EFFECT OF NUTRIENTS AND SPACING ON THE YIELD OF URDBEAN UNDER LATE SOWN CONDITION

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ABSTRACT
Field experiments were conducted during Kharif 2000 and 2001 to know the effect of plant density and different nutrient management practices under late sown conditions. The study revealed that soil application of 30 kg N and 20 kg N as basal in addition to 10 kg N as foliar application at two stages (30th and 40th DAS) recorded 4 to 11 and 2 to 4 per cent higher seed yield than 20 kg N as basal during 2000 and 2001 respectively. Among the interaction plant density 5.0 lakh/ha (20 x 10 cms) with 30 kg N combined with 10 kg N as foliar application at two stages recorded higher seed yield (1071 and 1292 kg/ha) during 2000 and 2001 respectively. Similar types of observations were recorded with respect to seed yield per plant, pods per plant and 100 seed weight during 2000.

INTRODUCTION
Urdbean is an important pulse crop in India. It is highly prized crop and rich in phosphoric acid. The grains are used in various food preparations. The time of planting and plant density in addition to nutrient management may be considered the foremost factors influencing its growth and development apart from determining its yield under late sown condition (Late kharif). Foliar fertilization offers a possible means of increasing soybean yields (Vasilas et al., 1980). Foliar fertilization is a tool of increasing total N input without involving the roots during critical period of seed fill. Keeping this in view a trial was laid out under All India Co-ordinated Pulse Improvement Programme (MULLaRP), to find out optimum input management combinations with plant densities under late sown condition during Kharif under rainfed condition in Southern Transitional Zone of Karnataka.

MATERIAL AND METHODS
A field study was conducted during Kharif seasons of 2000-2001 at Agricultural Research Station, Kathalgere Davangere Dist, University of Agricultural Sciences, Bangalore Karnataka. The experimental site was clay red loam having pH 6.4, E.C. 0.2 dSm⁻¹, Organic carbon 0.66 available N 499 kg/ha, available P 24.4 kg/ha, and K 202.3 kg/ha. The treatments comprised all combination of plant density (20 x 10 cm, 25 x 10 cm and 30 x 10 cm) and nutrient management practices (20 kg N as basal, 20 kg N as basal + 10 kg N as foliar application at two stages (30th and 40th DAS), 30 kg N as basal + 10 kg N as foliar application at two stages and 30 kg N as basal) Thus totally twelve treatments tried in factorial RCBD with four replications. The urdbean variety K-3 was sown as per treatments in the first week of August, in a finely prepared seedbed. The recommended P and K were applied in the form of single super phosphate and muriate of potash to all the plots. The nitrogen fertilizer was applied in the form of urea as per the treatments. For foliar spray treatments 5 kg urea dissolved in 250 liters of water, which makes 2% solutions and sprayed to the crop at 30th days after sowing. This was repeated on 40th days after sowing as per the treatments. Inter cultivation was done on 30th and 45th days after sowing to control the weeds in between the rows and two hand weeding were done to remove weeds between the intra row plants. Need based plant protection was given to control pest and diseases. The crop was harvested after maturity. Five randomly selected plants were taken to record biometric observations.
RESULTS AND DISCUSSION

a) Effect of plant density and nutrients management on yield: Among the nutrient management tried, significant increase in seed yield from 4 to 11 and 2 to 4 per cent was recorded in 20 kg N and 30 kg N as basal along with 10 kg N as foliar at two stages (30th and 40th DAS) as against 20 kg N alone as basal during 2000 and 2001 respectively. In interaction effect higher seed yield (1071 and 1292 kg/ha) was recorded with 5 ·lakh plant density (20 x 10cm) with 30 kg N as basal + 10 kg N as foliar at two stages during 2000 and 2001 respectively. (Table 1). This is mainly because in pulse crop N-uptake and N-fixation usually do not meet the N-demand of the developing seeds during period of seed fill. Foliar application of nitrogen in the form of urea might have influenced the higher yield. In north eastern plain zone (NEPZ) the application of nutrients through soil and foliar produced higher grain yield in blackgram than absolute control (Anonymous, 2001). At Lam application of 20 kg N or 30 kg N as basal in addition to 10 kg N as foliar recorded significantly superior yield in black gram to 20 kg N as basal. At Faizabad yield data revealed that among population density 25 x 10 cms gave significantly higher seed yield (Anonymous, 1997) Venkateswralu et al. (1996) observed that higher pod yield was noticed with proportionate increase in nutrients at higher plant population in groundnut.

b) Effect of plant density and nutrients management on yield attributes: Yield attributes like seed yield (g/plant) and pods per plant were significantly influenced by plant density and nutrient management, whereas 100 seed weight was influenced by nutrient management during 2000.

Soil application of 30kg N alone or in combination with 10 kg N as foliar application at two stages recorded on par and significantly superior seed yield per plant (4.04 and 4.01) than 20 kg N as basal (3.70). Among the plant densities 3.3 lakh to 4.00 lakh/ha recorded on par seed yield (3.98 and 4.03gms/plant) and significantly superior cver. plant density of 5.00 lakh/ha (3.76gm) during 2000 (Table 2). Manjula Devi and Pillai (1997) reported that combination with 2% urea spray at pre flowering +flowering+pod development stage recorded highest seed yield.

