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EFFICIENCY OF N - K COMBINATIONS ON NUTRIENT UPTAKE AND PRODUCTIVITYOF IR.50 RICE WITH VARYING POPULATION

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ABSTRACT

With the objectives of testing the optimum population and fertilizer combinations (NK) for getting higher yield in rice (IR.50), an experiment was conducted at wetlands, Tamil Nadu Agricultural University, Coimbatore during Kharif 1986. Population of 66 and 80 hills/m^2 and fertilizer combinations (N-K_2O kg/ha), control (No NK), 75-50, 150-50, 150-100, 225-50 and 225-100 were tested in a split plot design replicated four times. The population of 80 hills/m^2 was found to increase the yield parameters and yield of rice. Fertilizer combination of 150-50 kg N K_2O/ha was optimum in increasing the growth and yield parameters, DMP, nutrient uptake and production of rice.

In the present day agriculture, fertilizer management plays greater role in maximising the productivity of field crops. Of the major nutrients, nitrogen and potash are found to give response in increasing the productivity of rice. Optimum combination of these fertilizers not only economise the cost but also maximise the yield. Maintaining optimum plant population is another important factors that contribute higher yield with least cost involvement. A study was undertaken to test-verify the effect of population and fertilizers combination of the major nutrients, N and K_2O, for getting higher yield of popular short duration rice variety, IR 50 in a clay loam soil of Tamil Nadu.

MATERIALS AND METHODS

Field experiment was conducted at wetlands, Tamil Nadu Agricultural University, Coimbatore during Kharif (June-October) 1986 in a split plot design replicated four times. Populations, 66 (15x10 cm) and 80 (12.5x10 cm) hills/m^2 were tested in the mainplots and N-K_2O (Kg/ha) combinations, viz. 75-50, 150-50, 150-100, 225-50 and 225-100 and a control (No N K_2O) in the sub-plots. Nitrogen (urea) and potassium (muriate of potash) as per the treatments were split appied at 50% basal, 25% at tillering and 25% at panicle initiation. Phosphorus (Super-phosphate) at 50 Kg P_2O_5/ha was basally applied. The soil was clay loam, low in available N (250kg/ha), medium P (24 kg/ha) and high K (780 Kg/ha) with a pH of 8.3. Plant height, number

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of tillers and LAI were recorded at flowering and number of panicles, filled grains and test grain weight at maturity. Plant samples collected at different stages were analysed for nutrient (NPK) content and uptake worked out. Grain yield was recorded at 14% moisture and straw sun-dried and yield recorded.

RESULTS AND DISCUSSION

Growth and Yield Parameters (Table - 1)

Plant height was similar in both the population levels. Significantly more number of tillers were produced with 66 hills/m^2 but LAI was more with 80 hills/m^2. Among the yield parameters, only panicle number was increased by the higher population. Fertilizer levels increased the plant height significantly. Plants were taller in plots receiving 225-50 and 225-100 kg N K_2O/ha. Number of tillers and LAI increased with the fertilizer levels, but 150 and 225 kg N/ha were on a par. Increasing the fertilizer combinations increased the number of panicles and filled grains but not the 1000 grain weight. However, beyond 150-50 kg N K_2O/ha, there was no significant increase in number of panicles and filled grains.

Drymatter production (DMP) (Table - 2)

Drymatter production increased steadily with advance in growth stages and reached maximum at harvest. DMP was more or less similar with population levels during all the stages. Increasing the fertilizer levels increased the DMP significantly and 225 and 150 kg N/ha were on a par. Increased K levels did not influence the DMP significantly and a fertilizer combination of 150-50 kg N K_2O/ha found to be adequate.

Nutrient uptake

Nitrogen Uptake (Table - 3)

Nitrogen uptake increased from tillering to maturity due to increase in DMP. Higher population levels increased the N uptake and it was more with increased levels of fertilizer at all the growth stages. However, beyond 150 kg/ha, there was no significant increase in N uptake. Uptake was more or less similar due to K levels. Khauta et.al., (1976) informed that effect of K at lower levels was greater on nutrient uptake compared to higher levels.

