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Varietal Response of Rice to Nitrogen

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ABSTRACT

Six medium duration dwarf *indica* rice varieties *viz.* IR 20, IR 22, R. P. 5-3 (Sona), Co. 36 and tall *Indica* varieties Co. 32 and Bhavani, were tested during *kharif* seasons of 1972-73 and 1973-74 at Bhavanisagar under five levels of N (80, 120, 160, 200 and 240 kg/ha). The pooled analysis showed that R. P. 5-3 recorded maximum grain yield followed by Co. 36 and IR 20 which were on par, recording a per day production of 46.4, 44.2 and 44.6 kg/ha respectively. 120 kg N/ha recorded higher grain yield followed by 80 and 160 kg N/ha which were on par during 1973-74. IR 20 and R. P. 5-3 registered a quadratic trend while it was linear with Co. 36. Co. 32 recorded maximum straw yield followed by Bhavani, IR. 20, Co. 36 and R. P. 5-3 (Sona).

INTRODUCTION

The Lower Bhavani ayacut in Tamil Nadu commands 1.1 lakh hectares under rice cultivation during *Kharif* season, for which medium duration rice varieties are preferred. Differential response was noticed for the application of nitrogen in rice varieties in different localities. Optimum dose of N fixed for the varieties IR 8, IR 5, Jaya, Hamsa and Padma grown during *Kharif* season was 180 kg/ha (Rangiah, 1973). Response to N varied considerably in variety Jaya in different seasons (Anon., 1971, Natarajan *et al.* 1974). Short duration varieties responded upto 250 kg N/ha (Subbiah and Morachan, 1974). Optimum dose of N was fixed for tall and dwarf *indica* varieties (Venkatesan *et al.*, 1974). With the object of selecting a suitable high yielding variety of medium duration and to find out the optimum dose of nitrogen, a trial was conducted at the Agricultural Research Station, Bhavanisagar during 1972-74 in the *Kharif* season.

MATERIALS AND METHODS

Split plot design with four replications was adopted. The soil type was red loam with low available N and P and medium available K. Medium duration dwarf *indica* varieties *viz.*, IR 20, IR 22, R. P. 5-3 (Sona), Co 36, and tall indica varieties Bhavani and Co 32 formed the main plot treatments and the sub-plot treatments consisted of five levels of nitrogen (80, 120, 160, 200 and 240 kg/ha). The spacing adopted was 20 x 10 cm. N was applied in the form of ammonium

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sulphate at 50:25:25 ratio at basal, and 25 and 40 days after planting. P_2O_5 and K_2O were applied uniformly to all plots at 80 kg/ha.

RESULTS AND DISCUSSION

Varietal response: The grain yield data presented in Table I would show that the culture R.P. 5-3 recorded maximum grain yield (7015 kg/ha) followed by Co. 36, I R 20, and Bhavani which were on par. In the year 1973-74 the variety Co. 36 recorded maximum yield (5055 kg/ha) followed by R. P. 5-3, and I R 20 which were all on par. The pooled analysis revealed that R.P. 5-3 recorded maximum yield (6032 kg/ha) followed by Co. 36 and I R 20 recording per day production of 46.4, 44.2 and 44.6 kg/ha respectively. Lowest grain yield was seen in tall *indica* variety Co. 32. The straw yield was in variety Co. 32 (7843 kg/ha) followed by Bhavani, IR 20, Co. 36, and R. P. 5-3. Lowest yield was noticed in variety IR 22, recording 5143 kg/ha. From the above results it may be seen that the newly evolved variety R.P. 5-3 (Sona) with non-shedding character of grain and moderate straw yield is suited to the Lower Bhavani Project tract during *Kharif* season, besides Co. 36 and IR 20.

Effect of nitrogen levels : The grain and straw yields are furnished in Table II. Application of N at 120 kg/ha registered maximum grain yield followed by 80 and 160 kg/ha which were on par. The pooled data showed that there was response only upto 80 kg N/ha for the varieties during *Kharif* season. Application of N increased the straw yield in both the years. In 1972-73 application of nitrogen at 160 kg/ha recorded higher yield followed by 240 and 200 kg N/ha which were all on par. In the year 1973-74 240 kg N/ha recorded the highest yield. Lowest yield was recorded in 80 kg/N ha in both the years.

