Effect of spacing and fertilizer level on yield attributes of Dhaincha (Sesbania aculeata)

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Received: 17-07-2015 Accepted: 06-09-2017 DOI: 10.18805/LR-3564

ABSTRACT

A field experiment was conducted at Central Farm Unit situated in Agricultural College and Research Institute, Tamil Nadu Agricultural University, Killikulam during Rabi 2011-12 to evaluate the effect of spacing (120×30 cm, 120×20 cm, 90×30 cm and 90×20 cm) and fertilizer levels (12.5:25:12.5, 18.75:37.5:18.75, 25:50:25, 31.25:62.5:31.25 kg N, P2O5, K2O/ha and control) on yield attributes of Dhaincha. The results revealed that spacing adopted with 120×30 cm significantly recorded higher number of pods/plant (53.7), pod length (19.94 cm), number of seeds/pod (28.52) and seed yield (585 kg/ha) of Dhaincha. In respect of different fertilizer levels, application NPK @ 31.25:62.5:31.25 kg/ha perceived higher yield attributes (number of pods/plant (48.8), pod length (17.98), number of seeds/ pod (29.28) and seed yield (609 kg/ha). Combination of spacing (120×30 cm) with fertilizer levels of 31.25:62.5:31.25 kg/ha significantly recorded higher seed yield of 705 kg/ha.

Key words: Dhaincha, Fertilizer levels, Pod length, Seed yield, Spacing.

Green manure crops ensure ecological sustainability by maintaining the productivity of the soil over a long period by protecting soil from erosion. Plant nutrients are provided in a better form and over a longer period for the crops grown after green manuring. However, the choice of green manuring crops has to be made in relation to soil, climate and time available to raise the green manure crop and the facilities for irrigation (Thimmanna et al. 2014). Adopting leguminous annual green manure crop like dhaincha is an ideal green manure crop it is quick growing, succulent, easily decomposable and produces high amount of biomass with low moisture requirements. It can be grown in the salt affected soils and also in ill drained soils. It is quick germinating and fast growing crop and bears more number of nitrogen nodules. (Carlsson and Huss-Danell, 2003). Despite being a multi-purpose crop, Dhaincha has not gained due importance in our cropping system. Besides, little research work has been done on agronomic aspect of Dhaincha like spacing and nutrient requirement etc. Optimum spacing provides conditions for maximum light interception right from early period of crop growth. Further, it is important to realize that spacing should be defined not only in terms of number of plants per unit area but also in terms of arrangement of these plants on the ground (spatial/ geometry of planting). By changing the spacing, it is possible to achieve optimum vegetative and reproductive growth which can boost up the seed crop productivity (Lamani et al. 2004). Success in absorption of nutrients from soil depends on the spacing adopted for effective production.

Hence, a equate supply of nutrients under correct crop spacing becomes important for obtaining higher seed yield. Therefore the quantum of macronutrients required for each and every crop has to be specified especially the seed crops as they require higher levels than commercial crops (Savithri and Srimathi, 2001). Hence, the objective of present study was formulated to identify the optimum level of fertilizer and spacing required to obtain a higher seed yield with good quality.

The present study was carried out during kharif season of 2012 field No.C-8 of the Central Farm Unit at the Agricultural College and Research Institute, Killikulam to evaluate the performance of spacing and fertilizer levels on yield attributes of dhaincha. The experimental site is geographically located in the Southern agro-climatic zone of Tamil Nadu at 8° 46’ North latitude and 77° 42’ East longitude, at an altitude of 40 m above the mean sea level. The soil of experimental field was red sandy loam and well drained, having low available nitrogen (218 kg/ha), optimum available phosphorus (21.2 kg/ha) and low available potassium (226 kg/ha). Soil organic carbon content was also

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low (0.51%) with soil pH of 7.5. A split plot design was used with treatments consisting of spacing viz., 120×30 cm, 120×20 cm, 90×30 cm and 90×20 cm were assigned to main plot and various level of fertilizers like 12.5:25:12.5, 18.75:37.5:18.75, 25:50:25, 31.25:62.5:31.25 kg N, P₂O₅, K₂O/ha and control were assigned to sub plot and replicated thrice. The seeds of dhaincha (local variety) was treated with *Rhizobium* and *Phosphobacterium* and dibbled in respective of different spacing of treatment schedule on 10.11. 2011 and harvesting was done by hand picking of matured pods twice at 90 and 105 DAS.

The entire plants were cutting at 15 cm from ground level at 120 DAS and it was dried, threshed, cleaned and seeds were separated and dried and weighed. According to nutrient treatment schedule, nitrogen in the form of urea, phosphorus in the form of di ammonium phosphate and potash in the form of muriate of potash were applied as basal application in the sowing line and covered with soil. Five plants were tagged at random in each treatment plot for recording the various yield attributes at different stages of the crop.

Yield parameters as influenced by spacing: Marked variations due to spacing have been noticed with respect to characters like number of pods per plant, number of seeds per pod, seed recovery and seed yield. Spacing at 120 × 30 cm recorded more number of pods/plant (53.7), pod length (19.94 cm), number of seeds/pod (28.52), and seed yield of 585 kg/ha (Table 1 and Table 2). It was meticulously followed by adopting spacing with 120 × 20 cm. The less competition for light, moisture and more nutrient availability associated with treatments with 120 × 20 cm and 90 × 30 cm spacing. The non-availability of good quality seeds is one of the major constraints in popularizing the practice of green manuring with Dhaincha. Hence, the production and making available sufficient quantity and high quality of seeds at reasonable price are very much necessary for in this crop. For seed production purpose, suitable techniques have to be developed for each agro climatic situation. The information available on seed production aspects of this crop is very meager. In the seed production programme, spacing and nutrient management as most important aspects for increasing the production and productivity of seed.

