Studies on integrated nutrient management on yield of blackgram (*Vigna mungo L.*) in Chhattisgarh plain

Surabhi Patre, RK Shukla, Dinesh Pandey, PK Keshry and NK Chaure

Abstract

A field experiment was conducted at the Instructional farm, BTC CARS, Bilaspur (C.G.) university of Indira Gandhi Krishi Vishwavidyalaya, Raipur (Chhattisgarh). During kharif, season of 2021 with a view to study the “Studies on integrated nutrient management on yield of blackgram (*Vigna mungo L.*) In Chhattisgarh plain”. The Blackgram (urdbean) used to grown and treatment was replicated three times in randomized block design. The soil of experimental site was allisol belonging to textural clay loam. The investigation has recommended dose of fertilizer (RDF) i.e., 20:40:20 kg N, P₂O₅, K₂O ha⁻¹ which were applied at different concentrations in blackgram in seven treatments viz., T1: - 20:40:20 RDF, T2: - 125% RDF, T3: - 150% RDF, T4: - RDF + FYM @5t ha⁻¹, T5: - 125% of RDF + FYM @5t ha⁻¹, T6: - 150% of RDF + FYM @5t ha⁻¹ and T7: - Control (NPK). The yield parameters i.e., number of pods plant⁻¹, number of seeds pod⁻¹, pod length (cm), 1000 seed weight (g), seed yield q ha⁻¹, straw yield q ha⁻¹ and harvest index (%) were significantly superior in the treatment T6 (150% of RDF + FYM @5t ha⁻¹). On the basis of above findings, treatment T6 (150% of RDF + FYM @5t ha⁻¹) stand could be better performance first in position and T5 (125% of RDF + FYM @5t ha⁻¹) stand in second order of preference. However, treatment T1 (150% RDF) comes in next in order. Therefore, it may be concluded that treatment T5 (150% RDF + FYM @5t ha⁻¹) may be prefer for higher yield in blackgram.

Keywords: Yield parameter, nutrient management, blackgram, allisol, clay loam, RDF, N, P₂O₅, K₂O, FYM, seeds, pods

1. Introduction

Blackgram [*Vigna mungo* (L.) Hepper], is one of the most important pulse crops among the various grain legumes. According to Vavilov (1951) [21] it is native to India, belongs to the family Leguminaceae. It is consumed in the form of ‘dal’ (whole or split, husked and unhusked) or perched. It is used as nutritive fodder specially for milch animals. It fits well in various multiple cropping and intercropping systems. After picking of pods, blackgram plants may be used as green fodder for livestock or green manuring to increase fertility of soil. Besides these, the black gram crop also enriches soil by fixing the atmospheric nitrogen. Blackgram is spread in Indian subcontinent and popularly known as “Urad dal”. It is cultivated in Bangladesh, Afghanistan, Myanmar and Pakistan. Most suitable climate for blackgram is 27-30 °C, moderate rainfall and loamy soil with high water holding capability. Blackgram is third most important pulse crop grown under rainfed, rice fallow, irrigated conditions and during kharif, rabi and summer seasons, which matures in 90-100 days and it, enriches soil with nitrogen. India is major producer and consumer of blackgram (Raju, 2019) [13]. It is used for preparation of different food preparations like *Idli*, *Dosa* and non-fermented foods (Sivasubramanian et al., 2015) [19]. Black gram is a self-pollinated leguminous crop which is grown during kharif as well as summer in seasons in arid and semi-arid regions of India. It is tolerant to drought and can be grown successfully on all types of soils. (Krishnaprabhu et al. 2018) [17]. Black gram is the most important legume crop and India alone produce more than two-third of the world’s production (Saini and Jaiwal, 2002) [16] as food, feed and industrial raw material and ranks as the third important pulse crop in India (Selvakumar et al., 2012) [17]. Total blackgram production was 3280 thousand tonnes; of which percentage share in 13.48% during 2017-18 (Anonymous, 2018) [1]. The total blackgram production in India was 2.89 million tonnes from an area of 3.56 million hectare (Ministry of Agriculture and Farmer’s welfare annual report 2016-17). In Chhattisgarh during 2019-2020 total area has 134.13 thousand hectare and productivity of 371 kg ha⁻¹. In Madhya Pradesh, total area was 9.32 lakh hectare with total production of 515 million tonnes and productivity of 553 kg ha⁻¹.
2. Materials and Methods
The field experiment was conducted at the Instructional farm, BTC CARS, Bilaspur (C.G.) university of Indira Gandhi Krishi Vishwavidyalaya, Raipur (Chhattisgarh). The Research Farm is situated at 22.09°N latitude, 82.15°E longitude and at an altitude of 292.3 m above mean sea level. The region falls under the Eastern plateau and hill region (Agro-climatic zone-VII) of India. Chhattisgarh state is classified into three agro-climatic zones, in which Bilaspur falls under the Chhattisgarh plains zone of the state. The experimental field was well drained with uniform topography. The soil of experimental site was alfisol belonging to textural clay loam. The full dose of fertilizers was applied according to the treatments by manually in previously open furrows before sowing the seeds. The uniform dose of 20 kg N, 40 kg P2O5 and 20 kg K2O were applied through Urea, SSP and MOP, respectively in all the treatments. These were drilled by hand in the open furrows during sowing of seed in all the treatments. Five plants of each plot were randomly selected and tagged for recording the observations at different stages of growth. The observations on growth and yield parameters were recorded at an interval of 20, 40, 60 DAS and at harvest.

