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Effect of different varieties and spacings on growth and yield of sesame (*Sesamum indicum* L.)

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ABSTRACT

A field experiment was conducted during kharif season of 2025 at Experimental Farm, Oilseeds Research Station, Latur, Maharashtra, to study the response of sesame varieties to different spacings with respect to growth and yield. The experiment was laid out in Factorial Randomized Block Design with three replications. The treatments comprised three varieties viz., V_1 : TLT-7, V_2 : TLT-10 and V_3 : Madhuri and three spacings viz., S_1 : $45 \times 10 \text{ cm}^2$, S_2 : $45 \times 20 \text{ cm}^2$ and S_3 : $45 \times 30 \text{ cm}^2$. The results revealed significant differences among varieties and spacings for several growth and yield attributes, whereas the interaction effect was non-significant for most of the characters. Among varieties, TLT-7 recorded the highest plant height at harvest (89.02 cm), number of branches plant-1 (7.92), functional leaves plant-1 at 60 DAS (53.94), leaf area plant-1 at 60 DAS (16.71 dm^2), dry matter accumulation at harvest (26.82 g plant-1), number of capsules plant-1 (47.10), seed yield plant-1 (4.44 g) and seed yield (659 kg ha^{-1}). TLT-7 remained generally at par with TLT-10 for major growth and yield parameters. Among spacings, $45 \times 30 \text{ cm}^2$ recorded higher individual plant growth and yield attributes, viz., branches plant-1 (8.28), functional leaves plant-1 (55.22), leaf area plant-1 (17.12 dm^2), dry matter accumulation (27.39 g plant-1), capsules plant-1 (48.04) and seed yield plant-1 (4.62 g). However, $45 \times 10 \text{ cm}^2$ recorded the highest seed yield (676 kg ha^{-1}), straw yield (2473 kg ha^{-1}), biological yield (3149 kg ha^{-1}) and harvest index (22.02%), and remained at par with $45 \times 20 \text{ cm}^2$. The highest oil yield was recorded with TLT-7 ($273.79 \text{ kg ha}^{-1}$) among varieties and $45 \times 10 \text{ cm}^2$ ($283.43 \text{ kg ha}^{-1}$) among spacings. Thus, TLT-7 with $45 \times 10 \text{ cm}^2$ spacing was found promising for higher productivity and economic returns under the agro-climatic conditions of Latur.

Keywords: Sesame, Variety, Spacing, Growth, Yield, Oil yield, FRBD

Introduction

Sesame (*Sesamum indicum* L.) is one of the oldest cultivated oilseed crops and is an important source of edible oil and nutritional components. It is widely grown in tropical and subtropical regions and possesses considerable adaptability to different agro-climatic conditions. Sesame seed is valued for its high-quality edible oil and is also used in food and several industrial products. Productivity of sesame is influenced by genetic characteristics of the variety as well as crop management practices. Among the agronomic factors, plant spacing is an important determinant of crop growth and productivity because it regulates plant population and the availability of light, moisture, nutrients and growing space to individual plants. Improper spacing may increase competition among plants and adversely affect crop growth and yield. Varieties differ considerably in plant canopy, branching growth, leaf production, capsule formation and yield potential. Therefore, the response of a variety may vary under different plant geometries. Proper interaction between genotype and plant population is essential for achieving higher seed productivity and efficient utilization of available resources. Plant geometry improves canopy structure and influences light interception, air circulation and resource utilization. Appropriate spacing reduces competition among plants for nutrients, moisture and light and may improve individual plant growth. Considering the importance of suitable variety and plant geometry for increasing sesame productivity, the present investigation was undertaken to study the response of sesame varieties to different spacings during kharif season under the conditions of Latur.

