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EFFECT OF SPLIT APPLICATION OF POTASSIUM TO LOWLAND RICE GROWN IN MARGINALLY SALINE SOILS

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ABSTRACT

Field experiments were conducted in rabi and kharif seasons to find out the effect of potassium application on lowland rice in marginally saline soils. The results indicated that application of 125 kg k2 O/ha in three splits at transplanting, maxmium tillering and panicle primordium initiation stages significantly increassed the plant height, number of panicless/m2, dry matter production (DMP) in both the seasons. Leaf area index (LAI) was maximum at 125 kg k2O/ha in three splits during kharif season and for rabi season it was maximum under 93.75 kg k2O/ha in three splits. Highest grain yield was obtained with 125 kg k2O/ha applied in three splits in both the seasons.

One way of achieving larger rice production is the extension of area to problem soils. There are larger areas of saline soils in the coastal belts of Tanjore and Chidambaram Taluks of South Arcot Districts. These lands are grown with lowland rice, as this is the only crop which provides marginal returns to the farmers. Helal and Mengel (1979) reported that growth of salinized plants may be improved by adding K. Biswas (1976) concluded that split application of K alongwith N increased the yield in saline soil. Based on these observations the study was undertaken.

MATERIALS AND METHODS

Field experiments were conducted at two locations, one at Kille village during rabi and another at Annamalai University experimental farm, Annamalai nagar during kharif. The soil was clay and clay loam with a pH of 7.8 and 7.6 and ECe of 3.3 and 2.9 m.mhos/cm respectively. The available N was very low (128.8 and 142.5 kg/ha respectively), medium in P availability (39.3 and 36.8 kg/ha) and medium in available K (134.4 and 150.0 kg/ha). Four levels of potassium were applied as basal and three splits at transplanting, maximum tillering and panicle primordium initiation stages. The nitrogen and phosphorous were applied at the rates of 125 and 625 kg/ha for the treatments receiving 62.5, 93.75 and 125 kg k_20/ha, 145 kg N and 62.5 kg P_205/ha were applied to the treatments at 84 kg k_20/ha as per soil test recommendation. The nitrogen dose was given to all the treatments in three equal splits at basal, maximum tillering and panicle primordium inititiation stages. The entire phosphorous was applied as basal. The experiment was laid out in randomised blocks design with four replications.

RESULTS AND DISCUSSION

Effect of potassium on growth parameter

Growth parameters such as plant height, dry matter production and leaf area index were significantly influenced by the application of potassium. Application of potassium at 125 kg/ha in three splits significantly increased the plant height. This was on par with the treatments receiving 93.75 kg K_2O/ha in three splits in rabi season only. The leaf area index (LAI) was significantly higher under the treatments receiving 93.75 kg K_2O/ha in three splits for rabi season. For Kharif season LAI was maximum when K was applied at 125 kg k_20/ha in three splits.

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Table 1. Effect of split application of potassium on growth and yield on rice.

Levels of potassium (kg K_2O/ha)	Rabi							Kharif						
	Plant height at flowering (cm)	LAI at flowering	Dry matter production at maturity (t/ha)	No. of panicles/ m^2	Straw yield (t/ha)	Grain yield (t/ha)	Increase over control (%)	Plant height at flowering (cm)	LAI at flowering	Dry matter production at maturity (t/ha)	No. of panicles/ m^2	Straw yield (t/ha)	Grain yield (t/ha)	Increase over control (%)
62.5 kg (full basal)	73.7	5.5	9.7	176.0	5.94	3.50	--	67.3	5.5	8.9	396.0	5.25	3.75	--
84.0 kg (full basal)	81.7	6.1	9.9	219.3	6.06	3.60	2.85	69.4	5.7	9.3	409.3	5.46	3.83	2.13
93.75 kg (full basal)	78.2	6.5	10.6	264.0	6.32	3.70	5.71	69.7	5.8	9.5	442.2	5.60	3.95	5.33
93.75 kg (3 splits)	82.7	7.7	11.5	309.6	7.23	4.33	23.70	73.5	6.0	10.4	507.0	5.85	4.50	20.00
125.0 (full basal)	79.5	6.1	11.0	294.8	6.81	4.03	15.14	68.1	5.9	10.0	468.6	5.70	4.20	12.00
125.0 (3 splits)	84.0	7.0	12.2	322.5	7.61	4.64	32.57	75.2	6.2	10.9	520.0	6.18	4.75	26.67
SEd	1.58	0.08	0.38	21.78	0.141	0.084	--	1.95	0.24	0.25	28.46	0.072	0.090	--
CD (P = 0.05)	2.38	0.13	0.57	32.83	0.213	0.127	--	2.94	0.36	0.37	42.9	0.109	0.137	--

With regard to dry matter production, application of potassium at 125 kg/ha in three splits was found to increase significantly which was followed by the application of 93.75 kg k_2O/ha in three splits in both the seasons.

Effect of K on yield and yield parameter

(a) Number of panicles/m2

In both the seasons application of potassium at 125 kg/ha significantly increased the number of panicles/m2 (Table 1) and it was on par with the treatments receiving 93.75 Kg K_2O/ha in three splits. This is in accordance with the findings of Ramiah (1979).

(b) Grain yield

Highest grain yield was obtained with application of 125 Kg K_2O/ha in three splits with an yield of 4.64 t/ha and 4.75 t/ha respectively in both the seasons. The treatments receiving 125 Kg K_2O/ha in three splits at basal, maximum tillering and panicle primordium initiation stages registered an increase of 32.57 per cent and 26.67 per cent grain yield respectively over control (Table 1). This brings out clearly the superiority of split application of potassium. This additional grain yield may be due to increase in yield parameters of rice. Similar trends were also reported by Balram singh *et al.* (1977) and Biswas (1976).

(c) Straw yield

In both the seasons application of K at 125 kg/ha in three splits significantly influenced the straw yield with an yield of 7.67 t/ha and 6.18 t/ha respectively. The increase in straw yield might be due to the application of potassium in split doses alongwith N in marginally saline soil. The split application had increased yield parameters like plant height, tiller number, LAI which in turn increased the straw yield significantly.

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