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RESPONSE OF COWPEA TO PHOSPHORUS APPLICATION UNDER RAINFED CONDITION

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Effect of three levels of phosphours [0.20 and 40 kg/ha] and two levels of molybdenum [0 and one kg/ha] on yield, production of root nodule and uptake of p were studied for two seasons in cowpea under rainfed condition. The experimental area had low available p status. Phosphorus application at 20 kg/ha had consistently registered higher grain yield over control in both seasons whereas Mo application did not influence the grain yield. Root nodule per plant and N content of the nodule did not differ significantly among p and MO levels. Cowpea crop was found to remove 12p kg/ha of which 45 per cent is utilised for grain production. Phosphorus application had increased the available p status of the soil.

Cowpea (*vigna unguiculata* L) is an important pulse crop grown in Tamil Nadu both for its grain and vegetable purpose. It is mostly grown under unirrigated condition. This crop seldom receives manuring and hence the yield level is low. Work on the manuring of cowpea is very scanty in Tamil Nadu. Being leguminous crop the influence of the most important fertilizer nutrients phosphorus and Mo were not studied so far in this crop. Hence the present study was under

taken to gather information on the influence of P and Mo on grain yield and nutrient uptake.

MATERIALS AND METHODS

Field experiments were conducted for two seasons under rainfed condition with paiyur 1 cowpea. Three levels of phosphorus (0, 20 and 40 kg/ha) and two levels of molybdenum (0 and one kg/ha) were tried. The entire quantity of P as superphosp-

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Table 1. Influence of phosphorus and molybdenum application on rainfed cowpea

| Character | Season | Phosphorus [Kg/ha] | | | | | Molybdenum [Kg/ha] | | | |
|----------------------------|--------|--------------------|------|------|-------|------------|--------------------|------|------|------------|
| | | 0 | 20 | 40 | SE | CD @ 5% | 0 | 1 | SE | CD @ 5% |
| Grain | 1982 | 971 | 1001 | 1088 | 28.01 | 83.5 | 1021 | 1042 | 24.2 | — |
| Yield kg/ha | 1983 | 706 | 782 | 816 | 19.02 | 57.0 | 768 | 769 | 16.9 | — |
| Nodule | 1982 | 5.10 | 5.99 | 6.12 | 0.48 | — | 5.70 | 5.84 | 0.44 | — |
| Number / plant | 1983 | 6.52 | 7.61 | 8.24 | 0.89 | — | 7.25 | 7.30 | 0.81 | — |
| Nitrogen content | 1982 | 5.16 | 5.33 | 5.35 | 0.21 | — | 5.33 | 5.31 | 0.18 | — |
| of nodule (%) | 1983 | 5.79 | 5.76 | 6.13 | 0.23 | — | 5.82 | 5.96 | 0.20 | — |
| Phosphorus up take [Kg/ha] | | | | | | | | | | |
| Grain | 1982 | 4.8 | 5.7 | 6.8 | 0.30 | — | 5.4 | 5.9 | 0.28 | — |
| Haulm | | 6.4 | 6.6 | 7.3 | 0.36 | — | 6.4 | 6.7 | 0.32 | — |
| Total | | 11.2 | 12.3 | 14.1 | 1.45 | — | 11.8 | 12.6 | 1.36 | — |
| Grain | 1983 | 3.9 | 4.8 | 6.0 | 0.28 | — | 4.8 | 5.0 | 0.25 | — |
| Haulm | | 5.8 | 6.4 | 6.9 | 0.34 | — | 5.8 | 5.9 | 0.30 | — |
| Total | | 9.7 | 11.2 | 12.9 | 1.24 | — | 10.6 | 10.9 | 1.05 | — |
| Available in soil | 1982 | 11.1 | 12.2 | 14.1 | 1.07 | — | 12.4 | 12.2 | 0.83 | — |
| | 1983 | 6.4 | 9.1 | 11.7 | 1.96 | — | 8.8 | 8.0 | 1.71 | — |

hate and Mo as sodium molybdate were applied basally in all the treatments. The seeds were treated with multistrain rhizobial culture before sowing. The nodule number in the root and N content of the nodule were estimated at flowering stage. The uptake and soil available P at harvest stage were also determined and presented in table 1 along with the results of statistical analysis.

RESULTS AND DISCUSSION

The statistical analysis of the grain yield indicated that it increased significantly with increase in the le-

vels of P. In both the trials P application at 20 kg/ha had recorded significantly higher seed yield over control. Further addition of P from 20 to 40 kg/ha had significantly increased the grain yield from 1001 to 1088 kg/ha in the first season but in the second trial 20 and 40 kg levels remained on par. The positive yield response to P application could be attributed to the low available P status of the soil. Such positive influence of P was also reported in other pulse crops like blackgram (Rajendran *et al.* 1974) greengram (Venugopal and Morachan 1974) and in redgram (Veerasingam *et al.* 1976). Application of

molybdenum did not increase the grain yield significantly. Similar result was also observed by Subbiah and Ramiah (1982) and Dalal and Quilt (1977) in redgram.

Phosphorus application had increased the mean nodule number per plant from 5.48 in the control to 5.74. However the treatment difference did not differ significantly. The nitrogen content of the root nodule which is helpful in building the soil fertility ranged from 5.16 to 6.13 per cent. Phosphorus and Mo application did not have any significant influence on the N content of root nodule. The total uptake of P in cowpea ranged

from 9.7 to 14.1 kg/ha of which nearly 45 per cent was utilised for grain formation while the remaining portion was retained in the shoot itself. Phosphorus application had increased the available P status of the soil from 10.0 kg/ha in the initial soil to 14.1 kg/ha in the post harvest soil analysis at 40 kg level of P. Kalyan Singh *et al.* (1978) also reported that P application to pulse improved atmospheric N fixation resulting in restoration of soil fertility. Thus phosphate manuring to legume crop not only increased the grain yield but also improved the soil fertility.

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