Performances of fertilizers and foliar nutrition levels on yield of Greengram (Vigna radiata L.)

Sunil Kumar*1, S.K. Patel1 and Gautam Ghosh2
1Department of Agronomy, Sam Higginbottom Institute of Agriculture, Technology & Sciences, Allahabad-211007, India
2Dept. of Agronomy and Dean, Alld. School of Agriculture, Allahabad-211007, India
*e-mail: sunilagro.chaudhary@gmail.com
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Abstract: A field experiment was conducted with four levels of recommended dose of fertilizers (RDF) N&P (control, 100%, 85% and 70%) and four levels of foliar application (control, water spray, urea 2% spray and DAP 2% spray at 20 and 40 DAS) during Zaid season of at Crop Research Farm, Department of Agronomy, SHIATS, Allahabad (U.P) on Greengram (Vigna radiata L.). Significantly the higher length of pods, no. of pods per plant, no. of grain per pod, test weight, grain yield, stover yield and benefit cost ratio observed with application of 85% recommended dose of fertilizers, DAP 2% foliar spray and combination of 85% recommended dose of fertilizers with DAP 2% foliar spray.

Key words: RDF, foliar spray, yield, greengram

Introduction

Greengram is one of the major pulse crops of our country and also it serves as an important protein source of our Indian diet. To meet the additional nutritional requirement of ever increasing population, it is very much essential to enhance the production of pulses. To get higher production from the available scarce cultivable land resources, feasible conditions for cultivation are key factors. Application by broadcasting especially nitrogen and phosphorus is the most widely practiced method in India, which poor supply of nutrient is the primary reasons for poor productivity. Foliar application of fertilizer should be viewed as temporary or emergency solution only but still it showed excellent results in some crops. The foliar method of fertilizer application is usually preferred because very small amounts of fertilizers are applied per hectare. It has been established that all plant nutrients are absorbed through the leaves of plants and this absorption is remarkable rapid for some nutrients. Foliar application of fertilizers is regarded as a preferred solution when the quick supply of nutrients is hindered, it also reduces the number of passes of the applicant, thereby reducing problem of soil compactness (Salisbury & Ross, 1985). Foliar application of N at particular stage may solve the slow growth, nodule senescence and low seed yield of pulse without involving root absorption at critical stage (Pandragi et al., 1991; Latha and Nadanasababady, 2003; rajesh et al. 2013). Selvam et al. (1999) reported that top dressing of 10 kg Nha-1 to groundnut as foliar spray at two per cent urea pod yielded 2.82 t ha-1 while the same as soil application produced 2.47 t ha-1. Foliage applied macro and micronutrients at critical stages of the crop were effectively absorbed and translocated to the developing pods, producing more number of pods and better filling in soybean (Jayabal et al. 1999). Thiyageshwari and Rangnanathan (1999) studied the effect of foliar application of nutrients along with the recommended dose of nutrients on the dry matter production and yield of soybean.

Foliar application is also less likely to result in ground water pollution. Foliar spraying of DAP or urea increased the seed yield of pulse crops. Bichitra et al. (1975) reported that foliar application of DAP a part of P fertilizer was superior to soil application in increasing yields. Application of DAP reduce the flower dropping and increase of nodules which inturn increase the yield. Therefore, an experiment to study the influence of foliar application of DAP and urea on greengram.

Materials and Methods

A field experiment on sandy loam soil was conducted at crop research farm, department of agronomy, SHIATS, Allahabad during Zaid season with greengram (Vigna radiata L.). The soil had pH 7.5, organic carbon 0.36% and available N, P and K were 182.5, 40 and 246.84 kg ha-1, respectively. The treatments consist of four levels of recommended dose of fertilizers N&P (control, 100%, 85% and 70%) and four levels of foliar application (control, water spray, urea 2% spray and DAP 2% spray at 20 and 40 DAS) which were then replicated three times in factorial randomized block design. Full dose of recommended dose of fertilizers N&P were applied as per treatment at the time of sowing in the form of urea and single super phosphate, respectively. Foliar application was applied as per treatment with the help of knap-sac sprayer by using the recommended solution.

Results and Discussion

Experimental data and its statistical analysis have shown a significant effect of NP application under different modes on different yield parameters. The maximum number of pods per plant has been observed when soil application of 85% RDF and foliar spray of 2% DAP and their combination (Table-1) while minimum number of pods per plant was noted in the control. These results clearly indicate that application of fertilizer and foliar spray resulted in an increase in number of pods per plant. Growada and Growada (1980) observed similar results and concluded that the number of pods per plant was increased with NPK application. Ghildiyal (1992) found that foliar application increased number of pods per plant. Maximum Test weight (1000 seed) was recorded when 85% RDF was supplied through soil application followed by soil application of 70% RDF. The highest value of these parameters was resulted when foliar spray of 2% DAP than foliar spray of 2% urea. Combination
of soil application of 85% RDF with foliar spray of 2% DAP gave the significantly increased of these values followed by soil application of 70% RDF with foliar spray of 2% DAP and soil application of 100% RDF with foliar spray of 2% DAP, respectively on par, while the minimum value of these parameters was recorded in control. Which may be attributed to soil application and foliar spray was more effective in terms of producing higher yield and yield attributes of greengram. These findings are conformed by (Behera and Elamathi, 2007).