3. Results and Discussion
Data pertaining to yield attributes influenced by various treatment has been given in table 1 and fig 1, 2, 3, 4, 5, 6 and 7. Regarding number of pods plant−1, clearly shows that, significant highest number of pods (30.03) was noted in treatment T6 (150% of RDF + FYM@5t ha−1), followed by treatment, T3 (125% of RDF + FYM@5t ha−1) (29.00) and T1 (150% RDF) (27.02). Significant lowest number of pods plant−1 (18.10) was noted in treatment T7 (Control (NPK)). The results obtained in the present studies are also supported by Hussain et al. (2010) and Hussain et al. (2011).

Number of seeds pod−1, was observed significant highest (6.60) in treatment T6 (150% of RDF + FYM@5t ha−1), followed by treatment, T3 (125% of RDF + FYM@5t ha−1) (6.30) and T2 (150% RDF) (6.02). Significant lowest number of seeds pod−1 (4.50) was noted in treatment T7 (Control (NPK)). The results are also supported by Hussain et al. (2011), Vairavan (2011) and Sheikh et al. (2012). The pod length (cm), clearly shows that, significant highest pod length (6.01 cm) was noted in treatment T6 (150% of RDF + FYM@5t ha−1), followed by treatment, T3 (125% of RDF + FYM@5t ha−1) (5.90 cm) and T1 (150% RDF) (5.60 cm).

Significant lowest pod length (4.50 cm) was noted in treatment T7 (Control (NPK)). The results obtained in the present study are in accordance with the results of Singh et al. (2008), Kumpawat (2010) and Kokani et al. (2014). The combined dose of chemical and organic fertilizer was more beneficial in enhancing all the above parameters due to increased solubility of phosphorus and higher nitrogen fixation in nodules leading to increased availability of nitrogen and phosphorus. FYM also increased yield and yield attributing characters as well as nodulation and yield parameters.

Stover yield q ha−1 was noticed, significant highest (30.50 q ha−1) in treatment T6 (150% of RDF + FYM@5t ha−1), followed by treatment, T3 (125% of RDF + FYM@5t ha−1) (30.20 q ha−1) and T4 (150% RDF) (29.80 q ha−1). Significant lowest stover yield (18.00 q ha−1) was noted in treatment T7 (Control (NPK)). Similar results were also observed by Kurhade et al., (2015) and Gupta et al. (2006).

