/ha within one main plot.

In the 3rd crop season cowpea is raised and ^{only} nitrogen dose is given @ 30 kg/ha

The yield obtained in the different seasons are given in the table-8.

During Kharif season the maximum yield is recorded in the treatment No.10 with 120:60:60 N.P.K. in the form of chemical fertilizers having no organic manure application. The same trend of the superiority of the chemical fertilizers over the farm yard manure in increasing the rice yield is clearly evident from all the other treatments of this experiment.

During Rabi season, where the residual effect has been studied significant yield increase has been recorded with the application of increased doses of nitrogen in the form of chemical fertilizers during that season.

For the summer crop cow-pea the yield difference between treatments is not significant.

Table- 8. Production of paddy and cow-pea in kg/ha Kharif, Rabi and Summer 1975-76

Treatment number	Kharif			Rabi		Yield of cow-pea (Summer)
	30 kg N.	60 kg N.	90 kg N.	30 kg N.	60 kg N.	
T1. Control.	4243	3388	4111	4203	1745	
T2. F-0.N.60	5268	3296	4037	4703	1742	
T3. F4 tonnes & N-40	4888	3518	3907	4583	1733	
T4. F8 tonnes & N-20	4925	3472	3777	4490	1616	
T5. F12 tonnes & N-0	4530	3370	4222	4592	1558	
T6. F-0 , , & N-60 + P-30	5138	3611	3879	4296	1752	
T7. F-0 , , & N-60 + P-30 +K-30	5120	3703	3657	4537	1746	
T8. F-0 , , & N-60 + P-60	5345	3138	3740	4611	1701	
T9. F-0 , , & N-60 + P-60 +K-60	5160	3296	4055	4287	1487	
T10.F-0 , , & N-120 +P-60 +K-60	5422	3388	4148	4638	1961	
	Sig	Sig	Sig	Sig	N.S	
S.E	271	86	86	86		
C.D	569	551	551	551		

Sig = Significant
N.S = Non-significant

P A R T I I

EXPERIMENTS IN CULTIVATORS' FIELDS
MALAPPURAM AND TRIVANDRUM
DISTRICTS.

EXPERIMENTAL

As in the previous year during 1975-76 four types of trials, namely, A,B,C and G types were conducted at Malappuram and Trivandrum districts during kharif and rabi seasons. Each district is stratified into three agricultural homogeneous zones after leaving out the area demarked for C type experiments. The selection of villages within the blocks and the cultivators' fields within the villages are done by using random numbers. The names of the blocks selected in each zones are given below.

District	Zone	Block.
Malappuram	I	Kondotti Mancheri
	II	Andathode Tanur
	III	Mankada Malappuram
Trivandrum	I	Nenon Perinkadavila
	II	Kilimanur Nedumangad
	III	Chirayinkil Trivandrum (rural)

The soil pH in all these blocks are acidic ranging between 5 to 6.

There are twelve treatments in A and B type trials and 10 treatments each in C and G types.

In type A experiment the fertilizer requirement of high yielding varieties of rice is studied. This is with a view to formulate fertilizer recommendation of high yielding varieties of rice for different Agroclimatic regions of the State. The trial is comprised of six levels of nitrogen (0, 30, 60, 90, 120 and 180 kg/ha), three levels each of phosphorus and potash (0, 30, and 60 kg/ha) and a single dose of lime at the rate of 500 kg/ha in twelve different combinations as shown below.

No of plots	Serial No treatments	Treatment rotations.		
12	T1	N ₀	P ₀	K ₀
	T2	N ₆₀	P ₀	K ₀
	T3	N ₃₀	P ₃₀	K ₀
	T4	N ₁₂₀	P ₀	K ₀
	T5	N ₉₀	P ₃₀	K ₀
	T6	N ₆₀	P ₃₀	K ₀
	T7	N ₆₀	P ₆₀	K ₀
	T8	N ₆₀	P ₃₀	K ₃₀
	T9	N ₁₂₀	P ₆₀	K ₀
	T10	N ₁₂₀	P ₆₀	K ₆₀
	T11	N ₁₈₀	P ₆₀	K ₆₀
	T12	N ₆₀	P ₃₀	K ₃₀ +

Line @ 500 kg/ha

The varieties used in this trial is Jaya for both the districts.

In B type trial the comparative performance of dwarf and medium tall varieties of rice in relation to low and medium levels of fertilizer applications is studied. The test varieties used are Jaya for dwarf in both the districts for Kharif and Rabi seasons and for medium tall Jyothi in Malappuram district and Sabari and Bharati in Trivandrum district for Kharif and Rabi respectively. The trial is comprised of three levels of nitrogen (0, 40 & 80Kg/ha) and two levels each of Phosphorus and Potash (0, and 40 kg/ha) in twelve different treatment combinations as shown below.

No of plots	Sl.No. of treatments	Treatments	rotations
12	T ₁	V ₁ - N ₀	P ₀ K ₀
	T ₂	V ₁ - N ₄₀	P ₀ K ₀
	T ₃	V ₁ - N ₈₀	P ₀ K ₀
	T ₄	V ₁ - N ₄₀	P ₄₀ K ₀
	T ₅	V ₁ - N ₈₀	P ₄₀ K ₀
	T ₆	V ₁ - N ₈₀	P ₄₀ K ₄₀
	T ₇	V ₂ - N ₀	P ₀ K ₀
	T ₈	V ₂ - N ₄₀	P ₀ K ₀
	T ₉	V ₂ - N ₈₀	P ₀ K ₀
	T ₁₀	V ₂ - N ₄₀	P ₄₀ K ₀
	T ₁₁	V ₂ - N ₈₀	P ₄₀ K ₀
	T ₁₂	V ₂ - N ₈₀	P ₄₀ K ₄₀

V₁ - Dwarf variety

V₂ - Medium tall variety

In C type trial, the fertilizer requirement of rice in relation to soil fertility is studied. The base levels of nutrients used in this trial are 120 kg nitrogen, 120 kg Phosphorus and 60 kg Potash. They are applied in ten different combinations as noted below.

