moisture in the root zone of the concerned palms in both treatments.

From this study, it is concluded that basin irrigation at IW/CPE ratio of 1.0 at 4 cm depth or drip irrigation at 100 per cent Eo on monthly basis can be recommended for young coconut palms in the western zone of Tamil Nadu.

REFERENCES

COPELAND, E.G. (1931). **The Coconut.** London : Macmillan & Co.Ltd

MOHANDAS, S., PANCHANATHAN, R.M., KULANDAIVELU, R. and KANDASWAMY, P. (1989). Assessment of water requirement for coconut. **Indian Coconut. J., 20** (1) : 10-11.

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AGRONOMIC EFFECTIVENESS OF ORGANIC SOURCES AND MUSSOORIE ROCK PHOSPHATE TO PHOSPHORUS ECONOMY IN RAINFED GREEN GRAM

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ABSTRACT

A field experiment was conducted in red lateritic soil during *Kharif* seasons of 1993 and 1994 to study the cumulative agronomic effectiveness of various organic sources with Mussoorie rock phosphate on phosphorus economy in green gram under rainfed condition. Use of Mussoorie rock phosphate (MRP) alone could not increase the grain yield significnatly. But its efficiency was increased by mixing with organic sources *viz.*, farm yard manure (FYM), enriched bio-digested slurry (BDS) and phosphobacteria inoculation. Application of MRP with seed inoculation of phosphobacteria and enriched BDS alone gave the highest benefit whereas, single super phosphate (SSP) alone was uneconomical under rainfed conditions.

KEY WORDS : Mussoorie rock phosphate, organic sources, enriched bio-digested slurry, Phosphobacteria

Rock phosphate is a good source of phosphorus in acidic soils but such mineral phosphates are not suitable for alkaline and neutral soils because of their citrate-insoluble phosphorus content (*Pathak and Tiwari, 1984*)). Mixing with any organic materials or with biofertilizers greatly increases the efficiency of rock phosphates. Besides, excessive use of single super phosphate could be effectively curtailed by the combined application of Mussoorie rock phosphate (MRP) with organic sources. This combination improves the activity of symbiotic N fixing bacteria which in turn are helpful in better N uptake, nodulation, root growth and root proliferation and yield. Hence, an experiment was carried out to test the agronomic effectiveness of MRP in combination with organic sources and phosphobacteria in rainfed green gram.

MATERIALS AND METHODS

A field experiment was carried out during *Kharif* seasons of 1993 and 1994 at the National Pulses Research Centre. The soil was red lateritic having 7.5 kg available P_2O_5/ha with pH 5.4 (strongly acidic in reaction). Treatments consisted of individual application of SSP and combinations of MRP (25 and 50 kg P_2O_5/ha) with organic sources (Table 1). All treatments were replicated thrice in randomized block design. All fertilizer materials were applied as basal. A total rainfall of 245 and 233 mm were received in 16 and 14 rainy days during crop growth periods of 1993 and 1994 respectively. Short duration green gram variety 'VGG1.' (60 days) was grown as a test variety. The crop was sown adopting a spacing of 30 x 10 cm at a seed rate of 15 kg/ha. The seeds were treated with Phosphobacteria @ 400g/ha seed rate before

Table 1. Effect of various organic sources and Mussoorie rock phosphate on growth parameters of green gram (25 DAS) (mean of two years)

Treatments	Plant height (cm)	Nodules (No./ Plant)	DMP (kg/ha)	Vigour Index
T_1 - Control	6.9	5.1	282	400.2
T_2 - 25 kg P_2O_5/ha as SSP	7.7	6.6	485	531.3
T_3 - 50 kg P_2O_5/ha as SSP	7.8	9.3	753	561.6
T_4 - 25 kg P_2O_5/ha as MRP+Phosphobacteria	9.1	27.4	1220	791.7
T_5 - 50 kg P_2O_5/ha as MRP+Phosphobacteria	8.2	21.6	972	746.2
T_6 - 25 kg P_2O_5/ha MRP+10t FYM/ha	8.2	16.2	685	631.4
T_7 - 50 kgP_2O_5 as MRP+10t FYM/ha	7.8	21.3	484	553.8
T_8 - 25 kgP_2O_5 as MRP+5t BDS/ha	7.6	21.3	868	600.4
T_9 - 50 kgP_2O_5 as MRP+5t BDS/ha	8.2	18.0	637	623.2
T_{10} - Phosphobacteria seed inoculation	8.5	10.9	503	646.0
T_{11} - FYM 10t/ha alone	8.0	11.5	497	552.0
T_{12} - Enriched BDS 5t/ha alone	8.7	23.6	987	713.4
CD (P=0.05)	0.2	13.2	309	-

SSP - Single Super Phosphate ; MRP - Mussoorie Rock Phosphate
BDS - Enriched Bio/digested Slurry.
Phosphobacteria @ 400 g/ha. seed rate.

sowing. A uniform dose of N @ 25 kg/ha and K_2O @ 20 kg/ha was appleid to all plots. The relative agronomic effectiveness (RAE) of treatments was calculated against single super phosphate (SSP) @ 50 kg P_2O_5/ha, as advocated by *Mathur et al* (1979). Data on growth characters, yield attributes and yield were statistically analysed and furnished in Tables 1 and 2 and Vigour index was calculated.