Harvest index (%), was observed that, highest harvest index (43.44%) was noted in treatment T7 (Control (NPK)) followed by treatment, T6 (150% of RDF + FYM@5t ha−1) (43.61%) and T3 (125% of RDF + FYM@5t ha−1) (42.38%). Lowest harvest index (37.50%) was noted in treatment T1 (20:40:20 RDF). Similar result was also reported by Kokani et al. (2014) and Tomar et al. (2013).

<table>
<thead>
<tr>
<th>Tr. No.</th>
<th>Treatment details</th>
<th>Number of pods plant−1</th>
<th>Number of seeds pod−1</th>
<th>Pod length (cm)</th>
<th>1000 seed weight (g)</th>
<th>Seed yield q ha−1</th>
<th>Stover yield q ha−1</th>
<th>Harvest index (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>T1</td>
<td>20:40:20 RDF</td>
<td>22.06</td>
<td>5.04</td>
<td>5.01</td>
<td>35.00</td>
<td>10.50</td>
<td>28.00</td>
<td>37.50</td>
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<tr>
<td>T2</td>
<td>125% RDF</td>
<td>24.00</td>
<td>5.20</td>
<td>5.20</td>
<td>37.50</td>
<td>11.00</td>
<td>28.75</td>
<td>38.26</td>
</tr>
<tr>
<td>T3</td>
<td>150% RDF</td>
<td>27.02</td>
<td>6.02</td>
<td>5.60</td>
<td>42.00</td>
<td>12.30</td>
<td>29.80</td>
<td>41.28</td>
</tr>
<tr>
<td>T4</td>
<td>RDF + FYM@5t ha−1</td>
<td>26.01</td>
<td>5.60</td>
<td>5.40</td>
<td>40.10</td>
<td>11.60</td>
<td>29.25</td>
<td>39.66</td>
</tr>
<tr>
<td>T5</td>
<td>(125% of RDF + FYM@5t ha−1)</td>
<td>29.00</td>
<td>6.30</td>
<td>5.90</td>
<td>44.00</td>
<td>12.80</td>
<td>30.20</td>
<td>42.38</td>
</tr>
<tr>
<td>T6</td>
<td>(150% of RDF + FYM@5t ha−1)</td>
<td>30.03</td>
<td>6.60</td>
<td>6.01</td>
<td>45.00</td>
<td>13.30</td>
<td>30.50</td>
<td>43.61</td>
</tr>
<tr>
<td>T7</td>
<td>Control (NPK)</td>
<td>18.10</td>
<td>4.50</td>
<td>4.50</td>
<td>30.13</td>
<td>8.00</td>
<td>18.00</td>
<td>44.44</td>
</tr>
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</table>

S.Em (±) 2.19 0.34 0.14 2.57 0.61 0.72 1.70
CD (P=0.05) 6.75 1.07 0.45 7.94 1.90 2.23 NS
CV (%) 15.06 10.75 4.69 11.41 9.24 4.32 7.42

Table 1.1: Effect of integrated nutrient management on yield parameters of blackgram

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Fig 1: Number of pods plant-1

Fig 2: Number of seeds pod-1

Fig 3: Pod length (cm)
**Fig 4:** 1000 seed weight (g)

**Fig 5:** Seed yield q ha⁻¹

**Fig 6:** Stover yield q ha⁻¹
4. Conclusion
The yield parameters i.e., number of pods plant⁻¹, number of seeds pod⁻¹, pod length (cm), 1000 seed weight (g), seed yield q ha⁻¹, straw yield q ha⁻¹ and harvest index (%) were significantly superior in the treatment T₆ (150% of RDF + FYM@5t ha⁻¹).

On the basis of above findings, treatment T₆ (150% of RDF + FYM@5t ha⁻¹) stand could be better performance first in position and T₃ (125% of RDF + FYM@5t ha⁻¹) stand in second order of preference. However, treatment T₂ (150% RDF) comes in next in order. Therefore, it may be concluded that treatment T₆ (150% of RDF + FYM@5t ha⁻¹) may be prefer for higher yield in blackgram.

Fig 7: Harvest index (%)

5. References