Materials and methods

The field experiment was conducted during kharif season of 2025 at the Experimental Farm, Oilseeds Research Station, Latur, Maharashtra. The soil of the experimental field was clayey in texture, low in available nitrogen ($236.10 \text{ kg ha}^{-1}$), medium in available phosphorus (18.20 kg ha^{-1}) and very high in available potassium ($494.31 \text{ kg ha}^{-1}$). The soil reaction was slightly alkaline with pH 7.75. The mean maximum and minimum temperatures during the crop growth period were 29.45°C and 20.57°C , respectively, while morning and evening relative humidity averaged 82.55 and 44.48 per cent, respectively. The experiment was laid out in

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Factorial Randomized Block Design (FRBD) with three replications. Factor A consisted of three sesame varieties viz., V_1 : TLT-7, V_2 : TLT-10 and V_3 : Madhuri. Factor B consisted of three spacings viz., S_1 : $45 \times 10 \text{ cm}^2$, S_2 : $45 \times 20 \text{ cm}^2$ and S_3 : $45 \times 30 \text{ cm}^2$. Thus, there were nine treatment combinations and 27 experimental plots. The gross plot size was $5.40 \times 4.80 \text{ m}^2$ and the net plot size varied according to spacing treatments. The crop was sown by dibbling on 21 July 2025. Seed treatment was carried out with Vitavax @ 2.5 g kg^{-1} seed. Two to four seeds were dibbled per hill at approximately 2 cm depth and thinning was carried out to maintain one healthy plant per hill. The recommended dose of $50:25:00 \text{ kg N:P}_2\text{O}_5:\text{K}_2\text{O ha}^{-1}$ was applied through urea and single super phosphate. Five randomly selected plants from each net plot were tagged for recording biometric observations at different crop growth stages. The crop was harvested on 19 October 2025. The experimental data were statistically analysed according to the analysis of variance procedure for Factorial Randomized Block Design. Treatment means were compared using critical difference at 5 per cent level wherever the *F*-test was significant, following the procedure of Panse *et al.* (1967) [1].

Results and discussion

Growth attributes

Plant height: Plant height increased progressively during crop growth and remained almost constant at harvest. Among varieties, variety TLT-7 recorded the highest plant height (89.02 cm) and remained at par with TLT-10 (87.29 cm), whereas variety Madhuri recorded the lowest value (79.55 cm). Among spacings, $45 \text{ cm} \times 10 \text{ cm}$ recorded the highest plant height (91.81 cm) and was significantly superior to spacing $45 \text{ cm} \times 30 \text{ cm}$ (79.98 cm), while spacing $45 \text{ cm} \times 20 \text{ cm}$ remained intermediate. The greater height under closer spacing may be attributed to increased competition for light, resulting in more vertical growth.

Number of branches: variety TLT-7 produced the highest number of branches plant^{-1} (7.92), which was at par with variety TLT-10 (7.54), while variety Madhuri recorded the lowest (5.98). Among spacings, $45 \text{ cm} \times 30 \text{ cm}$ produced the highest number of branches (8.28), remaining at par with spacing $45 \text{ cm} \times 20 \text{ cm}$ (6.93), whereas spacing $45 \text{ cm} \times 10 \text{ cm}$ recorded the lowest (6.23). Wider spacing provided greater growing space and reduced inter-plant competition, favouring branch development.

Number of functional leaves: TLT-7 recorded the highest number of functional leaves plant^{-1} at 60 DAS (53.94), remaining at par with TLT-10 (50.14), whereas Madhuri recorded 41.96 leaves plant^{-1} . Among spacings, $45 \text{ cm} \times 30 \text{ cm}$ recorded the highest value (55.22),

followed by $45 \text{ cm} \times 20 \text{ cm}$ (48.64) and $45 \text{ cm} \times 10 \text{ cm}$ (42.18). The higher number of leaves under wider spacing may be attributed to greater availability of space, light, moisture and nutrients to individual plants.

