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Comparative Efficiency of Mussoorie Phos and Superphosphate on Rice (IR 20)

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Potculture studies made on the comparative efficiency of Mussoorie phos and superphosphate alone and their combinations with and without FYM in rice growing acid and neutral soils showed that superphosphate 100 per cent and the combination of superphosphate (25 %) Mussoorie Phos (75 %) and FYM produced higher yields. Acid soil responded well to P application.

Rock phosphate deposits occur to an extent of about 100 million tonnes (Jhingram and Chaudhuri, 1977), most of which are unsuitable for processing. Hence direct use of this deposits has to be explored. Ghildayal (1975) obtained appreciable response of crops to Mussoorie phos, a rock phosphate source from Mussoorie (UP) in phosphorus depleted acid to neutral soils, the ground Mussoorie phos can be used effectively in conjunction with water soluble inorganic phosphatic fertilizers and organic matter (Panda and Panda, 1969). The present study was taken up to compare the efficiency of Mussoorie phos and superphosphate on the yield of lowland rice, which is capable of utilising partially water soluble or in soluble phosphates because of the specific environment and rhizosphere.

MATERIAL AND METHODS

A pot trial was conducted on two rice growing soils, each representing

an acid and a neutral soil, with test crop of rice (IR 20). The acid soil was collected from a farmer's holding at Ambasamudram of Tirunelveli District. The neutral soil was collected from the New Area of Agricultural College and Research Institute, Madurai. The characteristics of the soils are furnished in Table I. Nine treatments were fixed and were replicated thrice. The treatment combinations are given in Table II. Mussoorie phos and superphosphate were analysed for water soluble, ammonium citrate soluble and total phosphorus with the procedure outlined in A.O.A.C. (1950). The 100 mesh size Mussoorie phos used in this study contained no water soluble P_2O_5 and 22.0 per cent of total P_2O_5 . The citrate soluble P_2O_5 was 8.6 per cent of the total P_2O_5 . Super phosphate used in this experiment contained 16.0 per cent water soluble phosphorus.

Based on the soil test values, calculated quantities of fertilizers were

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TABLE I Characteristics of Soils

Particulars	Acid soil of ASD*	Neutral soil of MDU*
Soil reaction	5.8	7.0
Electrical conductivity (mmho/cm)	0.2	0.1
Available nitrogen (ppm)	126	91
Available phosphorus (ppm)	3.20	4.00
Available potassium (ppm)	58	142
Organic carbon (%)	0.76	0.65
Cation Exchange Capacity (me/100 g)	15.3	12.5

* ASD — Ambasamudram

* MDU — Madurai

TABLE II Grain Yield of Rice (g/pot) (Mean values)

Treatments	Acid soil of ASD	Neutral soil of MDU	Mean
T ₁ No phosphate (control)	24.98	20.37	22.68
T ₂ Superphosphate 100 per cent	34.00	35.55	34.78
T ₃ Mussoorie phos 100 per cent	34.90	33.72	34.31
T ₄ Superphosphate 50 per cent + Mussoorie phos 50 per cent	34.27	34.07	34.17
T ₅ Superphosphate 25 per cent + Mussoorie phos 75 per cent	35.00	34.32	34.66
T ₆ Mussoorie phos 25 per cent + superphos- phate 75 per cent	34.30	34.42	34.38
T ₇ FYM + superphosphete 50 per cent + Mussoorie phos 50 per cent	34.90	34.35	34.63
T ₈ FYM + superphosphate 25 per cent + Mussoorie phos 75 per cent	35.00	34.55	34.78
T ₉ FYM + Mussoorie phos 25 per cent + superphosphate 75 per cent	34.70	34.45	34.57
Mean	33.56	32.86	

C.D. (P = 0.05)

Treatments —

0.81

Soils —

0.38

Treatments X soils

1.15

applied as per the Tamil Nadu Agricultural University fertilizer recommendation for high yielding rice varieties. The NPK fertilizer doses for the acid soil were 120 kg N, 60 kg P_2O_5 and 75 kg K_2O /ha and for the neutral soil the fertilizer doses were 120 kg N, 60 kg P_2O_5 and 45 kg K_2O /ha. The entire dose of P as superphosphate or Mussoorie phos or their combinations and K as Muriate of potash were applied basally and N as urea was applied in three split doses viz., half basal and the rest in two equal doses on 30th and 50th day after transplanting. FYM was applied at 10 t/ha, a week before transplanting. Submerged condition was maintained throughout the crop period.

RESULTS AND DISCUSSION

All the treatments which received P gave higher grain yield than control. The treatments superphosphate 100 per cent and the combination of superphosphate 25 per cent. Mussoorie phos 75 per cent and FYM produced similar grain yields. Equal efficiency of superphosphate and rock phosphate in increasing the grain yield of rice was reported by Mehrotra (1968). Nair *et al.* (1972) also indicated that rock phosphate and superphosphate gave similar results in rice.

Higher grain yield was recorded in the acid soil of Ambasamudram than in the neutral soil of Madurai. The higher yield obtained in acid soil may be attributed to the greater availability of N

due to high humus content in the acid soils. Patnaik *et al.* (1974) stated that about one third of the phosphate responding soils of India are acidic. Therefore the increased yield in the acid soil implies the favourable effect of dissolution of insoluble phosphates and increased availability of P on flooding due to reduction, besides the greater availability of N.

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