No of plots	Sl.No. of treatments	Treatment combinations.		
10	T ₁	N ₀	P ₀	K ₀
	T ₂	N _b	P ₀	K ₀
	T ₃	N _b	P ₀	K _b
	T ₄	N _b	P _{0.5b}	K _b
	T ₅	N _b	P _b	K _b
	T ₆	N _b	P _{1.5b}	K _b
	T ₇	N _b	P _b	K ₀
	T ₈	N _b	P _b	K _{0.5b}
	T ₉	N _b	P _b	K _{1.5b}
	T ₁₀	N _{1.5b}	P _{1.5b}	K _{1.5b}

b = base level of nutrients.

The phosphorus fixing capacity of representative sample of the soil series of C type trials is determined for deciding P_b (the base level of phosphorus)

All these A, B and C type trials are conducted on fresh site selected during each season.

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In the case of G type experiments the same site is used for conducting the trials during Kharif and Rabi seasons. The main objective of G type trial is to study the fertilizer requirements of a fixed single year two crop sequence under resource constraints. The treatments are randomised only in Kharif season while in Rabi season no randomisation is made. Each plot treated in Kharif season will receive the corresponding treatment for Rabi as shown below:-

Treatment No.	Levels of fertilizer application.					
	Kharif			Rabi		
T ₁	N ₀	P ₀	K ₀	N ₀	P ₀	K ₀
T ₂	N ₁₂₀	P ₆₀	K ₆₀	N ₁₂₀	P ₆₀	K ₆₀
T ₃	N ₉₀	P ₄₅	K ₄₅	N ₁₂₀	P ₆₀	K ₆₀
T ₄	N ₉₀	P ₉₀	K ₀	N ₉₀	P ₀	K ₉₀
T ₅	N ₉₀	P ₀	K ₉₀	N ₉₀	P ₉₀	K ₀
T ₆	N ₆₀	P ₃₀	K ₃₀	N ₉₀	P ₉₀	K ₀
T ₇	N ₆₀	P ₆₀	K ₀	N ₉₀	P ₄₅	K ₄₅
T ₈	N ₆₀	P ₀	K ₆₀	N ₆₀	P ₆₀	K ₀
T ₉	N ₆₀	P ₃₀	K ₃₀	N ₆₀	P ₃₀	K ₃₀
T ₁₀	N ₆₀	P ₀	K ₀	N ₆₀	P ₃₀	K ₃₀

-:22:-

In all the above four types of experiments the gross plot size is 50 m². Phosphorus and potassic fertilizers are applied as basal dressing and nitrogen in two split doses at planting and panicle initiation in Malappuram district and in three splits at planting, tillering and panicle initiation in Trivandrum district. The crops are raised purely under rainfed condition. The climatic conditions have been quite favourable during the period of crop growth in both seasons. Incidence of pests and diseases like leaf roller, brown plant hopper ^{and} sheath blight are prevalent in most of the plots where the experiments are conducted and are controlled by taking plant protection measures.

RESULTS AND DISCUSSION

A type experiment

In 'A' type experiment response of nitrogen, phosphorus, potash and lime are studied. The effect of nitrogen is studied in four different phases. They are, 1) response of nitrogen at three levels of 0, 60 and 120 kg/ha keeping phosphorus and potash at zero level, 2) effect of nitrogen at two levels (60 and 90 kg/ha), at lower level of phosphorus (30 kg/ha) and zero level of potash, 3) effect of nitrogen at two levels (60 and 120 kg/ha) at a higher level of phosphorus (60 kg/ha) and 4) effect of nitrogen at higher level of phosphorus and potash.

Response to nitrogen

The response of applied nitrogen at two different levels, namely, 60 and 120 kg/ha is found to be significant in Malappuram and Trivandrum districts during both seasons. The response is found to be maximum at 120 kg N/ha (Table 9 and 10). Maximum response to 120 kg N/ha is found in Zone I of Malappuram district consisting of Kondotti and Mancheri blocks resulting in an yield increase of more than 1000 kg/ha followed by Zone III consisting of Mankada and Malappuram blocks, during Kharif season. During Rabi season also the same trend is maintained as far as zone I is concerned.

In Trivandrum district maximum yield is recorded for 120 kg N/ha for both the Kharif and Rabi seasons in Zone III consisting of Chirayinkil and Trivandrum (rural) blocks followed by Zone II (Kilimanur and Nedumangad blocks) and Zone I (Femom and Perinkadavila blocks).

Response to phosphorus

Application of phosphorus has been found to be significantly increasing the yield in Malappuram and Trivandrum districts in both the seasons at all levels of application (Tables 11 and 12). The relative response is more pronounced in Zone III of Malappuram district consisting of Mankada and Malappuram blocks and Zone II of Trivandrum district consisting of Kilimanur and Nedumangad blocks at 60 kg P_2O_5 /ha during both the seasons. There is no significant response to phosphate application in Zone II (Andathode and Tanur) of Malappuram district during both the seasons.

