METHODS OF SOWING AND FOLIAR NUTRITION ON YIELD ENHANCEMENT IN BLACKGRAM


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Abstract

A field experiment was conducted at the Experimental Farm, Department of Agronomy, Faculty of Agriculture, Annamalai University, Annamalainagar during January – April, 2017 to evaluate various methods of sowing and foliar nutrition on yield enhancement in blackgram. The results of the experiment showed that ridge sowing of blackgram in main plot registered significantly improved growth and yield attributes and yield. Among the foliar nutrition in the sub plots, 0.1% humic acid foliar spray on 25 and 45 DAS significantly increased the growth, yield components and grain yield of blackgram. Regarding the interactions, M3S2-ridge sowing of blackgram along with 0.1% humic acid foliar spray on 25 and 45 DAS excelled all other treatments by recording higher growth and yield attributes and yield during the cropping period.

Key words: Ridge sowing, 0.1% humic acid foliar spray, growth attributes and yield.

Introduction

Blackgram (Vigna mungo L.Hepper) is a crop with excellent source of high quality protein and one of the most important pulse crops in India. Blackgram is the main source of deity protein (24%) also contains carbohydrate (67%), fiber (3.5%), fat (1.74%) and major protein with lysine in a vegetarian diet. The United Nations declared 2016 as “International Year of Pulses” (IYP) to heighten public awareness of the nutritional benefits of pulses as part of sustainable food production aimed at food security and nutrition (Mohanty and Satyasai, 2015). In Tamilnadu, blackgram is cultivated in 3.65 lakh hectares with the production of 3.10 lakh tonnes with average productivity of 851 kg ha⁻¹ (Tnstat, 2014). The current level of production is well below the requirement, and future projected demand for 2022 also mounting 16.1 million tonnes, to meet the specified per capita requirement (Praduman Kumar et al., 2009). The low yield is attributed to several reasons viz., cultivated as rainfed crop, as intercrops in marginal lands, improper sowing methods, poor nutrition management practices, and low yield potential of varieties. Even though, sufficient moisture is made available to the sown crop by following the appropriate time of sowing, placement of seeds on the surface of soil in broadcasting is likely to cause poor germination which need to taken care of by following the proper method of sowing (Maruthupandi et al., 2016). In addition to that the lack of nutrients during the critical stages of crop growth leads to nutrient stress, which leads to poor yield and productivity of the crop. With this background, the present investigation was undertaken to find out suitable methods of sowing and foliar nutrition on improvement of yield in blackgram

Materials and Methods

A field experiment was conducted at Annamalai University, Experimental farm during January-April, 2017 for blackgram cultivation. Experiment was laid out in split plot design with three replications using variety VBN-5 as the test crop. The Experimental Farm is geographically situated at 11° 24' North Latitude and 79° 44' East Longitude and with an altitude of + 5.79 m above mean sea level. The Experimental Farm is characterized by tropical climate with a mean annual rainfall of 1500 mm. The soils of the experimental field was clay loam. The soil was low in available nitrogen, medium in available phosphorous and high in available potassium. The treatment includes, different methods of sowing viz., M1 - broadcasting, M2 - line sowing, and M3 - ridge sowing were compared in main plots and various foliar nutrition viz., S1 - Control, S2 - 0.1 % humic acid foliar spray on 25 and 45 DAS, S3 - 2 % DAP foliar spray on 25 and 45 DAS, S4 - 3 % Panchakavya foliar spray on 25 and 45 DAS were compared in subplots. Cotton seeds were
sown in 5x4m plots with a spacing of 30 x 10cm. The variety was raised under optimum conditions of nutrient supply (25:50:25 kg NPK ha⁻¹) and plant protection measures in the field. The soil was clay in texture having pH 6.7, EC 0.34 ds/m, low in available N (246.50 kg ha⁻¹) medium in available P (18.5 kg ha⁻¹) and high in available K (280.75 kg ha⁻¹). Observations on growth and yield attributes were taken on five randomly selected peg marked plants in periodical intervals. The mean values were used for statistical analysis as suggested by Panse and Sukatame (1978).

Results and Discussion

Growth attributes

All the growth attributes were significantly influenced by various sowing methods and foliar spraying of nutrients. The growth components viz., plant height, leaf area index, number of branches plant⁻¹ and DMP were enhanced due to different sowing methods along with foliar spraying of nutrients (Table 1 and Table 2). The highest growth attributes was recorded in ridge sowing + foliar spray of 0.1% humic acid at 25 and 45 DAS (M₃S₃). Among the different sowing methods in the main plot, ridge sowing (M₃) significantly recorded the maximum growth attributes like plant height 55.85 cm, LAI of 4.65 at flowering stage, number of branches plant⁻¹ of 9.15, DMP of 3026.04 kg ha⁻¹ at harvest stage of the crop. This might be due to better growing conditions after seed germination and less competitive effect between plants in ridge sowing. Higher values were recorded in LAI and number of branches plant⁻¹ might be due to crop sown in ridges which provides loose layer of soil which enhances better root grown, nutrient and water uptake and subsequently increased the LAI and other growth components. Similarly, improved light penetration in middle and bottom of the crop canopy in ridge sowing reflects in higher DMP. Similar results were also observed by Hill et al., (2006) and Shashikumar et al., (2013).

