Comparative Performance of Two Sesame (Sesamum indicum L.) Varieties under Different Row Spacings

Riaz Ahmad, Tariq Mahmood, M. Farrukh Saleem and Shamim Ahmad
Department of Agronomy, University of Agriculture, Faisalabad, Pakistan

Abstract: The study was undertaken to determine the effect of three row spacings viz. 30, 45 and 60 cm on the yield and quality of two sesame varieties i.e. 92001 and TS 3. The results showed that maximum seed yield (0.7147 t ha⁻¹) was obtained with 30 cm row spacing and variety TS 3 gave about 110 % more seed yield and 1.37 % more oil content than variety 92001.

Key words: Sesame, row spacing, yield

Introduction
Sesame (Sesamum indicum L.) is an important conventional oil seed crop of Pakistan. Its seed contains about 50 % edible oil of high quality. The sesame oil does not turn rancid unlike other edible oils because of the presence of antioxidant sesamol (Hatan and Abassi, 1984). The seed contains all essential amino acids and fatty acids. It is a good source of vitamins (Pantothenic acid and vitamin E). The seeds also contain important minerals such as calcium (1450 mg 100 g⁻¹) and phosphorus (570 mg 100 g⁻¹) and seed cake is a valuable and nutritious feed for cattle (Balasubramaniamy and Palaniappan, 2001).

In Pakistan sesame crop is grown on an area of 86.8 thousand hectares with average yield of 454 kg ha⁻¹ (Anonymous, 2000) which is very low potential. One of the main reasons for this low yield is plant population. Gupta (1982) obtained maximum sesame yield from the plants grown at 30 x 15 cm² and said that the effect of spacing on plant height was inconsistent. Venkatesan et al. (1983) reported that sesame grown at plant spacing of 40 x 30 cm² gave highest seed yield in the summer season while in the monsoon season, maximum seed yield was obtained at 30 x 30 cm². Samma (1994) showed that spacing had no significant effects on yield and yield components. Dossall et al. (1998) reported that wider spacing gave higher seed yield than closer spacing while Montvillas (1999) concluded that increasing the row spacing decreased the rape yields. Improved and high yielding cultivars of sesame can give 15-40 % more yield than local traditional cultivars (Anonymous, 1998). Similarly Chen et al. (1994) reported that sesame cultivar Zhong Zhi 9 out yielded the control cultivar Wulinghui by 32.9 %. But much less such information is available under Pakistan environmental conditions. Keeping this in view and the contradictory findings about spacing of different crops, this study was designed to see the effect of row spacing on yield and yield components of two sesame cultivars under the agro-ecological conditions of Faisalabad.

Materials and Methods
Investigation to see the effect of different row spacings on seed and oil yield of two varieties of sesame were conducted at the Agronomic Research Area, University of Agriculture, Faisalabad, during 1999. Quadruplicated experiment was laid out in randomized complete block design (RCBD) with split arrangements using a net plot size of 8.0 x 3.6 m². Row spacings were randomized in main plots while varieties in sub plots. Treatments comprised of three row spacings viz. 30, 45 and 60 cm and two sesame varieties i.e., 92001 and TS 3. Crop was sown in the last week of July 1999 on a well prepared fine seed bed. Nitrogen and phosphorus @ 60 kg ha⁻¹ each, were applied in the form of urea and triple super phosphate, respectively at the time of sowing. Thinning was done two weeks after sowing to maintain the plant to plant distance of 10 cm. All other Agronomic practices were kept normal and uniform for all treatments. Crop was harvested on 23rd of October, 1999 and observations were recorded on different plant parameters like number of plants plot⁻¹, plant height, days to flowering, number of capsules plant⁻¹, number of seeds capsule⁻¹, seed weight capsule⁻¹, seed yield and oil content using standard procedures. The recorded data were analyzed statistically by using Fisher’s Analysis of variance techniques and LSD test was applied at 5 % probability level to compare the differences among treatment’s means (Steel and Torrie, 1984).

Results and Discussion
The data regarding number of plants plot⁻¹ are shows that plant population of sesame was significantly affected by row spacing (Table 1). Sesame crop planted in 30 cm apart rows exhibited significantly more number of plants plot⁻¹ than rest of the row spacings under study. The plant population ranged between 479.8 to 860.3 plants plot⁻¹. Apparently, more uniform plant distribution obtained by reduced row spacing may results in higher plant population as noted by Sims (1976) and Cheema (1999). Both the varieties had statistically the same number of plants m⁻² which varied from 693.25 to 693.417. Plant height was significantly affected by different row spacings (Table 1). Sesame crop planted in the pattern of 30 cm apart rows produced taller plants (116.9 cm), which was statistically at par with those sown in 45 cm apart rows, while minimum plant height (109.3 cm) was recorded from plants sown in 60 cm apart rows. This is because in narrow spacing of plants compete more for available resources especially for light and thus result in more height than widely spaced plants. Variety TS3 was significantly taller (116.375 cm) than variety 92001 that was 110.986 cm in height. These results are in conformity with those of Siddique (1997) but are contradictory to those reported by Delgado and Vermanos (1975), who stated that plant height increased with increased spacing. Row spacing had significant effect on number of days to flowering while differences between the two varieties and the interaction between row spacings and varieties were non significant for this parameter (Table 1). Comparison of individual treatment’s means of different row spacings showed that the number of days taken to flowering was maximum (56.125) when the crop was sown in 60 cm apart rows, while crop sown in 30 cm apart rows took minimum days (52.032) to flowering. Results further indicated that days taken to flowering were more when the crop was sown on wider row spacing than the closer ones. It might be attributed to more nutritional area available in wider spacing, which caused more vegetative growth. These results are in agreement with that of Alessi et al. (1977) who recorded more number of days taken to flowering at wider rows than at closer rows in sunflower.