Response to potash

In Malappuram district except Zone III (Mankada and Malappuram) there is no significant response to potash application in Kondotti, Mancheri, Andathode and Tanur blocks during Kharif season. During Rabi season significant response to potash has been noticed in the district; the response being more pronounced in Zone I consisting of Kondotti and Mancheri blocks followed by Zone II (Andathode and Tanur) at 60 kg K_2O /ha. For 30 kg K_2O /ha in Zone II of Malappuram district the response is 502 kg/ha of paddy and for 60 kg K_2O /ha the increased response is 289 kg/ha (Tables 13 and 14).

In Trivandrum district response to potash is noticed for 60 kg K_2O /ha in all the blocks during both the seasons. For 30 kg K_2O /ha significant yield increase is noticed in Zone III (Chirayinkil and Trivandrum rural) during Kharif season and in Zone II (Kilimanur and Nedumangad blocks) during Rabi season.

Combined effect of nitrogen, phosphorus and potash

In Malappuram district during both the seasons increasing the dosage from 60 kg N/ha to 90 kg N/ha over a base level of 30 kg P_2O_5 /ha does not produce any significant yield response (Tables 15 and 16).

Whereas, in Trivandrum district, to this applied increased dose of nitrogen, significant response is noticed during both the seasons. This is especially so in Zone III (Chirayinkil and Trivandrum rural). Increasing the nitrogen dose from 60 kg/ha to 120 kg/ha over a base level of 60 kg P₂O₅/ha there is no response in both the seasons in all the blocks of Malappuram district except in Zone III (Mankada and Malappuram) in Kharif season (Tables 17 and 18)

In Trivandrum district for the same treatments significant response is noticed in all the Zones during Kharif season to the applied nitrogen, whereas, during Rabi season only in Zone II (Kilimanur and Nedumangad) significant yield increase is noticed.

Still more addition of nitrogen upto 180 kg/ha has no added advantage over 120 kg N/ha for both the seasons in Trivandrum district. In Malappuram district this increased dosage of nitrogen has significant yield increase only in Kharif season (Tables 19 and 20).

Response to lime

Lime application has not shown any significant response in Malappuram district during both the seasons. In Trivandrum district significant yield increase is noticed only in Kharif season. This significance is mainly due to positive significant response to lime application in Zone I (Nemom and Perinkidavila) where the same trend is maintained during Rabi season also (Table 21).

'B' Type experiments

Response to nitrogen

In this experiment response to nitrogen at three different levels, namely, 0, 40 and 80 kg/ha on two different varieties are studied. In Malappuram district the varieties compared are Jaya and Jyothi during both seasons and in Trivandrum

district Jaya and Sabari in Kharif season and Jaya and Bharati in Rabi season. In both the districts during both the seasons high yielding variety Jaya produced more yield at all levels of nitrogen than the locally improved varieties. The rate of response per unit of nitrogen is also more in the case of high yielding variety Jaya. The highest yield is recorded at 80 kg N/ha for both the varieties during both the seasons (Tables 22 and 23).

Response to phosphorus

Application of phosphorus at 40 kg/ha over a basal dose of 40 kg and 80 kg N/ha has produced significant yield increases in Trivandrum district for both varieties during both the seasons. This is so during Kharif season in Zone I (Nemom and Perinkadavila) and Zone II (Kilimanur and Nedumangad), whereas, in Rabi season this was so in Zone I and Zone III (Cheriyinkil and Trivandrum rural) (Tables 24 and 25).

In Malappuram district significant yield response to phosphate application at both the levels of nitrogen (40 and 80 kg/ha) is noticed only in Jaya during both the seasons. For Jyothi there is no significant response to phosphate during Kharif and during Rabi significance is noticed only at 80 kg N/ha. This significant response to phosphate application was predominantly evident in Zone I consisting of Kondotti and Mancheri blocks for both the varieties during Kharif season and for only Jyothi during Rabi season. All the other blocks have not produced significant response for both the varieties during both the seasons except for Jyothi in Andathode and Tanur blocks of Zone II in Kharif season at the level of 40 kg N/ha.

Response to Potash

Positive significant response to applied potash is noticed for both the varieties during both the seasons in

Trivandrum district. In Zone I (Nemom and Perinkadavila) this is so during Kharif and Rabi seasons. But for Zone III (Chirayinkil and Trivandrum rural) significance for potash in increasing yield is noticed only during Kharif season for the variety Sabari alone. Whereas, in Zone II (Kilimanur and Nedumangad) potash application produced no significant yield increase during both the seasons for both the varieties (Table 26).

In Malappuram district significant yield increase due to potash application is obtained only for Jaya during Kharif season. In Zone II (Andathode and Tanur) significant yield increases for both the varieties are noted during Kharif and Rabi. In all other blocks of the district the effect of potash in increasing the grain yield is not significant.

'C' Type Trials

(Soil test values and crop response)

From the trials conducted it is seen that the response to nitrogen is evident for 'ML' and 'MM' fertility classes in Malappuram district and for 'ML' class in Trivandrum district during Kharif season. During Rabi season none of the fertility classes ('LM', 'LH' and 'MM') of Trivandrum district does not produce significant yield response for 120 kg N/ha. In Malappuram district for the same dose significant yield response has been obtained in 'LL' and 'LM' fertility classes (Tables 27 and 28).

The effect of phosphorus is found to be statistically significant only with respect to the trials conducted under 'LL' level of fertility class at 180 kg P₂O₅/ha during Kharif season in Malappuram district. During Rabi season significant yield response to phosphate application has been recorded for 60, 120 and 180 kg/ha in 'LL' fertility class, whereas, for 'LM' fertility class the significant response is only

for 180 kg P₂O₅/ha. It is noted that the variation in yield increase from 60 to 180 kg P₂O₅/ha is not significant for both the fertility classes.