### Table 1. Effect of different spacing and fertilizer levels on yield attributes of dhaincha

<table>
<thead>
<tr>
<th>Treatment</th>
<th>Number of pods/plant</th>
<th>Pod length (cm)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>S₁</td>
<td>S₂</td>
</tr>
<tr>
<td>M₁ - 120 × 30 cm</td>
<td>57.2</td>
<td>57.7</td>
</tr>
<tr>
<td>M₂ - 120 × 20 cm</td>
<td>45.0</td>
<td>45.1</td>
</tr>
<tr>
<td>M₃ - 90 × 30 cm</td>
<td>37.8</td>
<td>38.0</td>
</tr>
<tr>
<td>M₄ - 90 × 20 cm</td>
<td>37.0</td>
<td>37.4</td>
</tr>
</tbody>
</table>

SEd± CD (P=0.05) S Ed± CD (P=0.05)

M | 0.56 | 1.38 | 0.19 | 0.47
S | 0.55 | 1.12 | 0.30 | 0.61
M at S | 1.13 | 2.43 | 0.57 | 1.18
S at M | 1.10 | 2.25 | 0.60 | 1.22

S₁ : NPK @ 12.5:25:12.5 kg/ha S₄ : NPK @ 31.25:62.5:31.25 kg/ha
S₂ : NPK @ 18.75:37.5:18.75 kg/ha S₅ : Control (without fertilizer)
S₃ : NPK @ 25:50:25 kg/ha

### Table 2. Effect of different spacing and fertilizer levels on number of seeds/pod and seed yield (kg/ha) of dhaincha

<table>
<thead>
<tr>
<th>Treatment</th>
<th>Number of seeds/pod</th>
<th>Seed yield (kg/ha)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>S₁</td>
<td>S₂</td>
</tr>
<tr>
<td>M₁ - 120 × 30 cm</td>
<td>27.71</td>
<td>28.16</td>
</tr>
<tr>
<td>M₂ - 120 × 20 cm</td>
<td>25.16</td>
<td>26.91</td>
</tr>
<tr>
<td>M₃ - 90 × 30 cm</td>
<td>23.87</td>
<td>24.43</td>
</tr>
<tr>
<td>M₄ - 90 × 20 cm</td>
<td>24.23</td>
<td>24.29</td>
</tr>
</tbody>
</table>

SEd± CD (P=0.05) S Ed± CD (P=0.05)

M | 0.13 | 0.31 | 0.20 | 49
S | 0.34 | 0.70 | 12 | 26
M at S | 0.62 | 1.29 | 30 | 67
S at M | 0.68 | 1.40 | 25 | 52

S₁ : NPK @ 12.5:25:12.5 kg/ha S₄ : NPK @ 31.25:62.5:31.25 kg/ha
S₂ : NPK @ 18.75:37.5:18.75 kg/ha S₅ : Control (without fertilizer)
S₃ : NPK @ 25:50:25 kg/ha
with wider spacing had an edge in producing more reproductive parts compared to closer spacing. The favourable condition prevailed with wider spacing resulted in better growth and development of the number of pods/plant, number of seeds/pod and seed yield. These results are in conformity with the earlier findings of Satish Kumar et al. (2006)

**Effect of fertilizer levels on yield attributes:** Significantly higher number of pods/plant (48.8), pod length (17.98 cm) number of seeds/pod (29.28) and seed yield (609 kg/ha) were recorded with fertilizer level of NPK @ 31.25:62.5:31.25 kg/ha and which was significantly comparable with application of 25:50:25 kg/ha (Table 1&2). Application of the major nutrients might have improved the fertility status of the soil and effective nutrient supply system in growth stages might contributed better plant growth, dry matter production which positively influenced the yield attributes and ultimately the yield of dhaincha. The result of this study is concordance with the earlier findings of Saritha et al. (2012) in pigeon pea and Kipling et al. (2011) in sunnhemp.

**Yield attributes as influenced by interaction effects of spacing and fertilizer levels:** The interactions between spacing and various levels of fertilizer differed significantly for yield attributes and yield of Dhaincha. Significantly higher number of pods/plant (61.9), pod length (22.56 cm), number of seeds/pod (31.94) and seed yield of 705 kg/ha were recorded with adopting spacing of 120 × 30 cm along with application of NPK @ 31.25:62.5:31.25 kg/ha which was closely followed by spacing at 120 × 30 cm combined with NPK @ 25:50:25 kg/ha (Table 1 & 2). The enhancement of yield characters and yield might be due to the influence of sufficient spacing and with adequate nutrients helped the crop to perform better with growth and ultimately the yield. Similar results have also been observed by earlier research works (Meena et al. 2011 and Saritha et al. 2012).

**CONCLUSION**

From the results, it can be concluded that with respect to wider spacing at 120 × 30 cm, while fertilizer levels of NPK @ 31.25:62.5:31.25 kg/ha or 25:50:25 kg/ha the best option for ideal obtaining higher seed dhaincha.

**REFERENCES**


