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PERFORMANCE OF ROW SPACING ON THE YIELD OF SESAME VARIETIES

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Abstract

The experiment was carried out during *kharif-I* season of 2020 in the experimental field of Regional Agricultural Research Station (RARS), Bangladesh Agricultural Research Institute (BARI), Cumilla to evaluate the optimum plant spacing of sesame varieties. There were four plants spacing S_1 (30 × 5 cm^2), S_2 (30 × 10 cm^2), S_3 (40 × 5 cm^2) and S_4 (40 × 10 cm^2) and two sesame varieties of V_1 (BARI Til 3) and V_2 (BARI Til 4) were included in the experiment. The experiment was conducted using a split-plot design with three replications. The highest seed yield (1646 kg ha^{-1}) was found from BARI Til 4 but the highest number of capsule $plant^{-1}$ and number of branches $plant^{-1}$ were obtained from BARI Til-3. The maximum seed yield (1913 kg ha^{-1}) was achieved in the interaction of S_4V_2 (40 × 10 cm^2 and BARI Til 4) that was identical to S_2V_2 (30 x 10 cm^2 and BARI Til 4).

Introduction

Sesame (*Sesamum indicum* L.) commonly known as til in Bengali, belongs to the *Sesamum* genus of the Pedaliaceae family. It is the second largest source of edible oil in Bangladesh. The crop is grown in both summer and winter. It is grown mainly for seeds that contain 46% - 64% oil and 20% protein (Raja *et al.*, 2007). Sesame oil contains good quality poly-unsaturated fatty acids viz., 47% oleic and 39% linoleic acid. We can get a very good quality edible and medicinal oil, from sesame and it can be conserved for a long time. Til oil cake serves as a beneficial feed for various animals including poultry, fish, cattle, goats, and more. As sesame drought tolerant oilseed crop is grown successfully in the early summer in Bangladesh under rain fed condition. The crop is cultivated either as a pure stand or as a mixed crop with *aus* rice, jute, groundnut, millets, and sugarcane. In Bangladesh, sesame occupies a remarkable area under production and contributes second-ranked production after rapeseed and mustard. Although at present about 21,347 hectares of land are under sesame cultivation with a production of 19795 metric tons (BBS, 2020) but land area and production under sesame cultivation is decreasing day by day. In our country the yield of sesame is very poor compared to India and other sesame growing countries of the world. To increase the productivity of sesame, various improved technologies are needed and among them, various agro-techniques, isolating location-specific varieties assumes greater significance. In particular, variety, sowing time, population density and or plant spacing, and fertilizer management are very important. Plant spacing is one of the most important factors for getting higher yield. The optimum plant spacing depends on some factors including growing environment, planting system and cultivar used. Recommended plant spacing for sesame is not enough for normal growth and development for recently released high yielding sesame varieties. Keeping this point in mind, this experiment was undertaken to evaluate the performance of sesame varieties under different plant spacing for getting higher yield.

Materials and Methods

The experiment was conducted at the research field of RARS, BARI, Cumilla, Bangladesh during the *Kharif I* season, 2020. The soil of the experimental plot was sandy loam. The experiment was conducted using a split- plot design with three replications. The unit plot size was 3.6 m × 2.0 m. Four spacing were arranged in main -plot and two varieties in sub- plots. The spacing of the experiment were; S_1 = 30 × 5 cm^2, S_2 = 30 × 10 cm^2, S_3 =40 × 5 cm^2 and S_4 =40 × 10 cm^2 and the varieties were V_1= BARI Til 3 and V_2 = BARI Til 4. The seeds were sown on 17 March, 2020. The seed rates were used @ 8 kg ha^{-1} and after 25 days after emergence the spacing were maintained according to the treatment. Seeds were placed 2 to 3 cm depth in rows and seeds were covered with loose soil properly. Fertilizers were applied @ 50, 30, 25,20,1.8 and 1.8 of N-P-K-S-Zn & B kg ha^{-1} respectively. Half urea and all other fertilizers were applied as basal dose; remaining urea was top dressed at 25 days after sowing (DAS). Thinning and weeding were done at 20 and 40 days after emergence. Irrigation was given two times at 30 days after sowing (before flowering) and 60 DAS. Ripcord was given three times @ 3g L^{-1} of water for controlling the infestation of sesame hairy caterpillar. Bavistin was sprayed @ 2 g L^{-1} of water for controlling the stem rot disease. At maturity stage, before harvesting ten randomly selected plants were uprooted to collect data on plants m^2, plant height, branches $plant^{-1}$, capsules $plant^{-1}$, seeds $capsule^{-1}$, and 1000-seed weight and yield m^2. Data were analyzed statistically and treatments means were compared by least significant difference (LSD) test.