In Trivandrum district during Kharif season significant yield increase at all levels of phosphate application have been recorded for 'LL', 'LM' and 'ML' fertility classes. Similarly, during Rabi season the same trend of significance in yield increase has been recorded for 'LM', 'LH' and 'MM' fertility classes.

In Malappuram district potash application has not recorded any significant yield increase in all fertility classes except for 'MM' during Kharif season at 90 kg K₂O/ha. In Trivandrum district during Kharif season significant yield increase has been recorded for 'LL' fertility class at 60 kg and 90 kg K₂O/ha and for 'LM' and 'ML' fertility classes at 90 kg K₂O/ha. During Rabi season significant yield response has been recorded from 30 to 90 kg K₂O/ha in 'LM' fertility class, for 60 and 90 kg K₂O/ha for 'MM' fertility class and for 90 kg K₂O/ha for 'LH' fertility class.

The yield obtained at maximum level of fertilizer application (180:180:90) over 120:120:60 NPK was not significant in Malappuram district in both seasons. In Trivandrum district the same dose produced significant yield increase in Kharif season alone in 'LL', 'LM' and 'ML' fertility classes.

G Type Trials

Response of nitrogen, phosphorus and potash at low, medium and higher levels

In this type of trials the production of rice on three levels of nitrogen, phosphorus and potash combinations, namely, 60:30:30, 90:45:45 and 120:60:60 in each season is compared.

During both the seasons Zone II (Andathode and Tanur blocks) and Zone III (Mankada and Malappuram blocks) of Malappuram district recorded significant increased rice production for 120:60:60 NPK dose over 60:30:30 NPK (Table 29). In Trivandrum district significant results have been obtained for 90:45:45 over 60:30:30 in Zone II (Kilimanur and Nedumangad) during kharif season and for both Kharif and Rabi seasons in Zone III (Chirayinkil and Trivandrum rural). The maximum dose of fertilizer (120:60:60) has produced significantly more grain yield in all zones during both seasons over 60:30:30 NPK in this district.

The residual studies on the effect of different fertilizers as shown in Table 30, it can be inferred that the residual effect of the applied chemical fertilizers is negligible in both the districts. This may be due to high rainfall during Kharif season which results in heavy leaching losses of the applied nutrition to give any positive effect in yield during the following Rabi season.

SUMMARY AND CONCLUSIONS

Experiments at Model Agronomic Centre, Karamana are conducted to gather information on production potential under adequate as well as limited production resources, to study the long term effects of different agronomic practices on cropping system and to evaluate the fertilizer requirement of newly released varieties of rice.

The following important conclusions are drawn from the results of the experiments conducted during 1975-76.

1. The most suited cropping system for obtaining maximum production of rice annually is to raise three crops of Jaya in succession during three cropping seasons in an year.

2. Maximum production of 44 MT/ha food material per annum can be obtained from the rotation of two short duration paddy along with the summer crop of H.165 tapioca.

3. Maximum gross economic return is obtained from the rotation consisting of two medium duration paddy (Jaya) and a summer crop of bhendi.

4. Any reduction in the fertilizer dose from that of the recommended, significantly reduces the paddy yield.

5. Hand weeding has been found to be superior to the chemical method of weed control.

6. Farm yard manure application has direct, residual and cumulative effects in increasing rice production in Karamana soil.

7. Potassium schoenite as a source of potash is equally good and even better than potassium sulphate and potassium chloride in producing more rice.

8. Jaya variety seems to be the best in rice yield when compared with even the recently released rice varieties.

9. Phosphorus and potash application has no additional effect in increasing the grain yield of rice in Karamana soils.
10. Farm yard manure cannot replace chemical fertilizers as a source of supply for different nutrients to rice.
11. Higher doses of nitrogen have good response in increasing the rice yield in both Trivandrum and Malappuram districts. Maximum response in rice production has been obtained by applying 120 kg N/ha.
12. Similarly application of phosphorus significantly increases rice production in both the districts.
13. Response to potash application has been found to be more pronounced in Trivandrum district than in Malappuram district.
14. Maximum yield has been recorded by the combined application of 120:60:60 NPK in Trivandrum district; 180:60:60 NPK in Malappuram district.
15. Lime application has not produced any significant response in Malappuram district, whereas, the same was erratic and inconsistent in Trivandrum district.
16. Dwarf high yielding variety Jaya respond more by producing higher yields than the medium tall locally improved varieties.
17. Response to all applied nutrients, has been observed only in 'ML' fertility class of Trivandrum district during Kharif season. Nitrogen alone has response in 'ML', 'IM' and 'LM' in Malappuram district. Phosphorus application has positive response in all fertility classes during both the seasons in Trivandrum district, whereas, in Malappuram district the same has been noticed in Rabi season. Similarly, potash application at higher levels produced response in Trivandrum district during both the seasons, whereas, it was absent in Malappuram district.
18. Studies on residual effect of fertilizers have shown that there is no effect of the applied chemical source of nutrients in the subsequent season.

TABLE - 9. Response of Nitrogen in ' A ' type experiment at Zero level of Phosphorus and Potash Kharif 1975-76 (Grain yield kg/ha) Variety - Jaya.