Phosphorus Uptake (Table - 4)

There was increased P uptake with higher population which had produced more DMP. Fertilizer levels though steadily increased the P uptake, application of 150-50 kg N K_2O/ha was found adequate. Further increase in fertilizer level did not increase the P uptake significantly. The soil of the experiment field was adequately supplied with P. Under reduced conditions of the rice soil, solubility and availability of P are more and so uptake of P was not much influenced by higher fertilizer rates.

Potassium uptake (Table - 5)

Maximum K uptake occurred from late tillering to heading. At all the stages, higher population level (80 hills/m^2) recorded higher uptake of K mainly due to more of DMP in that

Table - 1 : Effect of population and N K_2O levels on growth and yield components of rice (IR 50)

	Treatment	Plant height (cm)	Number of tillers/hill	LAI	Panicles (No/m^2)	Filled grains (No/panicles)	1000 grain weight (g)
I	Population						
	66 hills/m^2	74	8.1	4.5	431	68	20.24
	80 hills/m^2	76	7.6	5.0	452	69	20.5
	CD (P=0.05)	NS	0.5	0.2	27	NS	NS
II	N K_2O combinations(kg/ha)						
	Control	65	6.9	3.3	382	63	20.0
	75-50	72	7.6	4.6	418	66	20.2
	150-50	75	8.3	5.0	476	72	20.6
	150-100	76	8.0	4.8	455	72	20.3
	225-50	79	8.1	5.6	469	69	20.6
	225-100	79	8.3	5.4	449	69	20.4
	CD (P=0.05)	2	0.6	0.7	28	4	NS

Table 2. **Effect of population, N K_2O combinations on dry matter production (t/ha) of rice (IR 50)**

Treatment	Growth stages			
	Tillering	Panicle initiation	Flowering	Harvesting
Population				
66 hills/m^2	0.98	2.91	8.57	10.05
80 hills/m^2	1.14	3.55	10.33	1.65
CD (P=0.05)	NS	0.58	NS	NS
N K_2O (Kg/ha)				
Control	0.74	2.43	7.85	8.54
75-50	0.96	3.03	9.33	10.33
150-50	1.16	3.28	9.80	11.76
150-100	1.13	3.53	9.62	11.51
225-50	1.20	3.45	10.06	11.44
225-100	1.17	3.65	9.81	11.50
CD (P=0.05)	0.15	0.36	0.88	0.86

treatment. Fertilizer levels upto 150-50 kg N K_2O/ha increased the K uptake steadily. Increasing K to 100 kg /ha did not exert any significant advantage in K uptake. This might be due to rich of K in the soil. Venkataraman (1980) reported that application of 25 kg K_2O/ha was adequate for rice.

Grain and Straw Yields (Table - 6)

Grain and Straw yield were significantly more with higher population levels. This was due to increased number of panicles, filled grains and higher DMP. Increase in fertilizer levels increased the grain and straw yields significanlty. Higher grain yield was obtained with 150-50 kg N K_2O/ha and further increase in fertilizer levels increased the weed infestation in the early stages and blast incidence in the later stages causing reduction in yield. Increasing the fertilizer application increased the straw yield and 225-100 kg N K_2O/ha gave the highest yield of straw. However, it was on par with 150-50 kg NK/ha. There was no added advantage of increased K application both in grain and straw yields beyond 50 kg K_2O/ha. This might be due to high K content in clay soil of the experimental field.

Results of the experiment reveal that a population of 80 hills/m^2 increased the biometrics, DMP, nutrient uptake and yield of rice. A fertilizer combination of 150-50 kg N K_2O/ha was found

Table - 3 : Effect of population, N K_2O combinations on N uptake (kg/ha) of rice (IR 50) at different growth stages

Treatment	Tillering	Panicle initiation	Flowering	Harvesting	
				Grain	Straw
Population					
66 hills/m^2	25.3	62.4	139	31.2	71.8
80 hills/m^2	25.6	70.5	161	37.6	76.8
CD (P=0.05)	NS	NS	11	3.4	NS
N K_2O (kg/ha)					
Control	15.2	43.8	110	27.6	55.1
75-50	24.4	60.7	146	32.2	68.5
150-50	29.7	72.3	167	37.5	89.9
150-100	26.1	68.9	147	36.2	77.4
225-50	28.0	71.6	165	36.2	78.5
225-100	29.3	81.2	165	36.7	76.5
CD (P=0.05)	3.0	6.8	12	2.6	5.9

Table 4 : Effect of popultion, N K_2O combinations on P uptake (kg/ha) of rice (IR 50) at different growth stages.

