Himachal Journal of Agricultural Research 33 (2):282-283, 2007

Short Note

Performance of promising rice (*Oryza sativa* L.) genotypes at different nitrogen levels under rainfed upland conditions

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The average national productivity of rainfed upland rice is only about 0.68 t/ha (Anonymous, 2006). Moisture stress at different crop growth stages, uneven plant population, inadequate and imbalanced use of fertilizers, and inefficient weed management are among the several factors responsible for low rice productivity under rainfed uplands. Lack of suitable region specific high yielding varieties is another important impediment in the way of enhanced yields of upland rice. Among major plant nutrients, nitrogen is probably the most important essential nutrient influencing crop yields. A field experiment was, therefore, conducted to evaluate promising rice genotypes at varying nitrogen levels under rain fed upland conditions during *kharif* 2004 at the CSKHPKV Rice and Wheat Research Centre, Malan. The experimental soil was silty clay loam, acidic in reaction (pH 5.7), and medium in nitrogen (444 kg N/ha), phosphorus (28 kg P_2O_5/ha) and potassium (182 kg K_2O/ha). The fifteen treatment combinations consisted of three nitrogen levels viz.40 (50% of recommended dose), 80 (100%) and 120 kg N/ha (150%) assigned to main plots and five promising rice genotypes viz. VL 3967, 3959, HPR 2001, HPR 2082 and VL Dhan 221 (check) in sub plots, in split plot design with three replications.

The crop was sown on 14th May, 2004 in lines 20 cm apart using 100 kg seed/ha. The cropping season (June to October) witnessed 1665 mm rainfall spread over 67 rainy days. The mean monthly minimum and maximum temperatures during rice season (June to October) ranged between 13.7°C to 22.5°C and 25.4°C to 31.6°C, respectively. Half of the nitrogen (as per treatment) along with 40 kg P_2O_5 and 40 kg K_2O was band placed at the time of sowing. The remaining nitrogen was top dressed in two equal splits at tillering and panicle initiation stages. Weeds were managed through two hand weedings 30 and 60 days after sowing. The data on plant height, yield attributes, and straw and grain yield have been presented in Table1.

Effect of nitrogen levels

Averaged over the varieties, the grain yield increased significantly upto 80 kg N /ha (recommended level) beyond which it declined

Table 1. Plant height, yield attributes, grain & straw yield as influenced by different rice varieties and N

Treatment	Plant height (cm)	Panicles (No./m²)	Filled spikelets /panicle	1000 grain weight (g)	Panicle weight (g)	Days to 50% flowering (No.)	Days to maturity (No.)	Response (kg grain/kg N)	Seed yield (q/ha)	Straw yield (q/ha)	Harvest Index
N (kg/ha)											
40	102.8	230	52.4	23.85	1.24	85.2	116.4	-	22.13	60.02	26.9
80	110.0	256	53.9	24.82	1.35	84.5	115.9	9.38	25.88	67.24	27.8
120	110.3	244	56.7	24.58	1.39	85.4	117.0	2.90	24.45	73.18	25.0
CD (P=0.05)	2.9	NS	NS	0.56	NS	NS	NS	-	1.85	NS	-
Variety											
VL 3967	120.2	244	57.6	24.65	1.42	86.1	117.1	4.44	27.74	77.30	26.4
VL 3959	118.9	257	55.9	23.49	1.29	85.7	116.2	3.07	25.91	77.23	25.1
HPR 2001	90.0	254	55.7	24.00	1.33	93.0	124.0	2.54	20.72	60.56	24.9
HPR 2082	118.8	225	62.8	25.18	1.57	85.3	116.6	9.73	24.45	81.10	23.2
VL Dhan 221	90.7	229	40.1	25.00	0.99	75.1	105.0	10.92	21.93	37.86	36.7
CD (P=0.05)		NS	9.6	0.86	0.21	1.7	2.2	-	2.73	12.30	

non-significantly. The plant height (at maturity) and 1000-seed weight recorded significantly higher values at 80 kg N/ha as compared to 40 kg N/ha. Similarly number of panicles/m^2 (256), panicle weight (1.35 g) and number of filled spikelets per panicle (53.9) at 80 kg N/ha recorded higher values, though non-significantly, over the lower level and the cumulative effect of the higher values of these yield attributes probably resulted in higher grain yield at this level over 40 kg N/ha. Results are in conformity with Mankotia *et al.* (2004).The response to the application of N was more at 80 kg N/ha (9.38 kg grain/kg N applied) and was lower (2.90 at 120 kg N/ha) over the base level of 40 kg N/ha. The days taken to flowering and maturity were not significantly affected by nitrogen levels.

Response of varieties

The plant height of VL 3967 was highest (120.2 cm) and was at par with VL 3959 and HPR 2082. The HPR 2001 was as dwarf as the check cultivar VL Dhan 221. All the genotypes registered equal panicle density. Similarly, the filled spikelets/panicles among different genotypes were statistically equal except in VL Dhan 221 which recorded significantly less filled spikelets/ panicle. VL 3967 being at par with HPR 2082 and VL Dhan 221, recorded more 1000-seed weight as compared to HPR 2001 and VL 3959, though panicle weight was significantly lowest in VL Dhan 221. VL 3967 and VL 3959 produced significantly more grain yield than the check (VL Dhan 221) which remained at par with HPR 2082 and HPR 2001.The performance of these genotypes was also similar at Almora (DRR,2004). The grains produced per unit of N applied i.e. response (on the basis of 40 kg N/ha as base level) was highest (10.92 kg grain/kg N) in VL Dhan 221 followed by HPR 2082. The harvest index of VL Dhan 221 was comparatively higher than others in which it ranged between 23.2 and 26.4 per cent. HPR 2082 produced highest straw yield, however, at par with VL 3967 and VL3959. VL Dhan 221 being short duration cultivar flowered and matured significantly earlier than other genotypes whereas flowering and maturity were significantly delayed in HPR 2001.

Nitrogen x genotype interaction was not significant on the grain yield which indicates suitability of VL 3967, VL3959 and HPR 2082 for rainfed upland cultivation in mid hills with recommended N level of 80 kg/ha along with 40 kg P_2O_5 and 40 kg K_2O/ha.

References

Anonymous 2006. Rice in India. Proc. Intl Rice Congress, New Delhi, October 9-13, pp 1- 4.

DRR 2004. Progress Report on Agronomy, Soil Science and Physiology. Directorate of Rice Research, Hyderabad Vol III pp.4.5-4.20.

Mankotia BS, Shekhar J and Negi SC 2004. Performance of promising rice (*Oryza sativa* L.) varieties at different nitrogen levels under direct sown rainfed upland conditions. Him. J. Agric. Res. **30** (1): 130-133.