District	Zone	Block	No. of trials	Control 0-0-0	Response to Nitrogen over 0-0-0		S.E	C.D
					60	120		
Malappuram	I	Kondotti Mancheri	2	2250	437	1031		
	II	Andothode Tanur	9	2480	318*	304*	149.4	295.9
	III	Mankada Malappuram	7	3626	409*	677*	120.3	240.7
		District Mean	18	2900	367*	530*	94.1	184.5
Erivandrum	I	Nemom Perinkadavila	8	3018	79	532*	145.7	288.5
	II	Kilimanur Medumangad	8	2877	323*	647*	113.2	224.2
	III	Chirayinkil Erivandrum(rural)	9	3219	789*	1187*	105.9	209.7
		District Mean	25	3045	413*	805*	70.2	137.6

TABLE - 10. Response of Nitrogen in 'A' type experiment at Zero level of Phosphorus and Potash Rabi 1975-76 (Grain yield kg/ha) Variety Jaya.

District	Zone	Block	No. of trials	Control 0-0-0	Response to Nitrogen over 0-0-0		S.E	C.D
					60	120		
MALAPPURAM	I	Kondotti Mancheri	16	3003	315*	811*	136.8	268.3
	II	Andathode Tanur	10	2918	402*	640*	110.0	217.9
	III	Mankada Maleppuram	11	3383	440*	557*	173.2	342.9
		District Mean	37	3093	376*	689*	84.2	165.0
ERIVANDRUM	I	Nenom Perinkadavila	12	2315	200	457*	133.9	265.2
	II	Kilimanur Nedumangad	10	2683	498*	701*	107.7	213.3
	III	Chirayinkil Erivandrum (rural)	10	2097	600*	827*	107.6	213.1
		District Mean	32	2362	418*	649*	69.4	136.0

TABLE-11. Response of Phosphorus in 'A' type experiment Kharif 1975-76.
(Grain Yield kg/ha)

District	Zone	Block	No. of trials	60-0-0	Phosphorus response over 60-0-0 on 60-30-0	120-0-0	Phosphorus response over 120-0-0 on 120-60-0	S.E	C.D.
MALAPPURAM	I	Kondotti Mancheri	2	2687	2000	3281	781		
	II	Andathode Tanur	9	2798	144	2784	253	149.4	295.9
	III	Mankade Malappuram	7	4035	247*	4303	600*	120.3	240.7
	District Mean		18	3267	390*	3430	446*	94.1	184.5
TRIVANDRUM	I	Memom Perinkadavila	8	3097	509*	3550	628*	145.7	288.5
	II	Kilimanur Nedumangad	8	3200	734*	3524	853*	113.2	224.2
	III	Chirayinkil Trivandrum (rural)	9	4008	245*	4406	492*	105.9	209.7
	District Mean		25	3458	486*	3850	651*	70.2	137.6

TABLE - 12 Response of Phosphorus in 'A' type experiment Rabi 1975-76.

(Grain Yield kg/ha) Variety Jaya.

District	Zone	Block	No. of trials	60-0-0	Phosphorus response over 60-0-0 on 60-30-0	120-0-0	Phosphorus response over 120-0-0 on 120-60-0	S.E	C.D.
MALAPPURAM	I	Kondotti Mancheri	16	3318	713*	3814	464*	136.8	268.3
	II	Andathode Tanur	10	3320	141	3558	-25	110.0	217.9
	III	Mankada Malappuram	11	3823	351*	3940	624*	173.2	342.9
	District Mean		37	3469	450*	3782	380*	84.2	165.0
TRIVANDRUM	I	Nomom Porinkadevila	12	2515	368*	2772	380*	133.9	265.2
	II	Kilimanur Nedumangad	10	3181	248*	3384	452*	107.7	213.3
	III	Chirayinkil Trivandrum(rural)	10	2697	228*	2924	420*	107.6	213.1
	District Mean		32	2780	287*	3011	415*	69.4	136.0

TABLE - 13 Response of potash in 'A' type experiment Kharif 1975-76.
(Grain Yield kg/ha) Variety - Jaya.

District	Zone	Block	No. of trials	60-30-0	Response of Potash over 60-30-0 on 60-30-30	120-60-0	Response of Potash over 120-60-0 on 120-60-60	S.E	C.D
MALAPPURAM	I	Kondotti Mancheri	2	4687	- 375	4062	- 1062		
	II	Andathode Tenur	9	2942	171	3037	238	149.4	295.9
	III	Mankada Malappuram	7	4282	339*	4903	293*	120.3	240.7
		District Mean	18	3657	176	3876	115	94.1	184.5
TRIVANDRUM	I	Nemom Porinkadevila	8	3606	175	4178	662*	145.7	288.5
	II	Kilimanur Nedumangad	8	3934	47	4377	331*	113.2	224.2
	III	Chirayinkil Trivandrum (rural)	9	4253	362*	4898	370*	105.9	209.7
		District Mean	25	3944	201*	4501	451*	70.2	137.6

TABLE - 14 Response of Potash in 'A' type experiment Rabi 1975-76.
(Grain Yield kg/ha) Variety - Jaya.

District	Zone	Block	No. of trials	60-30-0	Response of Potash over 60-30-0 on 60-30-30	120-60-0	Response of Potash over 120-60-0 on 120-60-60	S.E	C.D
MALAPPURAM	I	Kondotti Mancheri	16	4031	200	4278	367*	136.8	268.3
	II	Andathode Tanur	10	3461	232*	3533	289*	110.0	217.9
	III	Menkade Malappuram	11	4174	- 12	4564	222	173.2	342.9
	District Mean		37	3919	146	4162	302*	84.2	165.0
TRIVANDRUM	I	Nemom Perinkadavila	12	2883	- 22	3152	585*	133.9	265.2
	II	Kilimanur Nedumanged	10	3429	217*	3836	252*	107.7	213.3
	III	Chirayinkil Trivandrum (rural)	10	2925	162	3344	242*	107.6	213.1
	District Mean		32	3067	110	3426	374*	69.4	136.0

TABLE- 15 Response of Nitrogen in 'A' type experiment at lower level of Phosphorus keeping Potash at Zero level Kharif 1975-76 (Grain Yield kg/ha)
Variety - Jaya.

