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q ha⁻¹ was recorded with the application of glyphosate at 1.5 kg a.i. ha⁻¹ and was comparable with that of hand weeding twice. The lowest seed cotton yield of 0.41 q ha⁻¹ was recorded in unweeded check registering a reduction of 94.2 per cent over the glyphosate at 1.5 kg a.i. ha⁻¹. The increased yield under this treatment was due to higher number of fruiting branches (sympodia) which has led to the increased number of fruiting points per plant and ultimately recorded more number of bolls plant⁻¹. Another contributing factor was the increased boll weight. This was probably due to the effective control of weeds which has resulted in the increased uptake of nutrients of cotton, particularly phosphorus as indicated by the increased seed index (Table 3). Prasad and Prasad (1998) also reported that the high yielding varieties of cotton require adequate phosphorus fertilization for better expression of yield attributes viz. boll number, ten boll weight and lint/boll. The reduction in yield in the unweeded check was due to the cumulative effect of competition for space, nutrients and water. The economics analysis of data revealed that the highest benefit-cost ratio of 2.26 was recorded with the application of glyphosate at 1.5 kg a.i. ha⁻¹ and was followed by 2.24 for hand weeding twice. Both these treatments recorded the highest monetary returns of Rs. 13,509 and Rs. 13,300 per hectare respectively.

References
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Research Notes

Effect of soil application of potassium and DAP spray in blackgram (Vigna mungo L.)

M. YAKADRI AND RAMESH THATIKUNTA

In Southern Telangana region of Andhra Pradesh, the yield of blackgram is low due to poor management practices and inadequate plant nutrition. Nitrogen due to volatilization and leaching, phosphorous due to fixation and non application of potash, the nutrients may not be available at flowering and pod development stage. Mungbean needs more nitrogen and phosphorous at reproductive stage (Hamid, 1988). Some farmers are growing blackgram after Khafir rice under limited supply of irrigation water without giving due importance to potash nutrition. Foliar application of nitrogen and phosphorous through DAP along with potash resulted in economical use of fertilizers. The lack of information of these aspects prompted the present investigation. The experiment was carried out during November 1998 and 1999 at Students Farm, College of Agriculture, Rajendranagar, Hyderabad. Nine treatment combinations consisting of three potash levels (K₀ control, K₁-K₂O @ 25 kg ha⁻¹, K₂-K₃O@ 50 kg ha⁻¹) along with three sprays of 2% DAP
(F₀-control, F₁-preflowering, F₂-F₃-pod initiation stage) were tested in randomized complete block design with three replications. The soil was red sandy loam, neutral in reaction (pH 7.4), medium in available nitrogen (282 kg ha⁻¹), phosphorous (23 kg ha⁻¹), potassium (200 kg ha⁻¹) and non saline (0.8 dSm⁻¹).

Blackgram variety TAU-1 was sown during first week of November in both the years with a spacing of 22.5 x 10cm. A minimum dose of nitrogen and phosphorous (15 kg N + 25 kg P₂O₅ ha⁻¹) along with potash as per the treatments was applied to the soil at the time of sowing. Two percent DAP was sprayed at pre flowering and pod initiation stages according to the treatments allotted. The crop was raised under irrigated conditions with three irrigation in conjunction with winter rains. Pests and diseases were controlled and crop harvested at 95% maturity. Pods were dried, threshed, cleaned and seed yield was recorded.

Application of different levels of potassium and spraying of DAP at different crop growth stages in blackgram influenced the seed yield and other yield attributing characters (Table 1). In general, application of potash alone or in combination with DAP spray at pre flowering stage recorded higher yields compared to control. Further, giving one more DAP spray at pod initiation stage had marked impact on seed yield. The difference between seed yield of treatments T₇, T₈, T₉, T₁₀ was on par and it did not differ significantly from the control. The seed yield of the treatments T₆ and T₇ highly differed from rest of the treatments but on par with T₈ and T₉. The difference in seed yield of the treatment T₆ (K₁F₀) and T₇ (K₁F₁) is negligible. This trend is shown for the yield attributing characters like seeds per pod and pod length except 1000 seed weight and number of pods per plant were the treatments T₆ and T₇ are on par but significantly differed even from T₈ and T₉.