TABLE I. Performance of varieties in Lower Bhavani Project area in *kharif* season

Varieties	Straw yield			Grain yield			Mean duration in days	Per day production
	1972-73	1973-74	Pooled	1972-73	1973-74	Pooled		
R. P. 5-3	9179	4774	6977	7015	5052	6032	130	46.4
Co. 36	10048	4036	7042	6883	5055	5969	135	44.2
I R. 20	9917	4817	7367	6628	4961	5795	130	44.6
Bhavani	9809	5772	7791	5496	3979	4738	135	36.4
IR. 22	5512	4773	5143	6197	4353	5276	125	42.2
Co. 32	10569	5028	7843	5492	3972	4732	135	35.1
C. D. (P = 0.05)	2435	423	1270	582	495	309	—	—

TABLE II. Effect of nitrogen on grain and straw yield of rice

Nitrogen kg/ha	Grain yield			Straw yield		
	1972-73	1973-74	Pooled	1972-73	1973-74	Pooled
80	6421	4838	5630	7586	4303	5944
120	6229	4988	5609	8743	4701	6722
160	6645	4700	5673	9964	4846	7405
200	6327	4360	5344	9657	4954	7305
240	6270	3930	5100	9910	5533	7721
C. D. (P = 0.05)	--	435	459	752	406	542

TABLE III. Effect of N levels on the Yield of rice varieties (kg/ha)

Level of N kg/ha	Varieties						Mean
	RP 5-3	Co. 36	IR 20	Bhavani	IR 22	Co. 32	
80	5823	6272	5588	5838	4998	5265	5630
120	6022	6184	6239	5721	5380	5207	5609
160	6238	6083	6115	5517	5311	4774	5673
200	6231	5809	5592	4441	5286	4704	5344
240	5846	5498	5443	4659	5430	3723	5100
Mean	6032	5969	5795	4738	5275	4735	—

Varieties C. D. (P=0.05) 309
Nitrogen C. D. (P=0.05) 279
Variety X Nitrogen — Not significant.

The interaction effects between varieties and nitrogen in both seasons were not significant. However, from the trend of pooled data given in Table III it can be inferred that at a lower dose of N, the varieties Co. 36 (6272 kg/ha), IR 20 (5588 kg/ha), Bhavani (5838 kg/ha) and R. P. 5-3 (5823 kg/ha) recorded higher yield than Co. 32 (5265 kg/ha) and IR 22 (4998 kg/ha). Increase in N dose reduced grain yield in Bhavani and Co 32 due to lodging, while addition of N increased the yield in R.P. 5-3, IR 20 and IR 22. Response curves and equations for the varieties

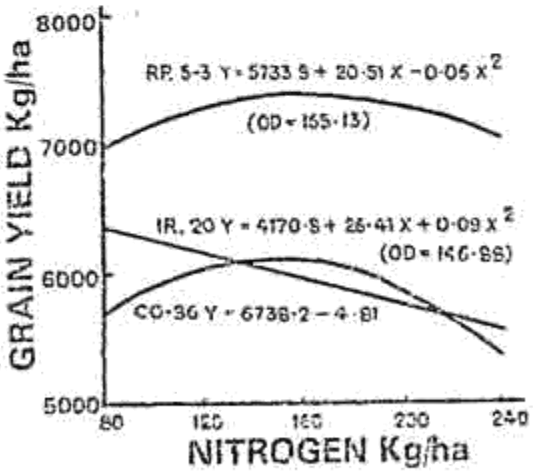

FIG. 1. RESPONSE CURVES FOR RICE VARIETIES IN KHARIF

IR 20. R.P. 5-3 and Co. 36 are given in Fig. 1. Quadratic trend was seen for the varieties R.P. 5-3 ($Y = 5733.9 + 20.51 X - 0.06 X^2$) and IR 20 ($Y = 4170.8 + 26.41 + 00.9 X^2$) whereas in variety Co. 36 linear response ($Y = 6738.2 - 4.81 X$) was noticed. Optimum dose of N fixed for RP. 5 3 and IR 20 was 165.13 and 146.88 kg/ha respectively. Increase in nitrogen application from 80 kg/ha decreased the yield in variety Co. 36. Thus the new variety R.P. 5-3 (Sona) with 165 kg N/ha is highly suited to lower Bhavani Project area during *Kharif* season besides IR 20 with 147 kg N/ha and Co. 36.

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