RESPONSE OF ROOT ROT RESISTANT CULTURES OF SESAME (SESAMUM INDICUM L.) TO PLANT DENSITY AND NPK FERTILIZER

K. Subrahmaniyan, D. Dinakaran, P. Kalaiselven and N. Arulmozhi
Regional Research Station
Tamil Nadu Agricultural University, Vridhachalam - 606 001, India

ABSTRACT

A field experiment was conducted during summer seasons of 1998 and 1999 to study the response of three root rot resistant cultures of sesame viz., ORM 7, ORM 14 and ORM 17 to three spacing (30x10, 30x20 and 30x30 cm) and three NPK levels (100, 125 and 150 per cent of the recommended dose). The pooled results revealed that among the three cultures, the culture ORM 17 recorded higher number of branches, crop drymatter production and number of capsules/plant and seed yield (691 kg/ha). A favourable increase in the yield parameters was observed with a spacing of 30x30 cm. However a spacing of 30x10 cm significantly recorded a higher seed yield of 622 kg/ha. Increasing NPK levels upto 150 per cent resulted markedly higher yield attributes and a seed yield of 630 kg/ha. Among the different combination of varieties, spacing and fertilizers, the culture ORM 17 grown under a spacing of 30 x 10 cm with 150% NPK recorded the highest seed yield of 844 kg/ha.

In the north eastern zone of Tamil Nadu, Sesame (Sesamum indicum L.) is an established oilseed crop raised under irrigated condition (Balasubramanian et al., 1995). Root rot caused by Macrophomina phaseolina (Tass.) Goid is a very serious and destructive disease, in all sesame growing areas. Murugesan et al. (1978) reported that 1 per cent increase in the incidence of Macrophomina phaseolina reduced seed yield by 1.8 kg/ha. Control of root rot disease by chemical means in the field is not economical. Identification of resistant varieties combined with good yield potential helps to achieve higher productivity and net return. Dinakaran et al. (1996) identified three sesame cultures viz., IVT 21 (ORM 7), IVT 22 (ORM 14) and IVT 23 (ORM 17) as resistant types to root rot pathogens in the All India Coordinated Research Project on Sesame. However, the yield potential of these cultures was very low due to fewer branches. Hence, the present study was undertaken to maximize the seed yield of these resistant cultures by evaluating suitable spacing and fertilizer requirement.

The field experiment was conducted at Regional Research Station, Vridhachalam during the summer seasons of 1998 and 1999. The experiment was laid out in randomized block design with 27 treatment combinations involving three root rot resistant cultures viz., ORM 7, ORM 14 and ORM 17, three spacing (30x10, 30x20 and 30x30 cm) and three NPK levels (100, 125 and 150 per cent of the recommended dose). The treatments were replicated thrice. The plot size was 20 m². Soil type was red sandy loam, low in available N (160 kg/ha), medium in available P₂O₅ (37.5 kg/ha) and available K₂O (145 kg/ha) with a pH of 7.3. A fertilizer schedule of 35:23:23 kg, N, P₂O₅ and K₂O/ha was kept constant for 100 per cent of the recommended dose of NPK. Seedlings were thinned on 15 days after sowing to achieve the required populations. At harvest growth and yield parameters were recorded from five sample plants in each treatment plots.

Performance of cultures: Among the cultures tested, ORM 17 recorded the maximum plant height (106.6 cm), more number of branches (5.6/plant), drymatter production (33.2 g/plant) and number of capsules (79.8/plant). As a result the culture ORM 17 recorded significantly higher seed yield of 691 kg/ha.
kg/ha when compared to ORM 7 (577 kg/ha) and ORM 14 (471 kg/ha).

Effect of plant density: Spacing plays a vital role in the growth and yield of sesame. Under a wider spacing of 30x30 cm, all the cultures registered maximum plant height, number of branches, drymatter production and number of capsules/plant which might be due to relatively lesser interplant competition for space, light, nutrient moisture etc. Although a favourable effect of wider spacing on growth and yield attributes on individual plants were observed, the seed yield/ha did not improve mainly because of the lower population. Yield declined significantly with wider spacing and decrease in plant population. Majumdar and Roy (1992) reported that improved individual plant growth and yield components under wider spacing could not sustain the yield of sesame and that was because of reduction in plant density. Though all the cultures produced more number of branches/plant, the branches were not fully developed one. Hence the seed yield was significantly higher under 30x10 cm (622 kg/ha) when compared to other spacing. The results clearly indicated that for these root rot resistant cultures, 30x10 cm was optimum spacing to achieve maximum seed yield.