District	Zone	Block	No. of trials	60-30-0	Response of nitrogen over 60-30-0 on 90-30-0	S.E	C.D
MALAPPURAM	I	Kondotti	2	4687	- 875		
		Mancheri					
	II	Andathode	9	2942	- 112	149.4	295.9
		Tanur					
	III	Mankada	7	4282	101	120.3	240.7
		Malappuram					
		District Mean	18	3657	- 114	94.1	184.5
TRIVANDRUM	I	Nemom	8	3606	210	145.7	288.5
		Perinkadavila					
	II	Kilimanur	8	3934	35	113.2	224.2
		Nedumangad					
	III	Chirayinkil	9	4253	460*	105.9	209.7
		Trivandrum (rural)					
		District Mean	25	3944	244*	70.2	137.6

TABLE-16 Response of Nitrogen in 'A' type experiment at lower level of Phosphorus keeping Potash at Zero level Rabi 1975-76 (Grain Yield kg/ha)
Variety - Jaya

District	Zone	Block	No. of trials	60-30-0	Response of nitrogen over 60-30-0 on 90-30-0	S.E	C.D
MALAPPURAM	I	Kondotti	16	4031	- 122	136.8	268.3
		Mancheri					
	II	Andathode	10	3461	+ 30	110.0	217.9
		Tanur					
	III	Mankada	11	4174	+ 15	173.2	342.9
		Malappuram					
		District Mean	37	3919	- 40	84.2	165.0
TRIVANDRUM	I	Nemom	12	2883	181	133.9	265.2
		Perinkadavila					
	II	Kilimanur	10	3429	73	107.7	213.3
		Nedumangad					
	III	Chirayikil	10	2925	211	107.6	213.1
		Trivandrum (rural)					
		District Mean	32	3067	156*	69.4	136.0

TABLE- 17 Response of Nitrogen in 'A' type Experiment at a higher level of Phosphorus keeping Potash at Zero level Kharif 1975-76 (Grain yield kg/ha)

Variety - Jaya.						
District	Zone	Block	No. of trials	60-60-0	Response of Nitrogen over 60-60-0 on 120-60-0	S.E C.D
MALAPPURAM	I	Kondotti Mancheri	2	3957	125	
	II	Andathode Tanur	9	3093	- 56	149.4 295.9
	III	Mankada Malappuram	7	4626	277*	120.3 240.7
	District Mean			18	3783	93
TRIVANDRUM	I	Nemom Porinkadavila	8	3828	350*	145.7 288.5
	II	Kilimanur Medumanged	8	4096	281*	113.2 224.2
	III	Chirayinkil Trivandrum(rural)	9	4598	300*	105.9 209.7
	District Mean			25	4191	310*

TABLE- 18 Response of Nitrogen in 'A' type Experiment at a higher level of Phosphorus keeping Potash at Zero level Rabi 1975-76 (Grain Yield kg/ha)

Variety - Jaya.						
District	Zone	Block	No. of trials	60-60-0	Response of Nitrogen over 60-60-0 on 120-60-0	S.E C.D
MALAPPURAM	I	Kondotti Mancheri	16	4253	25	136.8 268.3
	II	Andathode Tanur	10	3560	- 27	110.0 217.9
	III	Mankada Malappuram	11	4386	178	173.2 342.9
	District Mean			37	4105	57
TRIVANDRUM	I	Nemom Porinkadavila	12	3127	25	133.9 265.2
	II	Kilimanur Medumanged	10	3560	276*	107.7 213.3
	III	Chirayinkil Trivandrum(rural)	10	3250	94	107.6 213.1
	District Mean			32	3301	125

TABLE- 19 Response of Nitrogen in 'A' type experiment at a higher level of Phosphorus and Potash Kharif 1975-76 (Grain Yield kg/ha) Variety - Jaya.

District	Zone	Block	No. of trials	120-60-60	Nitrogen response over 120-60-60 on 180-60-60	S.E	C.D
MALAPPURAM	I	Kondotti	2	3000	1375		
		Mancheri					
	II	Andathode	9	3275	231	149.4	295.9
		Tanur					
MALAPPURAM	III	Mankada	7	5196	104	120.3	240.7
		Malappuram					
		District Mean	18	3991	309	94.1	184.5
TRIVANDRUM	I	Nemom	8	4840	637	145.7	288.5
		Perinkadavila					
	II	Kilimanur	8	4708	70	113.2	224.2
		Nedumangad					
	III	Chirayinkil	9	5268	325	105.9	209.7
	Trivandrum(rural)						
		District Mean	25	4952	343	70.2	137.6

TABLE- 20 Response of Nitrogen in 'A' type experiment at a higher level of Phosphorus and Potash Rabi-1975-76 (Grain Yield kg/ha) Variety - Jaya.