RESULTS AND DISCUSSION

Growth attributes

Application of 25 kg P_2O_5/ha as MRP combined with seed inoculation of Phosphobacteria significantly increased the plant height (PH), number of nodules/plant and dry matter production (DMP) of green gram (Table 1). The increased growth parameters might be due to the reason that phosphobacteria dissolves the insoluble 'P' in the soil and make it available to the crop plants for profused root and vegetative growth. Addition of organic sources to MRP (25 and 50 kg P_2O_5) increased the growth attributes significnatly as compared with sole organic sources except enriched BDS. Plots which received MRP at 50 kg P_2O_5/ha + Phosphobacteria and enriched BDS alone recorded taller plants, more number of nodules and DMP of green gram next to plot with MRP 25 kg/ha + phosphobacteria inoculation. Application of MRP as a source of phosphorus significantly enhanced the growth attributes as indicated by Verma and Sharma (1991). Vigour index was also higher under the treatments of MRP at 25 and 50 kg/ha + Phosphobacteria seed inoculation.

Table 2. Effect of various treatments on yield attributes, yield and economics of green gram (mean of two years)

Treatment	No.of pods/plant	Pod length (cm)	No.of seeds/pod	Grain yield (kg/ha)	Net return (Rs./ha)	RAE (%)
T_1	10.7	5.5	6.3	517	3755	-
T_2	12.3	7.0	8.0	634	4260	77
T_3	21.0	7.1	10.0	669	4785	100
T_4	45.3	8.3	12.3	1044	10635	346
T_5	25.3	6.4	8.7	799	6485	185
T_6	20.3	7.7	11.0	693	2795	116
T_7	20.7	6.6	9.7	708	2695	126
T_8	27.0	7.0	8.7	777	4655	171
T_9	39.3	7.8	11.7	813	4870	195
T_{10}	17.0	6.8	8.0	699	6285	120
T_{11}	14.3	6.9	8.3	600	3500	55
T_{12}	41.3	7.9	12.0	907	6805	257
CD(5%)	8.9	0.6	1.1	137	-	-

Cost of grains @ Rs.15/kg ; Cost of FYM and BDS @ Rs.400/ton ; Cost of Phosphobacteria @ Rs.10/200 gm pocket ; Cost of SSP @ Rs.135/50 kg ; Cost of MRP @ Rs.40/50 kg

Yield attributes and yield

The data on yield parameters revealed that the application of 25 kg P_2O_5/ha as MRP + phosphobacteria inoculation recorded significantly higher number of pods/plant, pod length and number of seeds/pod over other treatments (Table 2). The highest grain yield with increased net returns was also recorded under MRP at 25 kg/ha + phosphobacteria, which was closely followed by enriched BDS. The increase in grain yield might be due to better yield attributing parameters and better availability of P for higher production. P fertilization through MRP along with seed inoculation of phosphobacteria increased the grain yield which might to due to ability of phosphobacteria to dissolve the insoluble P in the soil and make it easily available to the plant which in turn helps to putforth profused growth and produced more yield attributes. Where as in other treatments (T_5 - T_9) the yields were low because most of the applied 'P' in the soil get fixed as iron and alumina complex by which the roots are not capable of absorbing Phosphorus from the soil pool-due to strongly acidic reaction of the soil (pH 5.4).

RAE was higher in 25 kg P_2O_5/ha as MRP + phosphobacteria seed inoculation. This was followed by enriched BDS alone. This suggests that green gram was benefited much by these treatments than other treatments. Generally, RAE was improved in MRP treatments with application of organic sources in soybean-sunflower system (Gopalakrishnan and Palaniappan, 1991). Individual application of either single super phosphate or FYM of Phosphobacteria seed inoculation were not economical, whereas enriched BDS alone recorded equally higher production due to its easily available nature to the crop plants.

Thus, for higher productivity of green gram, application of Mussoorie rock phosphate at 25 kg P_2O_5/ha along with seed inoculation of Phosphobacteria @ 400g/ha seed rate is economical in acid red lateritic soils under rainfed conditions.

REFERENCES

GOPALAKRISHNAN, B. and PALANIAPPAN, SP. (1991). Agronomic effectiveness of Mussoorie rock phosphate in Soybean-Sunflower cropping system. **India, J. Agron., 36**: 450-453.

MATHUR, B.S., JHA, K.K., LAL, S. and SRIVASTAVA, B.P. (1979). Utilization of rock phosphate deposits in acid soils of Chhota Nagpur Plateau in Bihar. **J. Indian Soc. Soil Sci., 35** : 249 - 252.

PATHAK, A.N. and TIWARI, K.N. (1984). **Fertilizer Use Efficiency Report on Wheat Research,** C.S. Azad Univ. Agric) Tech., Kanpur., 13pp.

VERMA, V.L. and SHARMA, N.L. (1991). Agronomic effectiveness of Mussoorie rock phosphate as a source of Phosphorus for wheat (*Triticum aestivum*). **Indian J. Agron., 36** : 329-332.

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GENETIC ANALYSIS IN LINSEED

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ABSTRACT

Genetic analysis of components of variation for seed yield, oil yield and yield components revealed the importance of both additive and non additive type of gene action in the inheritance of all the characters studied. However, preponderance of additive components was observed for phenological traits, *viz.*, days to flower and days to maturity, equal importance of both additive and dominance components for plant height, primary branches per plant, 500-seeds weight and seed oil content, whereas preponderance of dominance component was revealed for number of capsules per plant, seeds per capsule, seed yield per plant, biological yield per plant, harvest index and oil yield per plant. The biparental mating or diallel selective mating is suggested to exploit the genetic components for improvement of the characters studied.

KEY WORDS : Additive, genetic variance, biparental mating, diallel.

The breakthrough in boosting yield has not occurred in oil seed crops in general and linseed in particular. The yield being a complex character, the information regarding nature of gene action and