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SHORT COMMUNICATION

IMPACT OF VARIABLE PLANTING DENSITIES ON GROWTH AND YIELD OF RICE CULTIVARS

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Three early duration varieties of rice at three plant densities were evaluated to determine plant population influence on yield production. Results revealed that LAI at flowering and dry matter production from early growth stages had a close association with seed yield. Seed rate at 100 kg/ha was found optimum for obtaining higher yield.

The grain yield attributing parameters are determined not only by the magnitude of shoot weight but also by the distribution of dry matter between the reproductive and vegetative characters. According to Donald (1963), grain yield per unit area is maximum when production of dry matter becomes independent of plant population, whereas, Voldeng and Blackman (1974) observed that the relationship between shoot yield per unit area and density is asymptotic. Exhaustive physiological studies on these aspects in rice especially in direct sown rice are lacking. The present investigation was undertaken to study the effect of three densities (seed rates) on growth and development paramters of three very early rice cultivars under traditional broadcast method of sowing in Mahakoshal region of Madhya Pradesh.

Three very early duration (less than 90 days) rice cultivars viz., JS 16-15-1-1, JS 16-49 and CRM-13-3241 were tested during kharif 1979 at the university farm using 3 seed rates i.e. 50, 100 and 150 kg/ha in a randomised block design replicated three times. The plot size was 4 x 1.4m. The fertilizer N:P:K (80:40:40 kg/ha) was applied in three splits i.e., half at sowing, one fourth each at 40 and 60 days after sowing. Observations after flower initiation were recorded on 10 randomly selected plants from each plot at twelve days interval.

Significantly superior grain yield was observed in 100 kg/ha seed rate of three cultivars over 50 kg/ha seed rate. The grain yield in 150 kg/ha was lower than 100

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Table I. Variability in growth parameters, yield attributing characters and yield in rice cultivars under three seed rates.

Variety		JR 16-15-1-1			JR 16-49			CRM 13-3241			SEm±	CD
Seed rate		50	100	150	53	100	150	50	100	150		
					Growth parameters							
	Days				(i) Total dry matter (g/plant)							
	60	7.72	11.27	10.35	8.12	10.07	9.07	8.07	11.87	10.07	0.35	1.03
	72	18.50	23.10	21.52	18.62	21.15	19.50	17.60	24.15	21.97	0.29	0.87
	84	25.32	30.07	28.32	25.35	27.82	26.43	24.57	31.05	28.82	0.33	0.97
					(ii) Leaf area index							
	60	2.62	3.15	2.95	2.64	3.87	2.79	2.95	3.57	2.24	0.06	0.20
	72	2.12	2.72	2.67	2.95	2.54	2.45	2.43	2.94	2.40	0.08	0.24
	84	0.42	0.80	0.72	0.47	0.29	0.43	0.88	0.66	0.50	0.05	0.17
					(iii) Leaf area duration (cm^2/day)							
	60	633.68	834.14	747.71	541.23	694.99	660.26	844.24	1011.57	884.84	30.54	88.98
	72	1003.64	1197.85	1105.68	831.58	1031.73	963.55	1201.19	1399.28	1275.63	38.89	100.30
	84	322.94	386.15	348.59	282.33	333.06	283.01	431.48	527.79	475.41	21.88	63.75
					(iv) Yield and yield attributing characters							
Grain yield (q/ha)		25.90	36.20	34.38	25.25	33.50	32.88	27.50	40.75	37.00	1.27	3.69
Grain yield/plant (g)		6.95	6.75	6.75	6.85	6.55	6.50	6.65	6.55	6.45	0.04	0.12
1000 grain weight (g)		14.96	15.88	15.31	14.09	14.97	14.43	15.82	16.00	15.97	0.04	0.12
HI		0.21	0.23	0.22	0.24	0.22	0.24	0.19	0.25	0.24	0.009	0.026
Grains/panicle		93.29	78.27	69.20	87.37	79.61	70.18	70.21	77.22	75.98	1.71	4.99
Effective tillers/ plant		9.7	7.6	7.9	9.9	7.9	7.3	8.9	9.2	8.3	0.20	0.60

kg/ha seed rate. CRM-13-3241 (Sattari) a promising early type had yielded significantly higher yield than other cultivars with three seed rates. Cultivar JS 16-49 was a poor yielder (Table I). Though the grains per panicle were more in 50 kg/ha seed rate, the number of panicles per unit area was slightly low in higher seed rates than 50 kg/ha. Thus, it is clear that the number of grains per panicle and the kernel weight was maximum in 50 kg/ha and 100 kg/ha respectively in different varieties. Yamada (1961) observed that grain yield per unit area and dry matter production at harvest become constant regardless of its density. He, further, observed in rice "The law of constant final yield in growth" as proposed by Kira *et al.* (1959).

At 100 kg/ha seed rate, LAI and LAD were higher than in other seeding rates. Miyasaka *et al.* (1975) and Palit *et al.* (1977) observed that reduction in grain yield may be due to defoliation while, Murata (1975) assigned it to the decrease in the utilization of solar radiation reaching the middle canopy.

Venkateshwarlu *et al.* (1977) recorded reduction in grain number per panicle due to shading from primordia initiation onwards. Murata (1975) observed a close positive correlation with NAR and radiation within a crop stand irrespective of LAI. Kanda (1975) found that energy conversion values were related with LAI at vegetative period and with NAR at reproductive period. Thus, it may be inferred that competition among plants for light affected adversely reproductive phase parameters like yield, 1000 grain weight and number of grains/panicle due to reduced LAI and LAD at higher plant density (150 kg/ha) than the optimum plant population of 100 kg/ha seed rate.

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