District	Zone	Block	No. of trials	120-60-60	Nitrogen response over 120-60-60 on 180-60-60	S.E	C.D
MALAPPURAM	I	Kondotti	16	4645	123	136.8	268.3
		Mancheri					
	II	Andathode	10	3822	114	110.0	217.9
		Tanur					
MALAPPURAM	III	Mankada	11	4786	26	173.2	342.9
		Malappuram					
		District Mean	37	4464	92	84.2	165.0
TRIVANDRUM	I	Nemom	12	3737	255	133.9	265.2
		Perinkadavila					
	II	Kilimanur	10	4088	92	107.7	213.3
		Nedumangad					
	III	Chirayinkil	10	3586	168	107.6	213.1
	Trivandrum(rural)						
		District Mean	32	3800	120	69.4	136.0

TABLE - 21 Response of lime in 'A' type experiment Kharif and Rabi 1975-76
(Grain Yield kg/ha) Variety - Jaya.

District	Zone	Block	No. of trials		K H A R I F			R A B I			
					60-30-30	Response of Lime over 60-30-30 on 60-30-30 + Lime	C.D	60-30-30	Response of Lime over 60-30-30 on 60-30-30 + Lime	C.D	
			K	R							
MALAPPURAM	I	Kondotti Mancheri	2	16	4312	-	312		4231	301*	268.3
	II	Andathode Tanur	9	10	3113		268	295.9	3693	- 107	217.9
	III	Mankada Malappuram	7	11	4621		4	240.7	4162	5	342.9
	District Mean			18	37	3833		100	184.5	4065	102
TRIVANDRUM	I	Nomom Perinkadavila	8	12	3781		295*	288.5	2861	388*	265.2
	II	Kilimanur Medumangad	8	10	3981		176	224.2	3646	- 162	213.3
	III	Chirayinkil Trivandrum(rural)	9	10	4615		160	209.7	3087	131	213.1
	District Mean			25	32	4145		208*	137.6	3177	135

TABLE - 22 Response of Nitrogen in 'B' type experiment Kharif 1975-76 (Grain Yield kg/ha)

District	Zone	Block	No. of trials	Control 0-0-0	V 1 Response of Nitrogen over 0-0-0		Control 0-0-0	V 2 Response of Nitrogen over 0-0-0		C.D
					40	80		40	80	
MALAPPURAM	I	Kondotti Mancheri	5	2725	337	225	2625	150	350	395.3
V 1-Jaya V2 -Jyothi	II	Andathode Tenur	10	2410	424*	509*	2206	219	435*	415.2
	III	Mankada Malappuram	10	4660	507*	751*	3950	587*	681*	412.8
	District Mean		25	3373	440*	549*	2987	353*	517*	247.4
TRIVANDRUM	I	Nemom Porinkatevila	9	2556	398	79	2484	256	42	264.6
V1- Jaya V2-Sabari	II	Kilimanur Nedumangad	10	2501	190	408*	2407	149	466*	195.2
	III	Chirayinkil Trivandrum(rural)	8	3229	450*	636*	2840	346*	737*	257.1
	District Mean		27	2735	71	313*	2561	72	405*	135.5

TABLE - 23 Response of Nitrogen in 'B' type experiment Rabi 1975-76 (Grain Yield kg/ha)

District	Zone	Block	No. of trials	Control 0- 0- 0	V ₁		Control 0- 0- 0	V ₂		C.D	
					Response of Nitrogen over 0-0-0			Response of Nitrogen over 0-0-0			
					40	80		40	80		
MALAPPURAM	I	Kondotti	11	3240	612*	641*	3105	567*	975*	460.6	
		Mancheri									
	V ₁ - Jaya	II	Andathode	10	2690	490*	373*	2380	446*	487*	196.4
			Tanur								
V ₂ - Jyothi	III	Mankada	9	3719	635*	803*	3748	585*	668*	530.5	
	Malappuram										
		District Mean	30	3200	578*	601*	3056	569*	720*	238.6	
TRIVANDRUM	I	Nemon	10	2343	175	269	2334	29	244	280.7	
		Perinkatavila									
	V ₁ - Jaya	II	Kilimanur	8	2723	171	350*	2345	292	440*	311.3
			Hodumangad								
V ₂ - Bharati	III	Chirayinkil	10	1980	422*	630*	1610	364*	529*	231.3	
	Trivandrum (rural)										
		District Mean	28	2322	262*	421*	2078	224*	403*	155.7	

TABLE- 24 Response of Phosphorus in 'B' type experiment Kharif 1975-76
(Grain Yield kg/ha)

District	Zone	Block	No. of trials	V ₁		V ₂		Response over 40-0-0 on	Response over 80-0-0 on	C.D			
				Response over 40-0-0 on	Response over 80-0-0 on	Response over 40-0-0 on	Response over 80-0-0 on						
MALAPPURAM	I	Kondotti	5	3062	788*	2950	1250*	2775	475	2975	450*	395.3	
		Mancheri							*				
V ₁ -	Jaya	II	Andsthoode	10	2834	277	2919	289	2425	432	2641	297	415.2
V ₂ -	Jyothi	III	Mankade	10	5167	404	5411	279	4537	56	4631	200	412.8
		Melappuram											
		District Mean	25	3813	430*	3922	477*	3340	245	3504	288	247.4	
TRIVANDRUM	I	Nenom	9	2158	545*	2477	613*	2228	574*	2526	399*	264.6	
		Perinkatsvila											
V ₁ -	Jaya	II	Kilimanur	10	2691	568*	2909	597*	2556	546*	2873	484*	195.2
V ₂ -	Sabari	III	Chirayinkil	8	3679	256	3865	356*	3186	259*	3577	58	257.1
		Trivandrum(rural)											
		District Mean	27	2806	468*	3048	531*	2633	470*	2966	329*	135.5	

TABLE- 25 Response of Phosphorus in 'B' type experiment Rabi 1975-76 (Grain Yield kg/ha)

