

Influence of Levels of N on Yield and Yield Components of Rice Varieties

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Eight medium duration (120-140 days) rice varieties viz. Jaya, IET 1039, IET 2295, IET 2885, IET 1991, IET 1996, IET 2254 and Bhavani were studied under five levels of nitrogen (0, 50, 100, 150 and 200 kg/ha) in two seasons both in Samba (*kharif*) July to November and Navarai (*Rabi*) January to May. Their yield potentials under different nitrogen level was assessed. IET 2254 (RP-4-14) was found promising high yield and suitable for Tamil Nadu. It's grain quality is fine as that of Bhavani. It is also suitable for both the seasons. It's performance both under low and high fertility level is better than Bhavani and Jaya.

When new rice varieties are tested it is necessary to fix the optimum dose of fertilizer, especially the nitrogen. The precise recommendation will economise the fertilizer usage. In this investigation an attempt was made to fix up the optimum dose of nitrogen for the new promising rice varieties under two important seasons namely *kharif* (July-November) and *Rabi* (January to May).

MATERIALS AND METHODS

The trials were laid out under the auspices of All India Co-ordinated Rice improvement Project, at the Paddy Breeding Station, Tamil Nadu Agricultural University, Coimbatore. The layout was in a split plot design with three replications. Eight promising medium duration rice varieties viz. Jaya (T (N) 1 x T 141), IET 1039 (T 90 x IR 8), IET 2295, (IR 8 x CR 1014), IET 2885 (IR 8

x Siam 29), IET 1991 (GEB 24 x T (N) 1), IET 1996 (T 90 x IR 8), IET 2254 (T 90 x IR 8) and Bhavani (BPI 76 x Peta) were allotted to the main plot treatments, while five levels of nitrogen viz. 0, 50, 100, 150 and 200 kg/ha were in sub plot treatments. First experiment was sown on 20-1-73 and the second experiment was sown on 5-7-73. The soil was clay loam, low in available N, medium in available P_2O_5 and K_2O with a pH of 7.5. Gross and net plot sizes were 14 and 9.92 sq. m. respectively.

Twentyeight days old seedlings were planted adopting a spacing of 20 cm between rows and 10 cm in the row with two seedlings per hill. A dose of 80 kg P_2O_5 and 50 kg K_2O per ha was applied as basal dressing in the form of superphosphate and muriate of potash respectively. Nitrogen was applied in

the form of urea in three split doses, 50 per cent at the time of planting, 25 per cent at the time of tillering and 25 per cent at panicle initiation stage.

RESULTS AND DISCUSSION

(i) **Yield components:** Panicles/Sq.m. and weight of panicle were the characters much influenced and appeared to be essentially a function of variety and nitrogen levels. Maximum number of panicle of 442/sq. m. was recorded during *rabi* 1973 IET 1039 (Table I). During *kharif* 1973, maximum panicle/sq. m. was only 379 for IET 2885. During *rabi* 1973 Jaya, IET 1991 and Bhavani registered significantly lower number of panicles/sq. m. indicating their poor tillering capacity.

Panicle number per sq. m. progressively increased with N levels (Table I). In both the seasons application of nitrogen increased the number of panicles per sq. m. and N applied plots recorded significantly more panicles than zero level N plots. The findings that application of N improved panicle number's is in agreement with the observations of Rajagopalan *et al.* (1974) and Subbiah and Morachan (1974).

During *rabi* 1973, maximum weight of panicle was recorded for the variety Jaya (Table I). Eventhough Jaya has recorded low panicles/sq. m., the significantly greater weight of panicle caused the maximum yield of grain for the variety Jaya during *rabi* 1973. Significant difference in weight of panicle for the varieties tried and also for the levels of nitrogen was also seen during *kharif* 1973.

TABLE I. Yield components as influenced by nitrogen levels and varieties

Varieties	Panicles/sq. m.		Weight of Panicle in gm	
	<i>Rabi</i> 1973	<i>Kharif</i> 1973	<i>Rabi</i> 1973	<i>Kharif</i> 1973
Jaya	336	324	2.22	2.11
IET 1039	442	371	1.43	2.08
IET 2295	409	292	1.28	2.70
IET 2885	404	379	1.17	2.10
IET 1991	377	332	1.74	2.01
IET 1996	402	343	1.40	1.68
IET 2254	427	347	1.55	1.86
Bhavani	331	338	1.77	2.20
S. E.	19.4	18.0	0.126	0.134
C. D. (0.05)	59	36.1	0.380	0.270
N Levels kg/ha				
0	346	306	1.50	2.00
50	381	336	1.52	2.06
100	396	354	1.58	2.16
150	428	356	1.63	2.14
200	404	368	1.58	2.18
C. D. (P=0.05)	34	12.9	NS	0.062

N. S. Not Significant

Grain yield: Average yield recorded for different varieties and levels of nitrogen in different season are presented in Table I, III and IV.

