

Studies on the Effect of Phosphorus and Potassium on the Yield and Shelling Percentage of Groundnut *

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A pot experiment was conducted to study the effect of phosphorus and potassium on the yield of pods, haulms and shelling percentage in groundnut in the calcareous and non-calcareous red soils of Tamil Nadu. The non calcareous red soil recorded significantly higher yield of pods. Application of phosphorus and potassium significantly increased the yield of pods and the highest pod yield was obtained by the combined application of 60 kg P₂ O₅/ha and 90kg K₂ O/ha. Phosphorus alone significantly increased the yield of haulms. The shelling percentage was increased by the application of both phosphorus and potassium.

Groundnut plays an important role in the internal and external economy of India as an oil seed crop. However, the yield obtained in our country are far below the average yield in the other countries. Kanwar (1963) reported that groundnut responds to phosphorus in areas deficient in that nutrient. Saini and Sandhu (1973) recorded increased yield of pods in groundnut with phosphorus. Jayachandran et al. (1973) observed increased yield of pods with potassium. But the data available for red soils of Tamil Nadu, where groundnut is grown to a large extent is meagre. Hence this study was taken to find out the effect of phosphorus and potassium on the yield of pods, kernels, haulms and shelling percentage of groundnut in calcareous and non-calcareous red soils of Tamil Nadu.

MATERIAL AND METHODS

A pot experiment was conducted with groundnut POL 2, a high yielding bunch variety with 105 days duration as test crop in calcareous (S₁) and non calcareous (S₂) red soils, collected from groundnut growing areas of Pollachi. Phosphorus was applied as monoammonium phosphate at 0 (PO) 40 (P1) and 60 kg (P2) P₂O₅ /ha and potassium was applied as muriate of potash at 0 (KO), 60 (K1) and 90 (K2) kg K₂O/ha. The pots which were treated with phosphorus were given lesser amount of nitrogen in order to compensate for the nitrogen applied through monoammonium phosphate. The compost and nitrogen as urea were applied at 12.5t/ha and 20 kg N/ha respectively to all the pots. The seeds were treated with 0.2 per cent

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cerason and rhizobium culture before sowing. The seeds were sown at the rate of 4 seeds/pot and only 3 plants were allowed to grow after germination. The crop was harvested when the pods were fully matured and the yield of pods and haulms were recorded. The data pertaining to pod yield, haulm yield and shelling percentage are furnished in tables I to III.

RESULTS AND DISCUSSION

Yield of Pods

The non-calcareous red soil recorded significantly higher pod yield (25.09 g/pot) than the calcareous red soil (21.11 g/pot). (The application of phosphorus significantly increased the yield of pods from 18.04 to 27.16 g/pot. This conforms the findings of Saini and Sandhu (1973) who recorded increased yield of pods with phosphorus. The beneficial effect of phosphorus on fruiting may be attributed to the increased yield of pods (Cockfair, 1931 and Buckman and Brady, 1967).

The application of potassium significantly increased the yield of pods from 20.16 to 25.64 g/pot. This is in accordance with the findings of Jayachandran et al. (1973) who recorded increased yield of groundnut pods with potassium application. The interaction of the levels of phosphorus and potassium had a significant influence on the yield of pods. At all levels of potassium, the application of phosphorus significantly increased

the yield of pods. The highest yield of pods (31.87 g/pot) was obtained by the combined application of phosphorus and potassium at 60 kg P_2O_5 /ha and 90 K_2O /ha respectively in the non-calcareous red soil. This conforms the findings of Acuna and Sanchez (1969) who reported that potassium application increased the yield of kernels and also increased the effectiveness of the applied phosphorus in groundnut.