Leaf area: TLT-7 recorded the highest leaf area plant^{-1} at 60 DAS (16.71 dm^2), which was at par with TLT-10 (16.60 dm^2), whereas Madhuri recorded the lowest value (13.76 dm^2). Among spacings, $45 \text{ cm} \times 30 \text{ cm}$ recorded significantly higher leaf area (17.12 dm^2) than the closer spacings. Greater spacing allowed better individual plant development and canopy expansion.

Total dry matter: TLT-7 accumulated the highest dry matter at harvest (26.82 g plant^{-1}) and remained at par with TLT-10 (26.45 g plant^{-1}), whereas Madhuri recorded the lowest value (23.67 g plant^{-1}). Among spacings, $45 \text{ cm} \times 30 \text{ cm}$ recorded the highest dry matter accumulation (27.39 g plant^{-1}), remaining at par with $45 \text{ cm} \times 20 \text{ cm}$ (26.26 g plant^{-1}). Wider spacing provided greater availability of growth resources, resulting in better biomass accumulation.

The interaction effect of variety $\times$ spacing was non-significant for all the growth attributes, indicating that the response of varieties to different spacings remained broadly constant.

Yield attributes and yield

Number of capsules plant^{-1} : The number of capsules plant^{-1} increased up to 75 DAS and remained constant at harvest. Among varieties, TLT-7 recorded the highest number of capsules (47.10), which was at par with TLT-10 (45.49), whereas Madhuri recorded the lowest (40.75). Among spacings, $45 \text{ cm} \times 30 \text{ cm}$ recorded the highest number of capsules (48.04), which was at par with $45 \text{ cm} \times 20 \text{ cm}$ (44.42), while $45 \text{ cm} \times 10 \text{ cm}$ recorded the lowest value (40.88). Wider spacing favoured capsule production by reducing competition among individual plants.

Capsule yield plant^{-1} : Madhuri recorded the highest capsule yield plant^{-1} (37.50 g) and remained at par with TLT-10 (36.28 g), whereas TLT-7 recorded 33.37 g. Among spacings, $45 \text{ cm} \times 10 \text{ cm}$ recorded the highest capsule yield (37.29 g) and was at par with $45 \text{ cm} \times 20 \text{ cm}$ (34.36 g), while $45 \text{ cm} \times 30 \text{ cm}$ recorded the lowest value (31.50 g). The interaction effect was non-significant.

Table 1. Plant height, number of branches plant^{-1} , number of functional leaves plant^{-1} , leaf area plant^{-1} and total dry matter plant^{-1} of sesame as influenced by different treatments

Treatments	Plant height (cm) AH	No. of branches plant^{-1} AH	No. of functional leaves plant^{-1} at 60 DAS	Leaf area plant^{-1} (dm^2) at 60 DAS	Total dry matter plant^{-1} (g) AH
A: Varieties (V)					
V_1 : TLT-7	89.02	7.92	53.94	16.71	26.82
V_2 : TLT-10	87.29	7.54	50.14	16.60	26.45
V_3 : Madhuri	79.55	5.98	41.96	13.76	23.67
S.Em. $\pm$	2.472	0.238	1.611	0.452	0.62
CD at 5%	7.41	0.714	4.829	1.355	1.87
B: Spacing (S)					
S_1 : $45 \text{ cm} \times 10 \text{ cm}$	91.81	6.23	42.18	14.32	23.29
S_2 : $45 \text{ cm} \times 20 \text{ cm}$	84.07	6.93	48.64	15.63	26.26
S_3 : $45 \text{ cm} \times 30 \text{ cm}$	79.98	8.28	55.22	17.12	27.39
S.Em. $\pm$	2.472	0.238	1.611	0.452	0.62
CD at 5%	7.41	0.714	4.829	1.355	1.87
C: Interaction (V $\times$ S)					
S.Em. $\pm$	4.28	0.41	2.79	0.78	1.08
CD at 5%	NS	NS	NS	NS	NS

(continued on next page)

