Karnataka J. Agric. Sci., 9 (3) : (526-528) 1996

Yield and Quality of Groundnut as Influenced by Rockphosphate, Organics and Phosphate Solubilizers

The crop response to water soluble phosphates are prompt and positive in normal soils, but their use in acid soils is highly constrained because of their fixation (Kanwar and Grewal, 1958). In India, nearly 260 million tonnes of rockphosphate deposit is present but the bulk of it is unsuitable for commercial fertilizer preparation owing to its low reactivity. Hence, attempts were being made to increase the reactivity of rockphosphate by incorporating different organics, P solubilizing micro organisms and various accumulating waste materials on crop yield (Gaur, 1990). The present study examines the usefulness of inclusion of organics and phosphate solubilizing micro organisms with Mussoorie rockphosphate on the yield and quality of groundnut in acid sandy loam soil.

A field experiement was laidout in a randomised block design, replicated thrice during the rainy season (Kharif, 1992) on a acid sandy loam soil at Agricultural Research Station, Sirsi, Uttara Kannada district, Karnataka. The soil had a pH of 5.6 and available N, P, K and S were 284, 10, 180 and 34 kg ha^{-1},respectively. There were 14 treatments viz., T_1: control, T_2: Single superphosphate (SSP), T_3: Mussoorie rockphosphate (MRP)m T_4: MRP + Phosphate solubilizing bacterium - *Pseudomonas striata* (PSB) T_5: MRP + Phosphate solubilizing fungus - *Aspergillus awamori* (PSF), T_6: MRP + Farmyard manure (FYM), T_7 : MRP + FYM + PSB, T_8 : MRP+FYM+PSB, T_9: MRP + Biogas spent slurry (BSS), T_{10}: MRP + BSS +PSB, T_{11}: MRP + BSS + PSF, T_{12}: MRP + Green manure (GM), T_{13} : MRP + GM +PSB and T_{14}: MRP + GM + PSF. Mussoorie rockphosphate and SSP were applied @ 50 kg P_2O_5 ha^{-1}. Variety Dh-3-30 (Spanish, bunch type) was sown at a spacing of 30 x 10 cm. Organic amendments were incorporated three weeks before the sowing of the crop and groundnut seeds were treated with phosphate solubilizing bacterium or fungus using jaggary solution as a coating material.

The crop was harvested after maturity. The number of pods per plant, pod yield, test weight and shelling percentage were recorded. The oil content in the kernels was recorded by Nuclear Magnetic Resonance Spectrophotometer. The per cent protein content was obtained by multiplying the per cent N in kernel with the factor 6.25.

Application of P either through water soluble or insoluble sources significantly increased the number of pods per plant, pod yield, test weight, shelling percentage and protein content in kernels (table 1). The effect can be ascribed to the increased photosynthetic activity and better plant growth with applied phosphorus. The addition of organic amendments and P-solubilizers along with MRP significantly increased the test weight, shelling percentage and protein content in kernels. This may be due to the higher release of P from MRP and its subsequent availability

Table1. Influence of rockphosphate, organics and phosphate solubilizers on yield and quality of groundnut

Treatments	Number of pods per plant	Pod yield (a/ha)	Shelling percent	Test weight (g)	Oil content (percent)	Protein Content (%)
No P (control)	12.00	11.87	66.00	28.90	44.50	18.56
SSP alone	23.00	16.70	68.00	29.10	44.95	18.81
MRP alone	20.0	16.01	67.30	29.05	44.85	18.69
MRP + PSB	22.00	16.40	67.90	29.10	44.86	18.69
MRP + PSF	22.00	16.79	68.30	29.15	44.86	18.69
MRP + FYM @ 10 tonnes ha^{-1}	22.00	16.48	67.90	29.13	44.86	18.75
MRP + FYM +PSB	25.00	18.00	68.60	29.20	44.95	18.88
MRP + FYM + PSF	25.00	19.80	69.30	29.25	45.00	18.94
MRP + BSS @ 10 tonnes ha^{-1}	22.00	16.30	67.60	29.11	44.87	18.69
MRP + BSS + PSB	24.00	17.00	68.30	29.20	44.94	18.88
MRP + BSS + PSF	25.00	18.60	68.60	29.23	44.98	19.00
MRP + GM@ 10 tonnes ha^{-1}	22.00	16.40	67.90	29.10	44.86	18.75
MRP + GM + PSB	24.00	17.70	68.50	29.18	44.95	18.88
MRP + GM + PSF	24.00	18.90	69.00	29.20	44.98	19.00
S.Em ±	1.23	0.28	0.09	0.01	0.09	0.02
C.D. at 5%	3.57	0.82	0.25	0.03	NS	0.06

NS = Non - significant

to plants by the action of organic acids and chelating substances secreted by added amendments. The readily available P in the soil has a significant influence on the metabolism of carbohydrates, fats and protein (Punnose and George, 1975) and thereby resulted in enhanced test weight, shelling percentage and protein content of groundnut. The oil content did not vary significantly with the applied phosphorus. This might be due to the adequate availability of sulphur in soil, which was sufficient to meet out the crop's requirement.

The pod yield did not vary significantly among the different P-sources (MRP and SSP). The beneficial effect of MRP can be attributed to the higher phosphate concentration maintained in the

soil by steady dissolution, reduction of Fe and Al activity through liming effect and supply of other nutrients viz., calcium, Potassium, Magnesium and Sulphur besides phosphorus (Panda, 1986). Besides phosphate solubilization, the phosphate solubilizing micro organisms are known to produce certain growth promoting substances like auxins and gibberlins which have beneficial effect on the plant growth and nutrients uptake (Piccini and Azcon, 1987). The combination of organics and P solubilizers alongwith MRP recorded significantly higher pod yield over the P-sources.

The results therefore confirmed the positive influence of the added organic materials and phosphate solubilizing micro-organisms alongwith rock phosphate on the pod yield and quality of groundnut crop.

Department of Agril. Chemistry and Soil Science College of Agriculture Dharwad

K.M. MANJAIAH, H.T.CHANNAL T. SATYANARAYANA

(Received, June, 1996)

References

GAUR, A.C., 1990, Phosphate solubilizing microorganisms as Biofertilizers. Omega scientific publishers, New Delhi, pp. 176.

KANWAR, J.S. AND GREWAL, J.S., 1958, Behaviour of different phosphatic fertilizers in Punjab soils. *Journal of Indian Society of Soil Science*, **6** : 215-222.

PANDA, N., 1986, Use of Mussoorie rockphosphate as P-fertilizer, Proceedings of National Seminar on Rockphosphates in Agriculture held at TNAU, Coimbatore, pp. 109-119.

PICCINI, D. AND AZCON, R., 1987, Effect of phosphate solubilizing bacteria and vesicular arbuscular mycorrhizal fungi on the utilization of Bayovar rockphate by alfalfa plants utilizing sand vermiculite medium. *Plant and soil*, **101** : 45-50.

PUNNOSE, K. AND GEORGE, C.M., 1975, Effect of applied nitrogen and phosphorus on the nodulation in groundnut. *Agricultural Research Journal of Kerala*, **13** : 169-174.