Treatment	Tillering	Panicle initiation	Flowering	Harvesting	
				Grain	Straw
Population					
66 hills/m^2	3.2	7.4	17.1	15.8	5.5
80 hills/m^2	3.4	8.9	19.7	16.4	6.4
CD (P=0.05)	NS	1.2	1.8	NS	0.5
N K_2O (kg/ha)					
Control	2.1	5.3	14.1	11.8	17.7
75-50	2.9	7.2	17.5	14.2	20.9
150-50	4.0	8.8	20.9	19.2	27.1
150-100	3.5	8.7	18.9	17.4	25.3
225-50	3.6	9.1	19.7	16.7	26.3
CD (P=0.05)	0.1	0.7	1.6	1.7	0.1

Table 5 : **Effect of population, N K_2O combination of K uptake (kg/ha) rice (IR 50) at different growth stages**

Treatment	Tillering	Pinacle initiation	Flowering	Harvesting	
				Grain	Straw
Population					
66 hills/m^2	23	58	127	52	62
80 hills/m^2	27	70	152	54	73
CD (P=0.05)	3	11	14	NS	8
N K(kg/ha)					
Control	15	43	108	38	53
75-50	21	55	135	48	65
150-50	30	69	147	63	70
150-100	27	70	143	56	72
225-50	28	69	150	56	71
225-100	29	76	153	55	74
CD (P=0.05)	3	5	10	5	6

Table - 6: **Effect of population, N_2O combinations on grain and straw yield of rice (IR 50)**

Treatment	Grain yield (t/ha)	Straw yield (t/ha)
66 hills/m^2	6.2	4.5
80 hills/m^2	6.7	5.4
N K_2O (kg/ha)		
75-50	5.0	4.1
150-50	5.8	4.1
150-100	6.9	5.2
225-50	6.9	5.2
225-100	6.6	5.4

to be adequate in increasing the growth and yield parameters, DMP, nutrient uptake, grain and straw yields of short duration rice (IR 50).

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PATH COEFFICIENT ANALYSIS IN BLACKGRAM*

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ABSTRACT

Variability, heritability and genetic advance were estimated for sixteen characters in twenty blackgram (Urd) types. phenotypic and genotypic coefficient of variation for dry leaf weight was high followed by seed yield and leaf area. Genetic advance was high for seed yield followed by dry leaf weight. Seed yield per plant showed significant positive correlation with all the characters except number of primary branches, specific leaf weight and protein per cent. path coefficient analysis revealed plant height and primary leaf area had higher positive direct effect on seed yield and 100 seed weight recorded highest negative direct effect on seed yield.

INTRODUCTION

Yield improvement of any crop can be achieved by developing superior varieties by altering the genetic make up of the existing varieties. For this, information on genetic variability existing in the material chosen will facilitate the improvement knowledge on association of grain yield with yield components will help the breeder to formulate the selection criteria for improving the yield of blackgram. With this objective, the present investigation was undertaken to determine the correlation and direct and indirect association among the yield attributes through path coefficient analysis.

MATERIALS AND METHODS

Twenty genotypes of blackgram were raised in a randomized block design with three replications during summer, 1984 at Millet Breeding Station, Agricultural College and Research Institute, Coimbatore. Each genotype was sown in a row of 3 m long spaced at 45 cm apart. Plant to plant distance was maintained at 30 cm. Observations were recorded on five randomly selected plants for sixteen characters (Table - 1) and were subjected to analysis of variance and covariance as suggested by Panse

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