The number of capsules plant⁻¹ were affected significantly by different row spacings. Sesame crop planted at 60 cm apart rows produced significantly more number of capsules plant⁻¹ (32.94) than 45 and 30 cm apart rows. The lower number of capsules plant⁻¹ (23.99) were found in plots sown at 30 cm apart rows. The higher number of capsules plant⁻¹ in 60 cm apart rows were due to a proper adjustment of plants in the field which facilitated more aeration and penetration of light.
Table 1: Agronomic traits and oil contents of two sesame varieties as affected by different row spacings

<table>
<thead>
<tr>
<th>Treatments</th>
<th>No of plants plot</th>
<th>Plant height (cm)</th>
<th>Days to flowering</th>
<th>No of capsules plant&lt;sup&gt;-1&lt;/sup&gt;</th>
<th>No of seeds capsule&lt;sup&gt;-1&lt;/sup&gt;</th>
<th>Seed weight capsule&lt;sup&gt;-1&lt;/sup&gt; (g)</th>
<th>Seed yield (t ha&lt;sup&gt;-1&lt;/sup&gt;)</th>
<th>Oil content (%)</th>
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<tbody>
<tr>
<td>Row spacings (cm)</td>
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<td></td>
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<tr>
<td>30</td>
<td>969.5a</td>
<td>116.9a</td>
<td>82.03c</td>
<td>23.99c</td>
<td>31.10c</td>
<td>0.198NS</td>
<td>0.7147a</td>
<td>47.04NS</td>
</tr>
<tr>
<td>45</td>
<td>639.4b</td>
<td>114.8a</td>
<td>54.00b</td>
<td>28.58b</td>
<td>35.32b</td>
<td>0.195</td>
<td>0.6601a</td>
<td>46.35</td>
</tr>
<tr>
<td>60</td>
<td>479.8c</td>
<td>109.3b</td>
<td>56.12a</td>
<td>32.94a</td>
<td>38.43a</td>
<td>0.201</td>
<td>0.5872b</td>
<td>45.45</td>
</tr>
<tr>
<td>Varieties</td>
<td>92001</td>
<td>693.5NS</td>
<td>110.96b</td>
<td>54.07NS</td>
<td>23.81b</td>
<td>20.95b</td>
<td>0.153b</td>
<td>0.421b</td>
</tr>
<tr>
<td>TVS</td>
<td>693.417</td>
<td>116.36a</td>
<td>54.03</td>
<td>33.18a</td>
<td>46.97a</td>
<td>0.237a</td>
<td>0.887a</td>
<td>46.56a</td>
</tr>
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</table>

Means not sharing a letter in common differ significantly at p < 0.05

NS = Non-significant

There was significant difference between two varieties with respect to number of capsules plant<sup>-1</sup>. The variety TS3 was higher in number of capsules plant<sup>-1</sup> (33.18) than variety 92001. These results are in line with those reported by Delgado and Vermaans (1975) and Torres-Osseo and Velasquez Silva (1987). Similarly, sesame crop grown in the pattern of 30 cm apart rows exhibited significantly the lowest number of seeds capsule<sup>-1</sup> (31.10), while maximum (36.43) were found in 60 cm apart rows and variety TS3 gave significantly more number of seeds capsule<sup>-1</sup> (48.97) than variety 92001 (Table 1). Row spacings had non-significant effects on seed weight capsule<sup>-1</sup>. However, seed weight capsule<sup>-1</sup> was maximum in 60 cm apart rows and minimum in 30 cm apart rows. While, both the varieties differed significantly for this parameter. A higher seed weight capsule<sup>-1</sup> (0.237 g) was recorded for variety TS3, while variety 92001 exhibited only 0.153 g of seed weight capsule<sup>-1</sup>. Bikram et al. (1988) also reported a decrease in seed weight capsule<sup>-1</sup> with increasing plant density.

Planting patterns affected significantly the seed yield of sesame (Table 1). Sesame crop grown in the pattern of 30 cm apart rows produced significantly more seed yield (0.7147 t ha<sup>-1</sup>) and was statistically at par with that grown in the pattern of 45 cm apart rows while minimum seed yield of 0.5872 t ha<sup>-1</sup> was obtained from crop planted in 60 cm apart rows. More seed yield in 30 cm may be due to more number of plants per unit area as compared to 45 and 60 cm apart rows. These results are in agreement with those reported by Ghosh and Patra (1994) and Cheema (1999). Varieties also differed significantly from each other with respect to seed yield. TS3 being higher in seed yield (0.887 t ha<sup>-1</sup>) than 92001 (0.421 t ha<sup>-1</sup>). Seed oil content of sesame was not affected significantly by the various row spacings under study (Table 1). Venkateswarlu et al. (1980) were also of the view that planting density did not affect the oil content of seed. Both varieties were significantly different for their seed oil content. The cultivar TS3 contained 46.66 % oil content that was 1.37 % higher than 92001.

Results of this study suggest that high seed and oil yield will be obtained when sesame crop is sown with 30 cm row spacing and the use of appropriate cultivar such as TS3 will produce stable and higher yields.

References