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

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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 (Hatam 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 (Balasubramaniyan and Palaniappan, 2001).

In Pakistan sesame crop is grown on an area of 85.6 thousand hectares with average yield of 454 kg ha^{-1} (Anonymous, 2000) which is very low than 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 x15 cm^2 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 x30 cm^2 gave highest seed yield in the summer season while in the monsoon season, maximum seed yield was obtained at 30 x 30 cm^2. Sarma (1994) showed that spacing had no significant effects on yield and yield components. Dosdall *et al*. (1998) reported that wider spacing gave higher seed yield than closer spacing while Montvilas (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, 1996). Similarly Chen *et al*. (1994) reported that sesame cultivar Zhong Zhi 9 out yielded the control cultivar Wulinghei 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

Investigations 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 m^2. 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 sesamum was significantly affected by row spacing (Table 1). Sesamum 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 960.9 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). Sesamum 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 110.958 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. Sesamum 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 $plant^{-1}$ (23.96) 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 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

	Treatments	No of plants plot^{-1}	Plant height (cm)	Days to flowering	No of capsules plant^{-1}	No of seeds capsule^{-1}	Seed weight Capsule^{-1} (g)	Seed yield (t ha^{-1})	Oil content (%)
Row spacings	30	960.9a	116.9a	52.03c	23.96c	31.10c	0.189NS	0.7147a	47.04NS
(cm)	45	639.4b	114.8a	54.00b	28.58b	35.32b	0.195	0.6601a	46.25
	60	479.8c	109.3b	56.12a	32.94a	38.43a	0.201	0.5872b	45.45
Varieties	92001	693.25NS	110.96b	54.07NS	23.81b	20.93b	0.153b	0.421b	45.93b
	TS3	693.417	116.38a	54.03	33.18a	48.97a	0.237a	0.887a	46.56a

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^{-1}. The variety TS3 was higher in number of capsules plant^{-1} (33.18) than variety 92001. These results are in line with those reported by Delgado and Vermanos (1975) and Torres-osejo and Velasquez Silva (1987). Similarly sesamum crop grown in the pattern of 30 cm apart rows exhibited significantly the lowest number of seeds capsule^{-1} (31.10), while maximum (38.43) were found in 60 cm apart rows and variety TS3 gave significantly more number of seeds capsule^{-1} (48.973) than variety 92001 (Table 1). Row spacings had non-significant effects on seed weight capsule^{-1}. However, seed weight capsule^{-1} 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^{-1} (0.237 g) was recorded for variety TS3, while variety 92001 exhibited only 0.153 g of seed weight capsule^{-1}. Bikram *et al.* (1988) also reported a decrease in seed weight capsule^{-1} with increasing plant density.

Planting patterns affected significantly the seed yield of sesamum (Table 1). Sesamum crop grown in the pattern of 30 cm apart rows produced significantly more seed yield (0.7147 t ha^{-1}) 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^{-1} 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^{-1}) than 92001(0.421 t ha^{-1}). Seed oil content of sesamum was not affected significantly by the various row spacings under study (Table 1). VenKateswarlus *et al.* (1980) were also of the view that planting density did not affect the oil content of seed. Both varieties were statistically different for their seed oil content. The cultivar TS3 contained 46.56 % 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

Anonymous, 1996. Research on sesame perfection. Annual Report, AARI, Faisalabad, pp: 60.

Anonymous, 2000. Agricultural Statistics of Pakistan. Govt. of Pakistan. Ministry of Food, Agriculture and Livestock. Economic Wing, Islamabad, Pakistan, pp: 63-64.

Alessi, J., J.F. Power and D.C. Zimmerman, 1977.Sunflower yield and water use as influenced by planting date, population and row spacing. Agron. J., 69: 465-469.

Balasubramaniyan, P. and S.P. Palaniappan, 2001. Field crops: an overview. Principles and practices of Agronomy. Agrobios (India), pp: 47.

Bikram, S., D.S. Rao, S. Harbir, A.S. Faroda, B. Singh and H. Singh, 1988. Effect of spacing and plant density on performance of four sesame (*Sesamum indicum* L.) cultivars. Crop Research ISAR, 1: 96-101.

Chen, H.X., F.L. Liu and Y.Z. Zhao, 1994. Selection and Breeding of Zhong Zhi 9-a new black seed coated sesame cultivar with superior quality. Oil crops of China, 16: 53-55.

Cheema, M.A., 1999. Production efficiency of canola (*Brassica napus* L.) cv. Shirallee under different agro-management pratices. Ph.D Thesis, Dept. of Agronomy, Univ. Agric., Faisalabad, Pakistan.

Delgado, M. and D.M. Vermanos, 1975. Yield components of sesame (*Sesamum indicum*) under different population densities. Econ. Bot., 29: 69-78.

Dosdall, L.M., L.Z. Florence, P.M. Conway and N.T. Cowle, 1998. Tillage regime, row spacing, and seeding rate influence, infestations of root maggots (*Delia* spp.) in Canola. Canadian J. Plant Sci., 78: 671-681.

Ghosh, D.C. and A.K. Patra, 1994. Effects of planting density and fertility levels on productivity and economics of summer sesame (*Sesamum indicum*). Ind. J. Agron., 39: 71-75.

Gupta, T.R., 1982. Effect of plant density on yield and yield components in sesame (*Sesamum indicum* L.). Madras Agric. J., 69: 569-572.

Hatam, M. and G.Q. Abbasi, 1984. Oil seed crops. Crop production. National Book Foundation, Islamabad, pp: 359.

Montvilas, R., 1999. Investigations of double low winter oil seed rape. (*Brassica napus* L.) J. Sci. Food and Agric., 79:34.

Sims, R.E.H., 1976. Effects of planting pattern and sowing methods on the seed yield of safflower, oilseed rape and lupin. N.Z.J. Exp. Agric., 4: 185-189.

Sarma, N.N., 1994. Response of sesame (*Sesamum indicum* L.) varieties to levels of nitrogen and spacing. Ann. Agric. Res., 15: 107-109.

Siddique, M., 1997. Effect of different planting techniques on the yield and quality of sesame. M.Sc (Hons). Thesis, Dept. Agron., Univ. Agric. Faisalabad, Pakistan.

Steel, R.G.D. and J.H. Torrie, 1984. Principles and Procedures of Statistics. 2nd Ed. McGraw Hill Book Co. Inc., Singapore, pp: 172-178.

Torres-Osejo, J.C. and J.M. Velasqeuez-Silva, 1986. Effect of distance between rows and between plants on yield of sesame (*Sesamum indicum* L.) informe de las labores de la seccion de Agronomia, centro Nacional Experimental del Algodon, pp: 115-112.

Venkatesan, G., R. Elango and L. Arunachalam, 1983. Influence of spacing and nitrogen on the yield of sesame. Madras Agril. J., 70: 468-470.

Venkateswarlus, M.S., R.S. Rao, M.S.S. Rajan and G.H.S. Reddy, 1980. Agronomic strategy to increase oil and protein yield. Ind. J. Agron., 25: 562-563 .