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Effect of Phosphate Rock Enriched FYM on Yield, Uptake and Quality of Groundnut (*Arachis hypogaea* L.)

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ABSTRACT

A field experiment conducted during *rabi*, 2005-06 on sandy soils of Agricultural College Farm, Bapatla to evaluate the agronomic efficiency of phosphate rock enriched FYM in groundnut (*Arachis hypogaea* L.), recorded significantly the highest pod and haulm yields, phosphorus uptake, oil content and oil yields of groundnut were with the treatment that received phosphate rock enriched FYM (PROM) made of double the recommended dose (DRD) of P_2O_5 through PR and FYM in 1:4 ratio compared to the remaining treatments.

Key words : FYM,Groundnut,Phosphate rock,P uptake,Yield

Groundnut (*Arachis hypogaea* L.), an important oilseed grown in India, is a unique commercial crop and has been described as the nature's masterpiece of food values (Nagaraj and Reddy, 1986). Application of organic sources or enriched FYM was found to reinforce the quality parameters of groundnut and other legume crops.

Phosphate rich organic manure (PROM) comprises composting high grade phosphate rock in fine size with natural organic matter collected from variety of sources such as FYM, rice or wheat straw, pressmud, karanj cake or waste from fruit industries etc. It is sometimes more effective than conventional phosphatic fertilizers.

Treating phosphate rock with farm yard manure (FYM), green leaf manure and other bio-culture is found to be effective in releasing phosphorus from phosphate rock in neutral and slightly calcareous soils. It is also well known that P solubilizing microorganisms occurring in the soils play an important role in releasing phosphorus from phosphate rock. Application of phosphate rich FYM to improve quality parameters is an attempt made to study the influence of phosphate rock enriched FYM on quality parameters of groundnut.

MATERIAL AND METHODS

An experiment was carried out in *rabi,* 2005-06 at the Agricultural College Farm, Bapatla. The soil was sandy and well drained having pH 7.1, with low organic carbon 0.13, available N (125 kg ha^{-1}), low in available phosphorus (11 kg ha^{-1}) and high in potassium content (256 kg ha^{-1}). The mean minimum and maximum temperatures during the crop growth period ranged from 15.3°C to 23.7°C and 29.4°C to 33.4°C, respectively with a total rainfall of 8.5 mm.

The experiment comprised of eight treatment combinations laid in randomized block design with three replications. Seed inoculation with *Rhizobium* was common for all the treatments. The test variety wasTMV-2 which was sown after inoculation. The crop was sown on 26-11-2005 and harvested on 6-3-2006 following the recommended package of schedules with the following treatment details.

T_1 = Control (no phosphorus)

T_2 = RD (recommended dose) of P_2O_5 through SSP (normal practice)

T_3 = PROM made of RD of P_2O_5 through PR and FYM in 1:2 ratio.

T_4 = PROM made of RD of P_2O_5 through PR and FYM in 1:3 ratio.

T_5 = PROM made of RD of P_2O_5 through PR and FYM in 1:4 ratio.

T_6 = PROM made of DRD (double the recommended dose) of P_2O_5 through PR and FYM in 1:2 ratio.

T_7 = PROM made of DRD of P_2O_5 through PR and FYM in 1:3 ratio.

T_8 = PROM made of DRD of P_2O_5 through PR and FYM in 1:4 ratio

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RESULTS AND DISCUSSION

Application of PROM made of double the recommended dose (DRD) of P_2O_5 through PR and

Table 1. Effect of phosphate rock enriched FYM on Yield, quality and uptake of groundnut (*Arachis hypogaea* L.)

Treatments	Pod yield kg ha^{-1}	Haulm yield kg ha^{-1}	Phosphorus up take (kg ha^{-1})				Oil content (%)	Oil yield kg ha^{-1}
			30 DAS	60 DAS	90 DAS	Harvest		
T_1 - Control	1619	2350	0.9	4.0	8.5	9.1	39.8	386.5
T_2 - RD of P_2O_5 through SSP	2565	3380	2.0	7.5	13.5	17.2	42.2	771.1
T_3 - PROM made of RD of P_2O_5 through PR and FYM in 1:2	1755	2477	1.1	4.6	9.4	10.8	40.1	450.5
T_4 - PROM made of RD of P_2O_5 through PR and FYM in 1:3	1969	2502	1.2	5.1	10.2	11.4	40.2	514.6
T_5 - PROM made of RD of P_2O_5 through PR and FYM in 1:4	2247	2792	1.7	6.2	11.7	14.6	41.4	647.8
T_6- PROM made of DRD of P_2O_5 through PR and FYM in 1:2	2326	2869	1.8	6.4	12.5	16.0	41.8	680.7
T_7- PROM made of DRD of P_2O_5 through PR and FYM in 1:3	2499	3281	1.9	7.2	13.2	17.1	42.4	758.5
T_6 - PROM made of DRD of P_2O_5 through PR and FYM in 1:4	2594	3408	2.0	7.8	14.0	19.5	42.5	802.3
SEm±	150.8	240.6	0.14	0.62	0.92	1.22	1.03	30.37
CD(p=0.05)	323.6	516.1	0.3	1.3	1.9	2.6	NS	65.1
CV(%)	8.4	10.2	11.2	12.5	9.7	10.4	3.1	5.9

FYM in 1:4 ratio (T_8) significantly increased the pod and haulm yields of groundnut over other treatments (Table-1). The increase in pod and haulm yields may be attributed to the phosphorus influence on pod development and filling by directly effecting the RNA and protein synthesis and indirectly the nitrogen fixing capacity of the nodules, which might have also helped in realizing the maximum pod yield (Rao and Singh, 1985).

Ravikumar *et al,* (1995) reported that increased phosphorus availability and improved mineral concentration might have improved plant growth substances which inturn altered the plant growth and enzyme activity, resulting in increased pod yield. Similar response of groundnut to phosphate rock and FYM was also reported by Saxena *et al.* (2004).

Phosphorus uptake at all the growth stages significantly increased with the application of PROM made of DRD of P_2O_5 through PR and FYM in 1:4 ratio (T_8) but was comparable with recommended dose (RD) of P_2O_5 through SSP (T_2), PROM made of double the recommended dose (DRD) of P_2O_5 through PR and FYM in 1:3 ratio (T_7) and 1:2 ratio (T_6) and PROM made of RD of P_2O_5 through PR and FYM in 1:4 ratio (T_5) (Table-1).

The increase in phosphorus uptake might be due to increased release of nutrients in soil from native pool as well as their residual effect (Manujanth *et al*. 2004).

Organic acids and chelates produced during decomposition of organic residues brought out by microorganisms is known to provide energy for nodulation and nitrogen fixation and the phosphorus tied up as insoluble Ca, Fe and Al may be released into soluble form (Dhillion and Dev, 1979).

Though no significant variation in oil content of groundnut was noticed, application of PROM made of the DRD of P_2O_5 through PR and FYM in 1:4 ratio (T_8) significantly increased the oil yield of groundnut. The increase in oil yield might be due to enhancement in the tryacyl glycerols, the major component of groundnut oil accompanied by a corresponding decrease in free fatty acids and sterols as registered in the present investigation confirm with the findings of Sukhija *et al,* (1984).

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