Treatments	Plant height (cm) AH	No. of branches plant ⁻¹ AH	No. of functional leaves plant ⁻¹ at 60 DAS	Leaf area plant ⁻¹ (dm ²) at 60 DAS	Total dry matter plant ⁻¹ (g) AH
GM	85.29	7.15	48.68	15.69	25.65

Seed yield plant⁻¹: TLT-7 recorded the highest seed yield plant⁻¹ (4.44 g) and remained at par with TLT-10 (4.34 g), whereas Madhuri recorded the lowest value (3.76 g). Among spacings, 45 cm × 30 cm recorded the highest seed yield plant⁻¹ (4.62 g), followed by 45 cm × 20 cm (4.17 g) and 45 cm × 10 cm (3.75 g). The higher seed yield per plant under wider spacing was associated with better individual plant growth and greater development of branches and capsules.

Seed yield: TLT-7 recorded the highest seed yield (659 kg ha⁻¹) and was at par with TLT-10 (633 kg ha⁻¹), whereas Madhuri recorded the

lowest seed yield (546 kg ha⁻¹). Among spacings, 45 cm × 10 cm recorded the highest seed yield (676 kg ha⁻¹), followed by 45 cm × 20 cm (617 kg ha⁻¹) and 45 cm × 30 cm (545 kg ha⁻¹). The higher seed yield under closer spacing may be attributed mainly to the greater number of plants accommodated per unit area. The interaction between variety and spacing was non-significant.

Table 2. Number of capsules plant⁻¹, capsule yield plant⁻¹, seed yield plant⁻¹, seed yield, biological yield of sesame as influenced by different treatments

Treatments	Capsules plant ⁻¹	Capsule yield plant ⁻¹ (g)	Seed yield plant ⁻¹ (g)	Seed yield (kg ha ⁻¹)	Biological yield (kg ha ⁻¹)
A: Varieties (V)					
V ₁ : TLT-7	47.10	33.37	4.44	659	3066.44
V ₂ : TLT-10	45.49	36.28	4.34	633	2955.44
V ₃ : Madhuri	40.75	37.50	3.76	546	2652.11
S.E.m. ±	1.296	1.15	0.134	18.38	73.21
CD at 5%	3.886	3.15	0.403	55.10	219.50
B: Spacing (S)					
S ₁ : 45 cm × 10 cm	40.88	37.29	3.75	676	3148.78
S ₂ : 45 cm × 20 cm	44.42	34.36	4.17	617	2865.89
S ₃ : 45 cm × 30 cm	48.04	31.50	4.62	545	2659.33
S.E.m. ±	1.296	1.15	0.134	18.38	73.21
CD at 5%	3.886	3.15	0.403	55.10	219.50
C: Interaction (V × S)					
S.E.m. ±	2.25	2.02	0.23	31.84	126.80
CD at 5%	NS	NS	NS	NS	NS
GM	44.45	36.05	4.18	612.44	2891.33

Biological yield: TLT-7 recorded the highest biological yield (3066.44 kg ha⁻¹), remaining at par with TLT-10, while Madhuri recorded the lowest values. Among spacings, 45 cm × 10 cm recorded the highest biological yield (3148.78 kg ha⁻¹). The greater biomass production under closer spacing was mainly associated with the higher plant population per unit area.

Conclusion

The study revealed that both variety and spacing significantly influenced growth and yield performance of sesame under kharif conditions at Latur. Among the varieties, TLT-7 recorded superior growth, yield attributes, seed yield and was generally at par with TLT-10. Among the spacings, 45 × 30 cm favoured individual plant growth and yield attributes, whereas 45 × 10 cm produced the highest seed yield, biological yield and was at par with 45 × 20 cm for important yield and economic parameters.

Considering the overall performance, TLT-7 with 45 × 10 cm² spacing was found promising for obtaining higher seed productivity and profitability of sesame under the conditions of the present investigation. Since the study was conducted at one location during one kharif season, further evaluation across seasons and locations would be useful for confirming the recommendation.

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