(i) **Rabi 1973:** There was significant difference between varieties, levels of nitrogen and also interaction between varieties and levels of nitrogen. Among the varieties tried, Jaya recorded the maximum grain yield of 5927 kg/ha, which was on par with IET 2254, IET 2295 and IET 2885. These varieties were superior to IET 1039 and IET 1991. However, on per

TABLE II. Grain yield and per day production as influenced by varieties

Varieties	Grain yield kg/ha and per day production		
	<i>Rabi</i> 1973	<i>Kharif</i> 1973	Pooled average
Jaya	5927 (48)	4903 (37)	5415
IET 1039	4394 (34)	4463 (36)	4428
IET 2295	5403 (45)	4549 (36)	4977
IET 2885	5382 (49)	5227 (43)	5304
IET 1991	4053 (32)	4669 (37)	4362
IET 1996	4701 (42)	4890 (39)	4795
IET 2254	5665 (53)	5428 (43)	5547
Bhavani	4980 (59)	4979 (36)	4980
C.D. (0.05)	698	543	492

Parenthesis indicates per day production

day production basis IET 2254 ranked first registering 53 kg/ha.

Regarding the levels of nitrogen 150 kg/ha registered maximum grain yield of 5,400 kg/ha which was on par with nitrogen 200 kg and 100 kg/ha. 100 kg nitrogen levels is significantly superior to 50 kg N and control. Interaction between varieties and level of nitrogen revealed that at 0 and at 50

TABLE III. Grain yield kg/ha as influenced by levels of nitrogen in both *Rabi* and *Kharif* seasons

Levels of N Kg/ha	<i>Rabi</i> 1973	<i>Kharif</i> 1973	Pooled average
0	4335	3320	3856
50	4957	4325	4630
100	5320	5275	5295
150	5400	5686	5541
200	5340	5776	5556
C.D.	234.0	222.8	161.3

kg level, Jaya, Bhavani and IET 2254 were superior to other varieties. But at 100 and 150 kg levels Jaya and IET 2254 were superior and at 200 kg level Jaya alone was superior to other varieties tried.

(ii) *Kharif* 1973: The grain yield data revealed that IET 2254 has recorded the maximum grain yield of 5,547 kg/ha which was on par with IET 2885 and Bhavani. In *kharif* all the varieties responded to higher levels of nitrogen. 200 kg N/ha and 150 kg N/ha have registered significantly more yield than other levels. Even among lower levels they are significantly different in their yield potential. In *kharif* also IET 2254 recorded maximum per day production of 43 kg/hg. There was no interaction between varieties and levels of nitrogen. The response

equation worked out was $\hat{y} = 3336.92 + 25.15x - 0.0643x^2$. From those the optimum dose of nitrogen for the varieties was of 196 kg/ha.

(iii) *Pooled analysis*: Pooled analysis revealed that there was no significant difference for the different seasons. Whereas significant differences were noticed for varieties, levels of nitrogen, and interaction between season and varieties, between season and N level and varieties and N level.

In *rabi* 1973, Jaya, IET 2254, 2295 and IET 2885 were superior to other varieties, whereas in *kharif* 1973, IET 2254, IET 2885, Bhavani and Jaya were superior. In general

TABLE IV. Interaction between varieties X level of N during *rabi* 1973 (Grain yield kg/ha)

Varieties	Levels of N/kg/ha					SED	CD
	0	50	100	150	200		
Jaya	3970	4698	5651	6069	6339	162	455
IET 1039	3377	4311	4561	5136	4756		
IET 2295	4418	4696	5465	5617	5412		
IET 2885	4069	4701	5729	6075	5946		
IET 1991	3016	4044	4335	4850	5563		
IET 1996	4046	4316	5186	5195	5232		
IET 2254	4289	5487	6057	6095	5806		
Bhavani	4388	4787	5082	5294	5346		
C. D. (0.05)			581				

for the varieties tried, *rabi* yields were higher than *kharif* yields. At low levels of nitrogen viz., 0 and 50 Bhavani and IET 2254, are better than other varieties, but at medium and high levels of nitrogen i.e. 100 kg and 150 kg/ha, IET 2254, IET 2885, Jaya and IET 2295 are better. At 200 kg N level Jaya, IET 2885 and IET 2254 were superior to other varieties.

Response curve was worked out for all the varieties: $\hat{Y} = -0.0554 x^2 + 19.672 x + 3839.5$. The optimum dose for all the varieties was 177.55 kg/ha. Bhavani did not respond to N during *rabi* season. This is mainly due to lodging of the crop in the levels

beyond 50 kg N/ha during *rabi* season; however, during *kharif* season it responded to nitrogen linearly. For IET 2254, the response curve indicated $\hat{Y} = 4317.4858 + 27.345 x - 0.100 X^2$ and the optimum dose of N was 136.4 kg/ha.

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