Results and Discussion

Effect of Spacing

The maximum number of branches $plant^{-1}$ (4.30) was found in treatment S_4 (40 × 10 cm) which was identical with S_2 (30 × 10 cm) and S_3 (40 × 5 cm^2) and the lowest (3.30) in S_1 (30 × 5 cm^2). The maximum capsules $plant^{-1}$ (65.20) was observed in S_4 (40× 10 cm^2) which was identical with S_3 (40 × 5 cm^2) and S_2 (30 × 10 cm^2) and the lowest in S_1 (30 × 5 cm^2). The highest seeds $capsule^{-1}$ (82.2) was found in S_2 (30 × 10 cm^2) and the lowest (72.3) in S_1 (30 × 5 cm^2). The maximum 1000 -seed weight (2.80 g) was achieved in S_1 (30×5 cm^2) followed by S_3 (40×5 cm^2) and the lowest (2.60g) in S_2 (30 × 10 cm). The maximum seed yield (1817 kg ha^{-1}) was obtained in S_4 (40 ×10 cm^2) that was statistically identical with S_2 (30 × 10 cm^2) and the lowest yield (1234 kg ha^{-1}) in S_1 (30 × 5 cm^2). Enhanced exploitation of resources viz., solar radiation, nutrients, and water etc. may have favored 40 cm × 10 cm spacing in obtaining the maximum grain yield. The finding was in agreement with Shinde *et al.,* 2011 and Yadav *et al.,* 2007.

Table1. Effect of spacing on yield and yield attributes of sesame during *kharif–I*, 2020 in RARS, BARI, Cumilla

Treatment	Plant height (cm)	Branches $plant^{-1}$ (no.)	Capsules $plant^{-1}$ (no.)	Seeds $capsule^{-1}$ (no.)	1000-seed weight (g)	Seed yield (kg ha^{-1})
S_1(30 5 cm^2)	123.50	3.30	51.20	72.30	2.80	1234
S_2(30 10 cm^2)	120.20	4.10	58.50	82.20	2.60	1735
S_3(40 5 cm^2)	123.80	3.60	59.30	75.70	2.80	1457
S_4(40 10 cm^2)	124.70	4.30	65.20	78.20	2.70	1817
LSD(0.05)	NS	0.97	12.83	NS	NS	180.9
CV (%)	3.50	12.68	10.96	9.45	8.18	5.80

Effect of Variety

The highest Plant height (124.20 cm), seeds capsule^{-1} (78.70) and seed yield (1646 kg ha^{-1}) were achieved in var. BARI Til 4 and the lowest in BARI Til 3. The highest branches plant^{-1} (4.0), capsule plant (61.1) and 1000- seed weight (2.80g) was obtained in BARI Til 3 and the lowest in BARI Til 4. Similar results on 1000- seed weight was also found by Kokilavani *et al.* 2007, and Riaz *et al.* 2002 indicated that the number of capsules plant^{-1} differed significantly by different varieties. Chongdar *et al.* 2015 also observed variation in the number of seeds capsule^{-1} due to different varietal performance. Suryabala *et al.* (2008) opined that different *Sesamum* cultivars showed a significant variation in seed yield.

Table 2. Effect of varieties on yield and yield attributes of sesame during *kharif-I*, 2020 in RARS, BARI, Cumilla

Treatment	Plant height (cm)	Branches plant^{-1} (no.)	Capsules plant^{-1} (no.)	Seeds capsule^{-1} (no.)	1000-seed weight (g)	Seed yield (kg ha^{-1})
Variety						
V_1 (BARI Til 3)	121.9	4.00	61.10	75.50	2.80	1475
V_2 (BARI Til 4)	124.2	3.70	56.00	78.70	2.70	1646
Level of significant	NS	*	*	NS	NS	*

Interaction effect between spacing and varieties of sesame

Table-3 showed that different spacing and varieties had significant effect on branches plant^{-1}, capsule plant^{-1} and seed yield (kg ha^{-1}).

Table 3. Interaction effect of spacing and variety on yield and yield attributes of sesame varieties during *Kharif-I* 2020 in RARS, BARI, Cumilla

Treatment (Spacing Variety)	Plant height (cm)	Branches plant^{-1} (no.)	Capsules plant^{-1} (no.)	Seed capsule^{-1} (no.)	1000-seed weight (g)	Seed yield (kg ha^{-1})
S_1V_1	121.70	3.70	55.30	71.00	2.70	1257
S_1V_2	125.30	3.00	47.00	73.70	2.90	1211
S_2V_1	120.30	4.30	61.00	79.70	2.60	1614
S_2V_2	120.00	3.90	56.00	84.70	2.60	1856
S_3V_1	122.00	4.00	65.00	75.70	3.00	1309
S_3V_2	125.70	3.30	53.70	75.70	2.80	1605
S_4V_1	123.70	4.10	63.00	75.70	2.80	1720
S_4V_2	125.70	4.50	67.30	80.70	2.70	1913
CV (%)	4.42	8.34	4.83	8.31	7.24	5.04
LSD(0.05)	NS	0.60	5.325	NS	NS	148

