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Response of IR. 8 Paddy Strain to Fertilisers in Coimbatore District

by

D. S. AARON[1], Y. B. MORACHAN[2] and M. MURUGESAN[3]

IR. 8 is a high yielding dwarf variety with non-lodging habit. It is a high fertility strain. With a view to determine its fertilizer requirements under Coimbatore conditions, trials were initiated in 1967 *Kharif* season (June to September) in 31 ryots' holdings, distributed over five community blocks in the district.

The names of the blocks and the number of trials in each are furnished in Table 1.

TABLE 1. *Community Blocks and number of Trials*

Community Block	No. of trials	Source of irrigation	Previous crop
Thondamuthur	3	Well	Sorghum
Perianaickenpalayam	3	-do-	-do-
Erode	7	Channel	Paddy
Gobichettipalayam	9	-do-	-do-
Anamalai	9	-do-	-do-
Total	31		

The average characteristics of the soil in each block are furnished in Table 2.

TABLE 2. *Soil Characters*

Particulars	Thonda-muthur	Perianaicken-palayam	Erode	Gobich tti-palayam	Anamalai
p.H.	7.7	7.9	7.9	7.4	7.7
EC	0.38	0.50	0.32	0.36	0 37
Available N (kg/ha)	149	287	168	196	228
Available P (kg/ha)	43 2	42.1	23.3	43.3	39 5
Texture	Sandy loam	Clay	Sandy loam	Varying texture	Loam
Lime	Low	Copious	Low	Copious	Low

Seth and Abraham (1966) on the basis of a review of the results of fertilizer trials on paddy crop in cultivators' fields in various States, reported

1. Formerly Assistant Agronomist, C A.E. Coimbatore and now Assistant Cotton Specialist, 2, Formerly Agronomist in charge and now Professor of Agronomy and 3. Formerly Statistical Assistant and now Lecturer in Statistics, Agricultural College, Coimbatore.

uniformly good response to nitrogen in all agro-climatic regions. The response to phosphate and potash within each agro-climatic regions was much more variable than the corresponding response to nitrogen.

Materials and Methods: The trial involved ten treatments specified in Table 3.

TABLE 3. *Particulars of Fertilizer treatments*

Nutrients in the fertilizer	Quantity of nutrients (kg/ha)			Symbol
	N	P	K	
No fertilizer	—	—	—	0
N	60	—	—	N_1
N	120	—	—	N_2
P_2O_5	—	30	—	P_1
N and P_2O_5	60	30	—	N_1 P_1
N and P_2O_5	60	60	—	N_1 P_2
N and P_2O_5	120	30	—	N_2 P_1
N and P_2O_5	120	60	—	N_2 P_2
N, P_2O_5 and K_2O	120	30	30	N_2 P_1 K_1
N, P_2O_5 and K_2O	120	30	60	N_2 P_1 K_2

The entire quantity of phosphoric acid and potash and half the quantity of nitrogen were applied as basal dose. The remaining half of nitrogen was supplied as top dressing when the crop was 30 days old. Nitrogen, phosphoric acid and potash were supplied in the form of urea, superphosphate and muriate of potash respectively.

Each holding represented one replication. The treatments were randomised separately for each holding and allotted to plots. The gross and net sizes of the plots were 1/200th and 1/250th of a ha respectively. Besides grain yields, observations on the height of plants, number of earheads and number of grains in the earheads were taken in five plants selected at random in each plot in each holding.

Results: (i) *Grain yield*: The data on grain yield under the different treatments for the five blocks are presented in Table 4.

It may be seen from the Table that the mean yields of community blocks significantly differ. The mean yield of 6557 kg/ha for Anamalai block is the highest followed by Gobichettipalayam, Perianaickenpalayam, Erode and Thondamuthur in the order mentioned. It is very interesting to note the association of high mean yield with the large quantity of nitrogen available in

TABLE 4. *Grain yield (kg/ha)*

Treatments	Thonda-muthur	Perianaicken-palayam	Erode	Gobichetti-palayam	Anamalai	Mean of 31 trials
0	3,458	3,708	4,161	4,625	5,861	4,677
N_1	3,750	4,333	4,875	5,403	6,431	5,319
N_2	5,042	4,750	4,939	5,847	6,528	5,656
P_1	4,250	4,583	4,643	5,347	6,278	5,278
$N_1 P_1$	4,833	5,417	4,929	5,639	6,125	5,520
$N_1 P_2$	4,000	5,542	4,679	5,917	6,819	5,677
$N_2 P_1$	4,667	5,917	5,339	6,333	6,681	6,008
$N_2 P_2$	4,917	6,000	5,179	6,722	7,056	6,226
$N_2 P_1 K_1$	5,542	6,208	5,250	6,417	7,028	6,242
$N_2 P_1 K_2$	5,542	5,917	4,821	6,361	6,764	6,008
Mean	4,600	5,238	4,882	5,861	6,557	5,661

Difference between two means at 5% level :

	S.E.	C.D.
Fertilizer treatments	140	274
Community blocks	215	425
Fertilizer treatments / Community blocks	Not significant	

the soil (Table 2). Lack of interaction between the community blocks shows the response given by IR. 8 to different fertilizer treatments under the varying conditions prevailing in the different blocks was similar. All the fertilizer treatments without exception have recorded significantly higher yield than "No treatment", the increase over the yield of 4,677 kg/ha recorded by "No treatment" ranging from 642 kg/ha in the case of N_1 to 1565 kg/ha in the case of $N_2P_1K_1$.