Significantly on par and more number of pods/plants (18.47 and 18.38) were recorded in soil application of 30 kg N as basal alone and in combination with 10 kg N as foliar application at two stages than 20 kg N alone as basal (15.13) during 2000 (Table 2).

Table 1. Yield (kg/ha) of urdbean as influenced by plant densities and nutrient management under late sown condition

<table>
<thead>
<tr>
<th>Treatments</th>
<th>20 x 10 cms</th>
<th>25 x 10 cms</th>
<th>30 x 10 cms</th>
<th>Mean over year</th>
</tr>
</thead>
<tbody>
<tr>
<td>20 kg N as basal</td>
<td>925</td>
<td>1218</td>
<td>942</td>
<td>1150</td>
</tr>
<tr>
<td>20 kg N as basal+</td>
<td>999</td>
<td>1238</td>
<td>960</td>
<td>1204</td>
</tr>
<tr>
<td>10 kg N as foliar application</td>
<td>1071</td>
<td>1292</td>
<td>1067</td>
<td>1225</td>
</tr>
<tr>
<td>30 kg N as basal +</td>
<td>999</td>
<td>1553</td>
<td>1017</td>
<td>1173</td>
</tr>
<tr>
<td>10 kg N as foliar application</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Mean</td>
<td>999</td>
<td>1225</td>
<td>977</td>
<td>1188</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>SEm±</th>
<th>CD (0.05)</th>
<th>SEm±</th>
<th>CD (0.05)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Spacing (S)</td>
<td>8.89</td>
<td>26.66</td>
<td>34.32</td>
</tr>
<tr>
<td>Nutrient mg (N)</td>
<td>7.69</td>
<td>NS</td>
<td>39.64</td>
</tr>
<tr>
<td>S x N</td>
<td>15.39</td>
<td>NS</td>
<td>68.65</td>
</tr>
<tr>
<td>CV (%)</td>
<td>3.09</td>
<td>11.33</td>
<td></td>
</tr>
</tbody>
</table>
Table 2. Seed yield (g/plant), pods/plant and 100 seed weight (g) of urdbean as influenced by plant densities and nutrient management under late sown condition.

<table>
<thead>
<tr>
<th>Treatments</th>
<th>Seed yield (g/plant)</th>
<th>Pods/plant</th>
<th>100 seed weight (g)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Nutrients</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>20 kg N as basal</td>
<td>3.70</td>
<td>6.80</td>
<td>15.30</td>
</tr>
<tr>
<td>20 kg N as basal + 10 kg N as foliar application</td>
<td>3.94</td>
<td>7.72</td>
<td>17.12</td>
</tr>
<tr>
<td>30 kg N as basal + 10 kg N as foliar application</td>
<td>4.04</td>
<td>7.89</td>
<td>18.47</td>
</tr>
<tr>
<td>30 kg N as basal</td>
<td>4.01</td>
<td>7.07</td>
<td>18.38</td>
</tr>
<tr>
<td>SEm ±</td>
<td>0.05</td>
<td>0.30</td>
<td>0.19</td>
</tr>
<tr>
<td>CD (0.05)</td>
<td>0.15</td>
<td>NS</td>
<td>0.55</td>
</tr>
<tr>
<td>Spacing</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>20 x 10cms</td>
<td>3.76</td>
<td>7.18</td>
<td>16.19</td>
</tr>
<tr>
<td>25 x 10cms</td>
<td>3.98</td>
<td>7.49</td>
<td>18.09</td>
</tr>
<tr>
<td>30 x 10cms</td>
<td>4.03</td>
<td>7.44</td>
<td>17.68</td>
</tr>
<tr>
<td>SEm ±</td>
<td>0.04</td>
<td>0.26</td>
<td>0.17</td>
</tr>
<tr>
<td>CD (0.05)</td>
<td>0.13</td>
<td>NS</td>
<td>0.48</td>
</tr>
<tr>
<td>Interactions</td>
<td>NS</td>
<td>NS</td>
<td>NS</td>
</tr>
</tbody>
</table>

However soil application of 30 kg N alone as basal or 20 kg N and 30 kg N combined with 10 kg N as foliar application at two stages recorded higher number of pods (30.50 to 31.17) than 20 kg N as basal (28.83) during 2001. Srinivasan and Ramaswamy (1992), reported that pods per plant and seeds per pod were significantly higher with Diammonium phosphate @ 2% foliar spray at 20 and 30 days after sowing in cowpea. Venkateswralu et al. (1996), recorded more flowers and pegs produced per unit area in Spanish groundnut at higher plant densities coupled with higher nitrogen levels. The 100 seed weight 4.87 gm was recorded significantly higher in soil application of 30 kg N as basal with 10 kg N as foliar application at two stages during 2000 (Table 2). Sinclair and De Wit (1975) reported that 20 mg N per gram of photosynthates would be available from soil to the developing pulse seed as against the requirement of 26 mg N and the balance was to be made from the external sources to get increased seed yield.

CONCLUSION
The yield of urdbean can be increased under late sown Kharif season, either by maintaining plant density of 5 lakh/ha (20 x 10 cm) or 4 lakh/ha (25 x 10 cm) with nutritional management of 30 kg N as basal or 20 kg N as a basal with recommended P, and K combined with 10 kg N as foliar spray at two stages (30th and 40th DAS) of crop growth was found to be optimum.

REFERENCES