S_1=30×5 cm, S_2=30×10 cm, S_3=40×5 cm, S_4=40×10 cm; V_1= BARI Til 3, V_2= BARI Til 4

The maximum branches plant^{-1} (4.50) was observed in the interaction of S_4V_2 (40 × 10 cm^2 spacing and variety BARI Til 4) which was identical to the interaction of S_2V_1 (30 × 10 cm^2 BARI Til 3), S_4V_1 (40 × 10 cm^2 BARI Til 3), S_3V_1 (40 × 5 cm^2 BARI Til 3), S_2V_2 (30 × 10 cm BARI Til 4) and the lowest branches plant^{-1} (3.0) of S_1V_2 (30 × 5 cm and BARI Til 4). The maximum number of capsule plant^{-1} (67.3) was obtained in S_4V_2 (40 × 10 cm^2 and variety BARI Til 4) which was statistically identical to S_3V_1 (40 × 5 cm and BARI Til 3) and S_4V_1 (40 × 10 cm^2 and BARI Til 3) and the lowest capsule plant^{-1} (47.0) of S_1V_2 (30 × 5 cm and BARI Til 4). The maximum seed yield (1913 kg ha^{-1}) was achieved in the interaction of S_4V_2 (40 × 10 cm and BARI Til 4) that was identical to S_2V_2 (30 × 10 cm and BARI Til 4) and the lowest yield (1211 kg ha^{-1}) in the interaction of S_1V_2 (30 × 5 cm and BARI Til 4). The finding of Ozturk (2012) showed

that the highest seed yield was obtained from the narrow row spacing (30 cm) whereas the lowest seed yield from widest row spacing (70 cm). The highest plant height (125.7 cm) was observed of S_4V_2 (40 × 10 cm and BARI Til 4) and S_3V_2 (40×5 cm^2 and BARI Til 4) and the lowest plant height (120.0 cm) of S_2V_2 (30 × 10 cm^2 and BARI Til 4). The highest seeds $capsule^{-1}$ (84.7) was obtained of S_2V_2 (30 × 10 cm and BARI Til 4) and the lowest (71.0) was obtained of S_1V_1 (30 × 5 cm^2 and BARI Til 3). The highest 1000- seed weight (3.00 g) was achieved of S_3V_1 (40 × 5 cm^2 and BARI Til 3) and the lowest (2.60 g) in S_2V_1 (30 × 10 cm^2 and BARI Til 3) followed by S_2V_2 (30 × 10 cm and BARI Til 4).

Conclusion

From the study, it may be concluded that 40 × 10 cm^2 or 30 × 10 cm^2 would be the optimum spacing for sesame var. BARI Til 4 or BARI Til 3. These results indicate that 40 × 10 cm^2 and 30 × 10 cm^2 could be the optimum row spacing of sesame under the agro-ecological conditions of the experimental location.

References

BBS (Bangladesh Bureau of Statistics). 2020. Statistical pocketbook of Bangladesh. Bangladesh Bureau of Statistics. Statistics division, Ministry of Planning. Government of the People's Republic of Bangladesh.

Chongdar, S., B. Chhetri, S. Mahato and A. Saha. 2015. Production potentials and economic feasibility of improved sesame (*Sesamum indicum* L.) cultivars under varying dates of sowing in prevailing agro-climatic condition of North Bengal. Int. J. Agric. Sci. 7(2): 434-439.

Kokilavani, S., R. Jagannathan and S.K. Natarajan. 2007. Manual terminal clipping on yield and nutrient uptake of sesame varieties. Res. J. Agric. Biol. Sci. 6(3): 987-999.

Oztürk, O. and O. Saman. 2012. Effects of different plant densities on the yield and quality of second crop sesame. Int. J. Agric. Biosyst. Engin. 6(9): 644-649.

Raja, A., K.O. Hattab, L. Gurusamy and S. Suganya. 2007. Sulphur levels on nutrient uptake and yield of sesame varieties and nutrient availability. Int. J. Soil Sci. 2(4): 278-285.

Riaz, A., M. Tariq, S.M. Farrukh and A. Shamim. 2002. Comparative performance of two sesamum (*Sesamum indicum* L.) varieties under different row spacings. Asian J. Plant Sci. 1(5): 546-547.

Shinde, S.D., B.S. Raskar and B.D. Tamboli. 2011. Effect of spacing and sulphur levels on productivity of sesame (*Sesamum indicum* L.) under summer condition. J. Maharastra Agric. Univ. 36(1): 28-31.

Suryabala, Y., A.B. Abidi, R.P. Singh and S. Anju. 2008. Response of sulphur nutrition on nutritional characteristics of oil and cake of sesame (*Sesamum indicum* L.) varieties. J. Oilseeds Res. 25(1): 38-40.

Yadav, R.A., M. Akhilesh and D. Singh. 2007. Response of sesame cultivars under various plant spacing and seed rates. Plant Arch. 7(1): 287-288.