Having established the positive effects of treatment combinations, it is of interest to ascertain the nature of response to each of the different nutrients and to their combination. The yield figures furnished in Table 5 for the combinations of N levels and phosphoric acid levels show that, while the interaction between those two nutrients was not significant, N as well as phosphoric acid increased the yield with increase in their dosage.

TABLE 5. *Yield of grain (kg/ha) Nitrogen × Phosphoric acid*

Levels of N	Levels of Phosphoric acid			Mean
	P_0	P_{30}	P_{60}	
N_0	4,677	5,278	–	4,978
N_{60}	5,319	5,520	5,677	5,505
N_{120}	5,656	6,008	6,226	5,963
Mean	5,217	5,602	5,962	5,482

Difference between two means at 5% level:

N levels	S.E.	C.D.
N_2 or N_1 N_0	120	235
N_2 N_1	100	198
P levels		
P P_1	100	198
P_0 or P_1 P_2	120	235

N × P = Not significant

In both the cases the relationship between the input and yield was linear. The response to N was 8 2 kg of grain for every addition of one kg of N/ha as defined by the following functional relationship of yield on N $\hat{Y}=4990+8.2\ X$. The relationship between phosphoric acid application and yield is defined by $\hat{Y}=5222+12.4\ X$ indicating a response of 12.4 kg of grain for the applications of one kg of phosphoric acid. The absence of significant quadratic effect in both the cases, N as well as phosphoric acid application, appears to indicate the need for trying even larger doses of these nutrients to reach optimum level.

The figures furnished below show an increase of 234 kg/ha for the application of lower level of potash (K_1) in the presence of N_2P_1 but little importance can be attached to this since this increase is not significant.

Treatment	N_2P_1	$N_2P_1K_1$	$N_2P_1K_2$
Yield of grain kg/ha	6,008	6,242	6,008

(ii) *Height of plant:* As may be seen from Table 6 the trends of the effects of N and P_2O_5 run parallel to their effects on grain yield.

TABLE 6. *Height of plants in cm*

Nitrogen at		0	60	120	Mean
Phosphoric acid at	0	41.0	44.4	47.9	44.4
	30	43 8	46.2	50.0	46.7
	60	—	46.2	50.0	48.1
Mean		42.4	45.6	49.2	

(iii) *Number of grains per ear-head:* The data are furnished in Table 7.

TABLE 7. *No. of grains per earhead*

Nitrogen at		0	60	120	Mean
Phosphoric acid at	0	133.0	145.5	145 6	141.4
	30	151.9	153.4	161.5	155.6
	60	—	156.8	170.3	163.6
Mean		142.5	151.9	159.1	

The same remarks made in regard to the effects on plant height hold good in the case of effect on grains per ear-head also.

(iv) *Number of ears per plant :* The data furnished in Table 8 indicate increase in the number of ear-heads with increase in dose of N. The same cannot be said of the effect of P_2O_5. Application of P_2O_5 at 30 kg/ha was attended with increase in the number. But, further increase in the quantity of P_2O_5 was not effective.

TABLE 8. *No. of ears per plant*

Nitrogen at		0	60	120	Mean
Phosphoric acid at	0	15.9	18.3	20.7	18.3
	30	17.5	19.5	21.8	19.6
	60	—	18.8	20.8	19.8
Mean		16.7	18.9	21.1	—

Discussion: The results have clearly indicated favourable influence of both N and P_2O_5 on the growth and yield of grain.

Application of N at 120 kg/ha in combination with phosphoric acid at 60 kg/ha gives the highest net monetary return, vide Table 9.

TABLE 9. *Economics of Fertilizer application*

Treatments	Yield (kg/ha)	Additional yield (kg/ha)	Cost of fertilizers (Rs.)	Additional income (Rs/ha)
O	4677	—	—	—
N_1	5319	642	110	179
N_2	5656	979	220	221
P_1	5278	601	71	199
N_1 P_1	5520	850	181	202
N_1 P_2	5677	1000	252	198
N_2 P_1	6008	1331	291	308
N_2 P_2	6226	1549	362	335

NOTE: Paddy valued at Rs. 45/- per quintal
Urea at Rs. 44/- per bag of 50 kg
Super at Rs. 38/- per bag of 100 kg

As has been already indicated above there seems to be scope for increasing the quantity of nitrogen and phosphoric acid to still higher levels than the dosages tried in the experiments now reviewed. This is a point to be

taken note of in designing future experiments to be conducted with IR. 8 in other community blocks.

In the present study, the centres of trial were confined to five out of twenty prominent paddy growing community blocks in the district. Yet, the similar effect of N and P_2O_5 in the five blocks of varying inherant fertility seems to suggest that these results may reasonably be applicable to other blocks in the district. Another worthwhile point to note is that even from untreated plots, IR 8 paddy has recorded a mean yield of 4,677 kg/ha which is high as compared to the average yield of 1,723 kg for the first crop in Coimbatore District as per the Season and Crop Report of the Madras State, 1963-64.

Summary: Trials were conducted in 31 holdings distributed over five community blocks in Coimbatore district during *Kharif* season to study the response of IR 8 paddy strain to N, P_2O_5 individually and in combination with nitrogen, phosphoric acid and potash. The results indicated the need for heavy doses of not only N but also P_2O_5. The largest doses of N and P_2O_5 used in the trial was 120 and 60 kg/ha respectively. There appears to be scope for increasing the quantity of these two nutrients to still higher levels to reach the optimum.

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REFERENCE

Seth, G. R. and T. P. Abraham. 1966. Response of rice crop to fertilizer in India Ref. Num. 2, 12, 1966.