District	Zone	Block	No. of trials	V ₁			V ₂			C.D		
				Res- ponse 40-0-0 over- 40-0-0 on - 40-40-0	80-0-0	Res- ponse 80-0-0 over- 80-0-0 on - 80-40-0	40-0-0	Res- ponse 40-0-0 over- 40-0-0 on - 40-40-0	80-0-0		Res- ponse 80-0-0 over- 80-0-0 on - 80-40-0	
MALAPPURAM	I	Kondotti	11	3852	368	3881	363	3772	619*	4080	614*	460.6
V ₁ -	Jaya	Mancheri										
V ₂ -	Jyothi	II Andathode	10	3180	- 52	3063	114	2826	- 16	2867	143	196.4
		Tanur										
		III Mankada	9	4354	415	4522	471	4333	28	4416	471	530.5
		Malappuram										
		District Mean	30	3778	243*	3801	312*	3625	230	3776	415*	238.6
TRIVANDRUM	I	Nemom	10	2518	332*	2612	387*	2363	340*	2578	333*	280.7
V ₁ -	Jaya	Porinkatavila										
V ₂ -	Bharathi	II Kilimanur	8	2894	348*	3073	256	2637	218	2785	308	311.3
		Nedumangad										
		III Chirayinkil	10	2402	280*	2610	344*	1974	341*	2139	366*	231.3
		Trivandrum(rural)										
		District Mean	28	2584	318*	2743	334*	2302	305*	2481	337*	155.7

TABLE - 26 Response of Potash in 'B' type experiment Kharif and Rabi 1975-76
(Grain Yield kg/ha)

District	Zone	Block	No. of trials	V ₁			V ₂			C.D	V ₁			V ₂				
				Res- 80-40-0 over 80-40-0 on 80-40-40	Res- 80-40-0 over 80-40-0 on 80-40-40	Res- 80-40-0 over 80-40-0 on 80-40-40	Res- 80-40-0 over 80-40-0 on 80-40-40	Res- 80-40-0 over 80-40-0 on 80-40-40	Res- 80-40-0 over 80-40-0 on 80-40-40		Res- 80-40-0 over 80-40-0 on 80-40-40	Res- 80-40-0 over 80-40-0 on 80-40-40						
				K	H	a	R	I	F					R	A	B	I	F
MALAPPURAM	I	Kondotti	5 + 11	4200	350	3425	-38	395.3	4244	329	4694	-165	460.6					
Kharif		Mandacri																
V ₁ - Jaya	II	Andathode	10+ 10	3208	300*	2938	273*	415.2	3177	264*	3010	278*	196.4					
V ₂ - Jyothi		Tanur																
Rabi	III	Mankada	10+ 9	5690	191	4831	-56	412.8	4993	1	4887	-151	530.5					
V ₁ - Jaya		Malappurem																
V ₂ - Jyothi		District Mean	25+ 30	4399	266*	3792	80	247.4*	4113	209	4191	- 14	238.6					
TRIVANDRUM	I	Nomom	9+10	3090	498*	2925	355*	264.6	2999	385	2911	306*	280.7					
Kharif		Perinkatevila																
V ₁ - Jaya	II	Kilimannur	10+8	3506	232	3357	170	195.2	3329	179	3093	229	311.3					
V ₂ - Sabari		Madumengad																
Rabi	III	Chirayinkil	8+10	4221	200	3635	254*	257.1	2954	167	2505	186	231.3					
V ₁ - Jaya		Trivandrum(rural																
V ₂ - Bharathi		District Mean	27+28	3579	312*	3295	257*	135.5	3077	248*	2818	241*	155.7					

TABLE - 27 Response of Rice to Nitrogen, Phosphorus and Potash as influenced by
fertility classes Kharif 1975-76 (Grain Yield kg/ha) 'C' type experiments.

Variety - Jaya.

District	Ferti- lity classes	No. of trial	Non- re control	Manu- re control	Nitrogen response on 120-0-0 over 0-0-0	Phosphorus response over			Potash response over 120-120-0 on			180-180-90 over 120-120-60	C.D
						60-	120	180	30	60	90		
MALAPPURAM	LL	5	3240	494	122	58	774*	-364	-60	-36	376	619.6	
	ML	10	2670	845*	-73	151	22	45	80	-50	-104	260.3	
	MM	3	3299	1041*	365	215	322	90	206	506*	-113	435.6	
TRIVANDRUM	LL	6	2555	68	1357*	2132*	2314*	126	237*	403*	479*	139.7	
	LM	6	3054	57	1422*	2168*	2210*	42	66	214*	385*	79.1	
	MM	6	3146	316*	796*	1487*	1511*	193	324	504*	414*	210.0	

TABLE- 28 Response of Rice to Nitrogen, Phosphorus and Potash as influenced by
fertility classes Rabi 1975-76 (Grain Yield kg/ha)'C' type experiments.
 Variety - Jaya.

District	Fertility classes	No. of trial	Non-manu- re control	Nitrogen response on 120-0-0 over 0-0-0	Phosphorus response over 120-0-60 on			Potash response over 120-120-0 on			180-180-90 over 120-120-60	C.D
					60	120	180	30	60	90		
MALAPPURAM	LL	9	2946	783*	721*	630*	870*	217	202	281	161	424.5
	LM	9	4244	781*	290	287	412*	72	2	-6	192	312.0
TRIVANDRUM	LM	6	2456	86	1121*	1847*	1771*	307*	527*	688*	-184	304.6
	LH	6	2608	97	1083*	1139*	1232*	268	20	398*	61	335.0
	MM	6	2366	38	1361*	1633*	1638*	214	365*	449*	68	304.7