Application of lower dose of potash (K₂O @ 25 kg ha⁻¹) and spraying of DAP at pre flowering and pod initiation in blackgram gave a seed yield of 13.8 q ha⁻¹ and which gave 66% more yield compared to control and 9% compared to treatment T₉. The increase in yield due to doubling of potash dose from 25 to 50 K₂O kg ha⁻¹ with two sprays (T₉) is very marginal compared to T₆.

More number of plants per plant and more seed weight contributed for higher seed yield of the treatment T₇ in comparison to other yield attributing characters like number of seeds per pod and pod-length. In the present investigation,

<table>
<thead>
<tr>
<th>Treatments</th>
<th>Pods/Plant</th>
<th>Pod Length (cm)</th>
<th>Seeds/Plant</th>
<th>1000 seed weight (g)</th>
<th>Seed yield 1998</th>
<th>Seed yield 1999</th>
<th>Average</th>
<th>Benefit Cost ratio</th>
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SEm 2.57  0.72  0.71  0.70  1.47  1.39  1.36  0.55
CD (P=0.05) 5.42  1.46  1.43  1.43  3.13  2.95  2.76  1.17
Effect of soil application of potassium and DAP spray in blackgram (Vigna mungo L.)

response of blackgram to potash was up to 25 kg ha⁻¹ in combination with two sprays of DAP at pre flowering and pod initiation stage. This can be ascribed to the medium status of the available potash in the experimental site. Blackgram responded to DAP at pre flowering and pod initiation rather than pre flowering. This clearly indicates the constant requirement of nitrogen and phosphorous even by a legume crop like blackgram. Ramasamy and Ramaiah, (1990), Barik and Rout (1990), also found the beneficial effects of spraying DAP on blackgram. Nitrogen fixation bacteria may not supply the adequate nitrogen through out the plant growth period as senescence of bacteria occurs especially at the time of seed maturity and seed maturity especially during the winter season as the supply of phosphorous to plant from soil is restricted due to low temperatures.

Foliar spray of DAP has served the purpose of supplying nitrogen and phosphorous at the flag end stages of the crop and potash might have helped in effective translocation or mobilizing of the nutrients from one part of the plant to other parts. Therefore, it can be recommended that blackgram should be applied K₂O @ 25 kg ha⁻¹ along with DAP spray under Southern Telangana region of Andhra Pradesh for achieving the remunerative yield during winter season as this treatment shown maximum benefit cost ratio.

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Research Notes

Integrated phosphorus management in greengram

R. DURAI SINGH, K. VAIRAVAN AND M. RAMASAMY
National Pulses Research Centre, Vamban - 622 303, Tamil Nadu.

Green gram (Phaseolus radiatus L.) is one of the most important pulse crop with poor average yield. It is well known that the P is one of the major nutrients which is required in large quantities for its nodulation, N fixation and optimal growth, but it is a major constraint as nearly 98% of soils in India have inadequate supply of P. (Kanwar and Grewal, 1990). Further very little information is available about the effect of P solubilizing bacteria (PSB) on greengram. Hence the present investigation was carried out with objectives to find out the suitable source and levels of inorganic phosphate fertilizer and its combination with organic sources of phosphorus on the yield of greengram.

The field experiment was conducted during Kharif season of 1998-99 and 1999-2000 at National Pulses Research Centre, Vamban, Pudukkottai district. The soil was sandy loam (alfisols) with a pH of 6.3, available N, P₂O₅ and K₂O were 193, 8.5 and 260 kg ha⁻¹ respectively. The variety used for this study was Vamban 1. The crop was sown in an individual plot size of 5.4 m x 4 m with a spacing of 30 cm x 10cm. Before sowing, the seeds were treated