Among the different foliar nutrition practices in the sub plot, the foliar spray of 0.1% humic acid at 25 and 45 DAS (S₃) was significantly superior over the other treatments and recorded the highest plant height of 57.73 cm, LAI of 5.05, number of branches plant⁻¹ of 9.90, DMP of 3131.26 kg ha⁻¹ at harvest stage of the crop. This could be due to increased LAI, number of branches plant⁻¹, DMP might be due to the role of humic acid in increasing endogenous hormone as IAA stabilizing cell division and cell enlargement which in turn improves the plant growth. This result was in conformity with the reports of Bakry et al., (2015).

The treatment combinations of ridge sowing + foliar spray of 0.1% humic acid at 25 and 45 DAS (M₃S₃) significantly recorded the highest plant height of 59.84 cm, LAI of 5.48, number of branches plant⁻¹ of 10.65 and DMP of 3250.64 kg ha⁻¹ at harvest stage of blackgram. This might be due to increased availability of nutrients due to ridge sowing method and 0.1% humic acid foliar nutrition which provided equal opportunity to the crop to grow and perpetuate. Also improvement in growth attributes could be improved in soil physical and chemical characteristics by reaction with soil minerals then improved water, air, soil characteristics and nutrient and mineral adsorption respectively. These findings were conformed with the earlier reports of Lone et al., (2010) and Ananthi and Mallika Vanangamudi (2014).

Yield attributes and Yield

All the yield attributes and yield were significantly influenced by sowing methods and foliar spraying of nutrients. The yield attributes, grain yield and haulm yield were enhanced due to different sowing methods along with foliar spraying of nutrients table 3. Among the

Table 1: Methods of sowing and foliar nutrition of growth attributes of blackgram.

<table>
<thead>
<tr>
<th>Sub plot treatment</th>
<th>Plant height (cm) at Harvest stage</th>
<th>LAI at flowering stage</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>M₃</td>
<td>M₄</td>
</tr>
<tr>
<td>S₁</td>
<td>46.25</td>
<td>48.60</td>
</tr>
<tr>
<td>S₂</td>
<td>55.20</td>
<td>58.15</td>
</tr>
<tr>
<td>S₃</td>
<td>54.19</td>
<td>55.02</td>
</tr>
<tr>
<td>S₄</td>
<td>51.20</td>
<td>53.44</td>
</tr>
<tr>
<td>Mean</td>
<td>51.71</td>
<td>53.80</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>SEₐ</td>
<td>0.78</td>
</tr>
<tr>
<td></td>
<td>CD (p=0.05)</td>
<td>1.64</td>
</tr>
</tbody>
</table>

M₁ - (Broad casting), M₂ - (Line Sowing), M₃ - (Ridge Sowing), S₁ - (Control) S₃ - (0.1 % Humic acid foliar spray on 25 and 45 DAS), S₄ - (2 % DAP foliar spray on 25 and 45 DAS), S₅ - (3 % Panchakavya foliar spray on 25 and 45 DAS).
different sowing methods in the main plot, ridge sowing (M₁) significantly recorded the maximum yield attributes and grain yield of 800.19 kg ha⁻¹ and haulm yield of 1996.89 kg ha⁻¹. The highest grain yield and haulm yield was obtained by the effective utilization of resources that increased the performance of crop. This result was conformity with the reports of Chaturvedi et al., (2015).

Among the different foliar nutrition practices in the sub plot, the treatment (S₁) recorded the highest yield attributes, grain yield of 868.56 kg ha⁻¹, haulm yield of 2110.34 kg ha⁻¹. This might be due better translocation of assimilates to the sink which reflected in maximum values in yield components and other traces in humic acids could have resulted in higher post-flowering photosynthesis and assimilate apoplast and symplast movement of nutrients. This result was in conformity with the reports of Kalaichelvi et al., (2006). There was significant interaction between treatment combinations of ridge sowing + foliar spray of 0.1% humic acid at 25 and 45 DAS (M₃S₂) significantly recorded the highest grain yield of 934.40 kg ha⁻¹ and highest haulm yield 2248.32 kg ha⁻¹. This might be due to increased synthesis of translocation from source to sink which in turn registered higher number of pods plant⁻¹, number of grains pod⁻¹, hundred grain. The cumulative and conjunctive application of nutrients to the crop might have enjoyed with sufficient nutrient condition for a longer period of time and the nutrient uptake there by allowing the plant to perpetuate with all the yield components and yield. This result was in conformity with the findings of Mishra et al., (2012) and EL – Habbasha et al., (2012).

References


