

GROWTH AND YIELD OF COWPEA AS INFLUENCED BY DIFFERENT METHODS AND SOURCE OF PHOSPHORUS APPLICATIONS*

A field trial was conducted at the Rice Research Station, Pattambi during the year 1980–81 to compare the efficiency of Mussoorie rockphosphate with that of superphosphate and to find out the effect of different methods of application of phosphorus to cowpea when grown in rice fallows. The trial was laid out in a split-plot design with four replications. The treatments included in this trial consisted of five levels, two sources and two methods of application of phosphorus. The levels of phosphorus were allotted to the whole plots and combinations of sources and method of application to the sub-plots. The two sources were superphosphate (S_1) and Mussoorie rockphosphate (S_2) and the methods, broadcasting (M_1) and placement (M_2). For placement, fertilizer was applied in bands besides the rows made with hand hoe. The levels of phosphorus were the following.

P_1	12.5 kg P_2O_5 /ha
P_2	25.0 kg P_2O_5 /ha
P_3	37.5 kg P_2O_5 /ha
P_4	50.0 kg P_2O_5 /ha
P_5	62.5 kg P_2O_5 /ha

Uniform doses of 20kg N and 10 kg K_2O /ha were applied in all the plots. The soil of the experimental site was sandy loam with a pH of 5.3. It contained 0.1456 per cent total nitrogen, 0.0014 per cent available P_2O_5 and 0.0018 per cent available K_2O .

Cowpea cv. Kanakamani was planted at a spacing of 30 x 20 cm. Observations on plant height, leaf area index, number of pods per plant, seeds per pod, pod length, hundred grain weight and grain yield were recorded.

Results revealed significant difference between treatments with respect to pods per plant, seeds per pod, hundred grain weight and uptake of phosphorus by the plant (Table 1). Significant difference was obtained for grain yield also. The increase in grain yield due to successive incremental doses was significant upto 50.0 kg P_2O_5 /ha. Maximum grain yield (1130 kg/ha) was recorded by 50.0 kg P_2O_5 /ha while the minimum was at the lowest dose of phosphorus application. Beyond 50.0 kg P_2O_5 /ha decrease in yield was noticed at the highest level tried. Similar decrease in grain yield beyond a certain limit of phosphorus application was earlier recorded by Ahlawat *et al.* (1979). The effect on grain yield due to different sources was also significant. Rockphosphate was found to be slightly superior to superphosphate. The trends in yield components and phosphorus uptake were also similar.

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Table 1

Effect of levels, sources and methods of application of phosphorus on growth and yield of cowpea

Treatments	Grain yield (kg/ha)	Pods per plant	Seeds per pod	100 grain weight (g)	Uptake of P (kg/ha)
Levels of P_2O_5 (kg/ha)					
12.5	669	5.21	13.71	11.40	8.72
25.0	923	6.02	14.32	11.61	10.37
37.5	1042	6.35	14.74	12.04	11.01
50.0	1130	6.65	15.09	12.45	11.78
62.5	824	5.97	14.37	11.53	9.94
SEM \pm	12.67	0.014	0.114	0.049	0.023
CD (0.05)	39.01	0.044	0.352	0.150	0.071
Sources					
Superphosphate	859	5.95	14.24	11.67	10.04
Mussoorie rock-phosphate	976	6.13	14.66	11.94	10.69
SEM \pm	7.49	0.016	0.124	0.053	0.027
CD (0.05)	21.22	0.044	0.352	0.150	0.077
Methods of application					
Broadcasting	922	6.03	14.40	11.80	10.41
Placement	914	6.05	14.49	11.82	10.32
SEM \pm	7.49	0.016	0.124	0.053	0.027

The interactions between levels and sources, levels and methods and that between methods and sources were statistically significant (Tables 2 and 3). The data from the interaction tables show that there was significant increase in yield upto 50 kg P_2O_5 /ha when superphosphate was used whereas there was yield stabilisation at the lower level of 37.5 kg/ha when Mussooriephos was used as the source. Similarly, superphosphate recorded better crop yield when placed whereas broadcast application of Mussoorie rockphosphate gave higher yields than its placement (Table 3). Superiority or broadcast application of insoluble rock phosphate is to be normally expected as this method of application enhance soil fertilizer contact which is necessary for conversion of insoluble forms of phosphorus to soluble available forms. Reduced soil fertilizer contact should favour enhanced availability of soluble phosphatic fertilisers like superphosphate by reducing the degree of fixation of soluble forms of this element.

Table 2

Interaction effects of sources/methods of phosphorus application and levels of phosphorus on grain yield (kg/ha)

	Levels of P application				
	P ₁	P ₂	P ₃	P ₄	P ₅
Superphosphate	625	835	950	1103	782
Mussooriephos	712	1011	1135	1156	866
Broadcasting	671	896	1056	1130	855
Placement	666	950	1029	1130	793
C. D. (0.05)	For comparing sources/methods within the same level of phosphorus				47.45
C. D. (0.05)	For comparing different levels of phosphorus for particular source/method				50.80

Table 3

Interaction effects of sources and methods of phosphorus application on grain yield (kg/ha)

	Superphosphate	Mussooriephos
Broadcasting	825	1018
Placement	893	934

C. D. (0.05) = 30.01
SEM ± = 10.59

സംഗ്രഹം

രണ്ടാം വിളയ്ക്കുശേഷം തരിശായി കിടക്കുന്ന നെൽപാടങ്ങളിൽ കൃഷിചെയ്യുന്ന പയർ വിളയ്ക്ക് ഭാവഹം നൽകുന്നതിന് സൂപ്പർഫോസ്ഫേറ്റിനേക്കാൾ ഫലപ്രദമാണ് മുസ്സോറി റോക്ക്ഫോസ്ഫേറ്റ് എന്ന് പട്ടാമ്പി നെല്ലുഗവേഷണ കേന്ദ്രത്തിൽ നടത്തിയ പരീക്ഷണങ്ങളിൽനിന്നും തെളിഞ്ഞിരിക്കുന്നു. ഈ വളം നൽകുമ്പോൾ അത് മണ്ണുകായി നല്ലതുപോലെ ചേർക്കുന്നത് വിള വർദ്ധനക്ക് സഹായകമാണെന്നും കണ്ടിരിക്കുന്നു.

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Reference

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