Yield of haulms

The non-calcareous red soil recorded slightly higher yield of haulms (22.47g/pot) than the calcareous red soil (21.80 g/pot). The application of phosphorus significantly increased the yield of haulms from 18.50 to 25.25 g/pot and this might be due to the increased cell division and cell elongation by the applied phosphorus, leading to increased meristematic activity as reported by Russel (1963) and also better utilization of nitrogen in the presence of adequate amount of phosphorus as reported by Raheja (1966). The application of potassium increased the yield of haulms from 21.20 to 23.41g/pot.

Shelling percentage

The non-calcareous red soil recorded slightly higher value for the shelling percentage (73.44 per cent) than the calcareous red soil (77.67 per cent). The application of phosphorus significantly increased the shelling percentage from 75.28 to

80.89 per cent and this might be due to the synthesis of carbohydrate, protein and fat constituting the kernels and resulting in good development of the kernels. Bayer and Walmsley (1974) observed increased shelling percentage with the application of phosphorus. The application of potassium increased the shelling percentage from 75.53 to 80.17 per cent and this might be due to good filling and development of the kernels by the applied potassium.

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TABLE I Effect of P and K on Pod Yield of Groundnut (Mean of 3 replications in g/pot)

Treatments	Calcareous red soil				Non-calcareous red soil			
	0	60	90	Mean	0	60	90	Mean
K ₂ O Kg/ha P ₂ O ₅ Kg/ha								
0	11.20	15.27	16.87	14.44	17.43	23.40	25.63	21.63
40	19.03	23.37	26.70	23.03	23.43	25.43	27.87	25.18
60	24.27	25.23	27.67	25.86	24.03	26.70	31.87	28.46
Mean	18.17	21.42	23.74	21.11	22.16	25.58	27.53	25.09

Mean Yield (g/pot)

	S ₁	S ₂	SE of mea	CD (P = 0.05)	
1. Soils	21.11	25.09	0.37	1.11	
2. Levels of P	P ₀ 18.04	P ₁ 24.11	P ₂ 27.16	0.47	1.35
3. Levels of K	K ₀ 20.16	K ₁ 23.50	K ₂ 25.64	0.47	1.35

TABLE II. Effect of P and K on Haulm Yield of Groundnut (Mean of 3 replications in g/pot)

Treatments	Calcareous red soil				Non-calcareous red soil			
	0	60	90	Mean	0	60	90	Mean
K_2O Kg/ha								
P_2O_5 Kg/ha								
0	17.23	17.80	20.80	18.61	17.87	17.63	17.73	18.41
40	22.20	22.17	23.30	22.56	21.67	22.63	24.07	22.79
60	22.60	24.23	25.87	24.23	25.60	26.39	26.70	26.20
Mean	21.68	21.40	23.32	21.80	21.71	22.19	23.50	22.47

Mean Yield (g/pot)

1. Soils	S_1		S_2	SE of mean	CD (P = 0.05)
	21.80		22.47		NS
2. Levels of P	P_0	P_1	P_2		
	18.50	22.67	25.25	0.65	1.87
3. Levels of K	K_0	K_1	K_2		
	21.20	21.80	23.41		NS

TABLE III Effect of P and K on Shelling Percentage in Groundnut (Mean of 3 replications in per cent)

Treatments	Calcareous red soil				Non-calcareous red soil				
	K_2O Kg/ha P_2O_5 Kg/ha	0	60	90	Mean	0	60	90	Mean
0		69.80	76.78	77.49	71.55	71.55	77.28	78.78	75.87
40		78.16	78.46	79.72	78.78	76.02	76.99	78.95	77.32
60		76.88	79.84	82.36	79.55	80.66	81.91	83.78	82.12
Mean		76.17	77.13	79.72	79.67	76.08	78.73	80.50	78.44

Mean values (per cent)

1. Soils	S_1	S_2	SE of Mean	CD (P = 0.05)
	77.67	78.44		NS
2. Levels of P	P_0	P_1	P_2	
	75.28	78.05	80.89	0.77
3. Levels of K	K_0	K_1	K_2	
	75.53	78.54	80.17	0.77
				2.23