Effect of NPK fertilizers: A linear response to NPK fertilizers was observed. Each successive increase in the dose of NPK fertilizers up to 150 per cent significantly recorded the maximum plant height, number of branches, drymatter production and number of capsules/plant and a seed yield of 626 kg/ha. Higher doses of fertilizers might have enhanced the vegetative growth and development of yield attributes as indicated by higher drymatter production and more number of branches and capsules/plant. These results confirm the findings of Subrahmaniyan and Arulmozhi (1999).

Table 1. Effect of plant density and NPK levels on the growth, yield attributes and seed yield of sesame (Pooled mean of summer 1998 and 1999) cultivars.

<table>
<thead>
<tr>
<th>Treatment</th>
<th>Plant height (cm)</th>
<th>No. of branches/plant</th>
<th>Drymatter production (g/plant)</th>
<th>No. of capsules/plant</th>
</tr>
</thead>
<tbody>
<tr>
<td>Varieties</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>ORM 7</td>
<td>92.3</td>
<td>98.5</td>
<td>95.4</td>
<td>5.2</td>
</tr>
<tr>
<td>ORM 14</td>
<td>93.3</td>
<td>99.9</td>
<td>96.6</td>
<td>4.4</td>
</tr>
<tr>
<td>ORM 17</td>
<td>105.2</td>
<td>108.0</td>
<td>106.6</td>
<td>5.5</td>
</tr>
<tr>
<td>Spacing (cm)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>30x10 cm</td>
<td>97.2</td>
<td>98.8</td>
<td>98.0</td>
<td>5.0</td>
</tr>
<tr>
<td>30x20 cm</td>
<td>98.2</td>
<td>99.0</td>
<td>98.6</td>
<td>4.6</td>
</tr>
<tr>
<td>30x30 cm</td>
<td>98.8</td>
<td>104.2</td>
<td>102.0</td>
<td>5.6</td>
</tr>
<tr>
<td>NPK levels (%)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>100</td>
<td>92.0</td>
<td>95.8</td>
<td>93.9</td>
<td>4.0</td>
</tr>
<tr>
<td>125</td>
<td>98.1</td>
<td>102.5</td>
<td>100.3</td>
<td>5.4</td>
</tr>
<tr>
<td>150</td>
<td>102.5</td>
<td>106.5</td>
<td>104.5</td>
<td>5.9</td>
</tr>
<tr>
<td>CD (P=0.05)</td>
<td>0.97</td>
<td>1.07</td>
<td>1.02</td>
<td>0.22</td>
</tr>
</tbody>
</table>

Interaction effect: The interaction effect was found to be significant (Table 2). Among the different combination of varieties, spacing and fertilizers, the culture ORM 17 grown under a spacing of 30 x 10 cm with 150% NPK recorded the highest seed yield of 844 kg/ha. By the virtue of more number of plants/ha under 30 x 10 cm spacing along with higher doses of NPK fertilizers resulted in higher seed yield. This is line with the findings
of Balasubramanian et al. (1995).

Table 2. Seed yield as affected by different treatment combinations (Pooled mean of summer 1998 and 1999)

<table>
<thead>
<tr>
<th>Varieties</th>
<th>30x10 cm</th>
<th>30x20 cm</th>
<th>30x30 cm</th>
<th>Mean</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>100%</td>
<td>125%</td>
<td>150%</td>
<td></td>
</tr>
<tr>
<td>ORM 7</td>
<td>511</td>
<td>661</td>
<td>768</td>
<td>301</td>
</tr>
<tr>
<td>ORM 14</td>
<td>306</td>
<td>510</td>
<td>568</td>
<td>404</td>
</tr>
<tr>
<td>ORM 17</td>
<td>695</td>
<td>738</td>
<td>844</td>
<td>596</td>
</tr>
<tr>
<td>Mean</td>
<td>622</td>
<td>529</td>
<td></td>
<td>586</td>
</tr>
</tbody>
</table>

CD (0.05)

<table>
<thead>
<tr>
<th>Factor</th>
<th>Mean</th>
</tr>
</thead>
<tbody>
<tr>
<td>Variety (V)</td>
<td>18.71</td>
</tr>
<tr>
<td>Spacing (S)</td>
<td>18.71</td>
</tr>
<tr>
<td>Fertilizers (F)</td>
<td>18.71</td>
</tr>
<tr>
<td>V x S</td>
<td>32.40</td>
</tr>
<tr>
<td>V x F</td>
<td>32.40</td>
</tr>
<tr>
<td>S x F</td>
<td>32.40</td>
</tr>
<tr>
<td>V x S x F</td>
<td>56.13</td>
</tr>
</tbody>
</table>

REFERENCES