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PHOSPHORUS AND POTASSIUM REQUIREMENT OF GROUNDNUT IN RICE - GROUNDNUT SYSTEM

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ABSTRACT

In field trials conducted in a rice-groundnut cropping system in which rice crop received normal rates of NPK the yield of succeeding groundnut was the highest at 60 kg K_2O/ha while the application of phosphorus could not influence the pod yield.

Key words: P and K requirement, rice-groundnut system

Rice-groundnut is the major cropping system in Lower Bhavani project area of Periyar district accounting for about 80,000 ha. Response to application of fertilizers to groundnut, is at variance. The present manurial recommendation is to apply fertilizers for individual crops without considering the residual effect of the fertilizer applied to the previous crops. Efficiency of fertilizer applied to rice seldom exceeds 40 per cent. Therefore there is a necessity to systems approach in fertilizing which calls for working out fertilizer schedule for component crops in a cropping system rather than crop in isolation. Fertilizer requirement of groundnut in rice-groundnut sequence has been studied by Ramaseshaiah *et al.* (1985). To find out whether the fertilizer applied to groundnut can be economised in rice-groundnut, field experiments were conducted at the Agricultural Research Station, Bhavanisagar during 1983-86 with groundnut variety Co.1 as test crop.

MATERIALS AND METHODS

The experiments were conducted in a sandy loam soil which analysed for 190, 14.9 and 191 kg/ha in available NPK status respectively. The soils were free from salinity and alkali hazards. Every year rice (IR 20) was grown during August to December with recommended dose of fertilizer application (120: 60:60 kg/ha of NPK). After the harvest of rice crop groundnut was raised during December 15th to April 15th with five levels in each of P and K as shown below.

P_2O_5 : O,10,20,30 and 40 kg/ha
K_2O : 0,15,30,45 and 60 kg/ha

Each treatment was replicated three times in a randomised block design. The crop received a uniform dose of N at 20 kg/ha. Entire doses of fertilizers were applied basally. The crop was given a spacing of 30 cm between rows and 10 cm within the row. Routine cultural practices were followed in raising the crop. At the time of harvest from five plants in each plot selected at random, the number of mature and immature pods were observed. Pod and haulm yields were recorded plotwise.

RESULTS AND DISCUSSIONS

Pod yield data (Table 1) revealed that in two out of four years application of P_2O_5 upto 40 kg/ha did not result in significant yield increase. The same trend was revealed by the pooled analysis also. In the case of potash application, it was revealed that in three out of four years the highest pod yield was under the highest dose of applied K (60 kg K_2O/ha). However, the differences attained the level of significance only during 1983 and 1986. Pooled analysis of the pod yield data also revealed that the highest pod yield was

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Table 1.Effect of varying levels of P and K on pod and haulm yields of groundnut

Treatment	Pod yield (kg/ha)					Haulm yield (Kg/ha)				
	1983	1984	1985	1986	Pooled mean	1983	1984	1985	1986	Pooled mean
P_0	1184	1157	1906	1407	1413	1229	2857	2020	2029	2034
P_{10}	1121	1117	1816	1594	1412	1258	2952	2131	2049	2098
P_{20}	1227	1146	1729	1512	1405	1248	2609	1944	1989	1948
P_{30}	1308	1300	1889	1552	1512	1285	2628	2451	2021	2096
P_{40}	1106	1260	1792	1461	1405	1230	2647	2207	2050	2034
SE_D	37.5	50.7	122	39.9	57.1	----------			NS	----------
CD	75.4	NS	NS	79.8	NS					
K_0	1049	1043	1752	1227	1261	1069	2514	2030	1979	1898
K_{15}	1135	1248	1735	1417	1384	1147	2705	2116	2050	2001
K_{30}	1240	1203	1852	1555	1463	1316	2838	2040	2009	2051
K_{45}	1123	1254	1866	1637	1470	1318	2629	2066	2020	2008
K_{60}	1440	1243	1954	1688	1582	1405	3009	2100	2262	2194
SE_D	37.5	50.7	122	39.9	57.1	425	701	263	142	79
CD	75.4	NS	NS	79.8	114	NS	NS	NS	NS	157

under the highest dose of added K. This dose was on par with that of 45 kg/ha.

With regard to the effect of phosphorus it was observed that in two out of four years application of P_2O_5 at 30 kg/ha resulted in higher pod yield. However, the pooled data indicated that increasing doses of P did not increase the pod yield. In the case of haulm yield, in all the four years application of varying levels of P_2O_5 did not result in marked yield differences. Even-though application of K_2O did not result in significant difference in haulm yield in individual years, the pooled analysis revealed that higher haulm yield was under the 60 Kg K_2O application. The number of matured and immatured pods per plant did not vary due to varying levels of applied P and K. Hence, the increase in pod yield due to K might be attributed to a possible increase in seed weight. Lack of response to applied P in the present investigation could be due to the fact that the experimental soils were medium in available phosphorus (14.9 kg/ha). Residual effect of phosphorus applied to the previous rice crop could be another reason for lack of response to applied P as the residual response to fertilizer phosphorus has been considered to be large (Kanwar *et al.*, 1982). Besides, groundnut is reported to solublize more phosphorus which might be unavailable to cereals or other crops and may leave the soil richer in plant nutrients (Singh and Sahu, 1981). Non-significant response to P application in groundnut was reported by Jayachandran *et al.* (1971) and Mariakulandai and Morachan (1965). Positive response to K application could be due to the fact that the initial available K_2O content of soil was low (101 kg/ha). Similar trend of yield increase due to applied potash was reported by Natarajan *et al.* (1973). Reviewing the permanent manurial experiments on groundnut at Tindivanam, Viswanathan *et al.* (1979) reported a positive response to applied potassium.

In a rice-groundnut sequence Ratnaprasad *et al.* (1987) also observed higher pod and haulm yield of groundnut at 60 kg K_2O.

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