Maximum length of pods (cm), number of grains per pod, grain yield (q/ha) and stover yield (q/ha) was recorded when 85% RDF was supplied through soil application followed by soil application of 70% RDF. The highest value of these parameters was resulted when foliar spray of 2% DAP than foliar spray of 2% urea. Combination of soil application of 85% RDF with foliar spray of 2% DAP gave the significantly increased of these values followed by soil application of 70% RDF with foliar spray of 2% DAP and soil application of 100% RDF with foliar spray of 2% DAP, respectively on par, while the minimum value of these parameters was recorded in control. These findings are conformed by (Behera and Elamathi, 2007). According to Gomathi (1996) foliar spray of 1per cent urea increased the number of pods significantly in greengram. In soybean, number of pods plant-1 was greater with the foliar application of 50 ppm salicylic acid at 24 DAS (Pramod Kumar et al., 1999). Pandian et al. (2001) reported the application of basal dose of N and P sprayed along with 2 per cent DAP spray registered significantly higher number of pods plant-1 and 100 seed weight as compared to control in greengram. More number of pods plant-1 was recorded in blackgram when 2 per cent DAP was sprayed along with soil application of potassium (Yakadri and Ramesh Thatkunta, 2002). According to Manivannan et al. (2002) foliar application of N, P and K with chelated micronutrients has increased the grain yield of blackgram. Foliar application of one per cent DAP + 0.5 per cent urea recorded significantly more number of pods plant-1 in irrigated blackgram (Subramani et al., 2002). The above concluded that application of 85% recommended dose of fertilizers and with foliar application of 2% DAP was found more remunerative in greengram under Allahabad condition.

### References


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**Table 1: Effect of fertilizers and foliar spray levels on yield and yield attributes of greengram**

<table>
<thead>
<tr>
<th>Treatments</th>
<th>No. of pods/plant</th>
<th>Length of pods (cm)</th>
<th>No. of grains/pod</th>
<th>Test weight 1000 seed (g)</th>
<th>Grain yield q/ha</th>
<th>Stover yield q/ha</th>
<th>B.C. ratio</th>
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<tbody>
<tr>
<td><strong>Levels of Fertilizers</strong></td>
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<tr>
<td>F&lt;sub&gt;1&lt;/sub&gt;- 0% RDF (control)</td>
<td>21.13</td>
<td>8.83</td>
<td>9.37</td>
<td>51.20</td>
<td>10.50</td>
<td>29.58</td>
<td>1.86</td>
</tr>
<tr>
<td>F&lt;sub&gt;2&lt;/sub&gt;-100% RDF</td>
<td>24.54</td>
<td>9.03</td>
<td>10.00</td>
<td>53.21</td>
<td>13.93</td>
<td>30.00</td>
<td>2.13</td>
</tr>
<tr>
<td>F&lt;sub&gt;3&lt;/sub&gt;-85% RDF</td>
<td>25.63</td>
<td>9.11</td>
<td>10.25</td>
<td>53.42</td>
<td>14.71</td>
<td>40.63</td>
<td>2.29</td>
</tr>
<tr>
<td>F&lt;sub&gt;4&lt;/sub&gt;-70% RDF</td>
<td>25.30</td>
<td>9.06</td>
<td>10.15</td>
<td>53.23</td>
<td>14.00</td>
<td>30.95</td>
<td>2.23</td>
</tr>
<tr>
<td>C.D. at 5%</td>
<td>0.31</td>
<td>0.05</td>
<td>0.05</td>
<td>0.08</td>
<td>0.30</td>
<td>0.78</td>
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<tr>
<td><strong>Foliar spray at 20 and 40 DAS</strong></td>
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<tr>
<td>S&lt;sub&gt;1&lt;/sub&gt;- No spray (control)</td>
<td>22.45</td>
<td>8.99</td>
<td>9.58</td>
<td>51.88</td>
<td>11.38</td>
<td>32.13</td>
<td>1.83</td>
</tr>
<tr>
<td>S&lt;sub&gt;2&lt;/sub&gt;- water spray</td>
<td>23.61</td>
<td>8.98</td>
<td>9.75</td>
<td>52.25</td>
<td>12.87</td>
<td>35.83</td>
<td>2.08</td>
</tr>
<tr>
<td>S&lt;sub&gt;3&lt;/sub&gt;- urea 2% spray</td>
<td>24.25</td>
<td>9.03</td>
<td>10.03</td>
<td>52.89</td>
<td>13.59</td>
<td>38.79</td>
<td>2.18</td>
</tr>
<tr>
<td>S&lt;sub&gt;4&lt;/sub&gt;- DAP 2% spray</td>
<td>26.50</td>
<td>9.13</td>
<td>10.40</td>
<td>54.04</td>
<td>15.30</td>
<td>40.42</td>
<td>2.42</td>
</tr>
<tr>
<td>C.D. at 5%</td>
<td>0.31</td>
<td>0.05</td>
<td>0.05</td>
<td>0.08</td>
<td>0.30</td>
<td>0.78</td>
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