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Effect of seed priming and rate on direct-seeded, rainfed summer rice (*Oryza sativa*)

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Rainfed summer rice (*Oryza sativa* L.) suffers from frequent drought conditions, resulting in very low and fluctuating yield. Seed priming induces drought tolerance to the crop. In view of this, a field experiment was conducted to study the effect of potassium as priming material on the plant-water-relationship and ultimately on yield of direct-seeded summer rice and also to find out an optimum seeding rate of primed seed. The study was carried out at Jorhat during summer 1989 in a randomized block design. The soil was sandy loam with pH 5.25 (1 : 2), organic carbon 0.935% and available N, P and K 272.0, 10.25 and 155.6 kg/ha respectively.

The treatments consisted of seed priming with KCl solution @ 0, 3, 4, 5 and 6% along with the normal practice of dry seeding and 3 seed rates of 'IR 50' (70, 85 and 100 kg/ha). The seeds were air-dried under shade after priming to bring the moisture content to normal before sowing. The seeds were sown in lines 25 cm apart on 25 March 1989 and the crop matured in 118 days. Fertilizers were applied @ 40, 20 and 20 kg N, P_2O_5 and K_2O/ha respectively. The consumptive use of water in the crop was estimated by using the soil-moisture-depletion method and the water-use efficiency by dividing the grain yield with consumptive use.

Seed priming with 4% KCl resulted in the significantly highest plant population, panicle number and filled grains/panicle, and better N, P and K uptake and water-use efficiency, thereby giving significantly higher yield than the other treatments (Tables 1, 2). Similar observations were made by Peeran and Natanasabapathy (1980) and Borgohain (1988). However, grain yield was significantly higher when the seed rate was 70 kg/ha. The lower was the seed rate the higher was the number of grains/panicle, 1,000-grain weight and water-use efficiency (Table 1). Interaction of seed priming and seed rate on grain yield

Table 1. Grain yield (q/ha) of 'IR 50' rice as affected by the interaction between seed priming and seed rate

Seed priming	Seed rate (kg/ha)			
	70	85	100	Mean
Dry seeding	7.82	9.09	9.25	8.72
0%	10.81	8.49	8.44	9.25
3%	11.08	10.67	10.35	10.70
4%	13.75	11.58	11.36	12.23
5%	12.75	11.40	11.13	11.76
6%	12.03	9.97	10.95	10.98
Mean	11.37	10.20	10.24	
CD (P = 0.05)				
Seed priming		0.46		
Seed rate		0.33		
Interaction		0.80		

Table 1. Growth, yield characters, nutrient-uptake pattern and water-use in rainfed summer rice as influenced by seed priming and seed rate

Treatment	Plant population at maturity/ m^2	Dry-matter at maturity (kg/m^2)	Panicle numbers/ m^2	Total grains/ panicle	Filled grains/ panicle	1,000-grains weight (g)	Nutrient uptake (kg/ha)			Plant water content at flowering (%)	Consum-ptive use= (cm)	Water use= efficiency (kg/ha-cm)
							N	P	K			
Seed priming												
Dry seeding	374.66	0.481	172.44	60.99	32.00	19.01	22.13	8.55	35.92	80.70	79.86	10.92
0%	380.44	0.533	181.78	61.99	33.78	18.63	26.66	9.04	38.71	81.04	81.19	11.39
3%	411.55	0.568	197.78	63.88	35.00	18.87	31.96	10.24	43.70	81.63	82.36	12.99
4%	453.33	0.714	219.56	61.33	35.55	18.59	52.95	11.71	51.69	83.45	83.12	14.71
5%	432.44	0.647	201.33	61.55	38.77	18.60	43.31	10.63	44.32	82.18	81.96	14.35
6%	412.00	0.626	198.67	61.77	35.22	18.86	37.74	9.87	41.59	81.33	80.90	13.57
CD (P = 0.05)	26.26	0.11	12.23	NS	1.49	NS	4.29	NS	3.56	1.51		
Seet rate (kg/ha)												
70	337.55	0.591	148.44	64.05	44.05	19.61	33.78	8.97	34.62	81.69	80.78	14.08
85	417.77	0.596	201.11	62.50	31.83	18.83	35.44	10.02	43.12	82.35	81.17	12.57
100	476.88	0.598	236.22	59.22	29.28	17.87	38.15	11.03	50.22	81.15	82.72	12.38
CD (P = 0.05)	18.57	NS	8.64	2.09	1.06	0.412	3.04	1.54	2.52	NS		

=Analysis not done

was significant (Table 2). The grain yield was the highest when seed priming was done with 4% KCl solution before sowing @ 70 kg/ha.

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Effect of nitrogen, potassium and zinc on growth and yield of wheat (*Triticum aestivum*)

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A field experiment was conducted at the Instructional Farm, Junagadh, during winter (*rabi*) season of 1991–92. The soil was clay loam in texture, low in available nitrogen (229 kg/ha), phosphorus (26 kg/ha), potassium (131 kg/ha) and zinc (0.38 ppm). It was slightly alkaline in reaction (7.8 pH) and showed electrical conductivity 0.34 dS/m. The treatment were: 3 levels each of nitrogen (90, 120 and 150 kg/ha) and zinc sulphate (0, 25 and 50 kg/ha) and 2 levels of potassium (0 and 60 kg/ha). These were laid out in factorial randomized block design with 4 replications. Half dose of N and full dose of P_2O_5, K_2O and $ZnSO_4$ were applied at sowing as per treatment and remaining half quantity of N was top-dressed at 21 days after sowing as per treatment. The crop was sown on 15 November 1991 with inter-row spacing of 22.5 cm, using seed rate 100 kg/ha and was harvested on 26 February 1992.

Significant increase in growth parameters (plant height and total number of tillers/m row length) and in yield-attributing characters (effective tillers/m row length, length of spike, number of spikelets/spike, number of grains/spike, grain weight/spike and test weight) was observed only up to the application of 120 kg N/ha. Further increase in N level was not found beneficial. This trend was also reflected for grain as well as straw yield of wheat. The improvement in yield under 120 kg N/ha might be due to improvement in growth and yield-attributing characters and higher photosynthetic activities at higher level of N. The finding corroborates the report of Patel *et al.* (1991).

Application of potassium @ 60 kg/ha was found significantly superior in all the growth parameters and yield-attributing characters compared with the control (no K) (Table 1). Grain and straw yields of wheat with 60 kg K_2O/ha were significantly higher