

EFFECT OF DIFFERENTIAL SPACING ON HIGHER SEED SET IN MONO STEM SESAME (*Sesamum indicum*) Variety VRI 5

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ABSTRACT

A field experiment was conducted during 2025 and 2026 to evaluate the effect of plant spacing on yield contributing characters of sesame mono stem variety VRI 5 at Agricultural Research Station, Tamil Nadu Agricultural University, Bhavanisagar. The experiment was laid out in a Randomised Block Design (RBD) with seven replications. Three plant spacings viz., 10 cm, 15 cm and 20 cm were used as treatments by adopting 20 cm as row spacing along with farmers practice namely broad casting method. Among different plant spacings, wider spacing of 20 x 20 cm showed significantly highest number of capsule per plant (62.86), 1000 seed weight (3.4 g), seed yield per plant (7.30 g) and seed yield per hectare (690 kg) followed by broadcasting method during 2025. Similar trend was obtained during 2026 also showing that, superiority of 20 x 20 cm spacing for higher seed set (708 kg ha⁻¹) in sesame mono stem variety VRI 5 the by registering 7.8% increase when compared to broad casting method (656 kg ha⁻¹).

KEYWORDS: Plant spacing, Broad casting, Mono stem, Seed yield, Seed quality

INTRODUCTION

The ancient crop sesame (*Sesamum indicum* L.) is one of the most significant oilseed crops farmed in India and is second crop to groundnut in terms of importance. Sesame is known as "the queen of oils" it is grown throughout the year and being a crop with a short growing season, fits well into a variety of cropping sequences and systems (Bedigian and Harlan, 1986). Sesame oil is distinguished for its stability and purity as well as its great resistance to oxidative rancidity. Sesame oil is also known as "the poor man's ghee alternative" due to its high quality characteristics (Manojkumar and Padmavathi, 2026).

Sesame cultivation has many advantages as it set seed and yields relatively well under high temperature and can be grown on residual moisture without any extra rainfall. It readily fits into numerous systems as it can be grown in pure stands and also as a companion crop.

The effect of plant spacing on the performance of crops cannot be overemphasized. The optimum plant spacing for a particular region and level of husbandry must be accurately determined for maximum yields and efficient use of fertilizers and other resources (Ojikpong *et al.*, 2007). The plat population density is the major factor that influences the growth and yield of sesame (Kalu and Adeyemo, 1998).

Due to the increasing population and meeting their demands, an increase of sesame yield is necessary. Among the cultural practices, optimum plant spacing is one of the vital factor. Population density has a crucial impact on seed yield. The planting density may be rectified through the usage of proper seed rates and row and plant spacing (Islam *et al.*, 2024). Considering attributes like inter plant competition for optimum nutrients, moisture, sunlight and aeration, it is required to find a proper combination of row and plant spacing to achieve maximum yield of sesame under various agro-climatic conditions. Based on this background the objectives were planned to conduct the spacing experiment in sesamum.

MATERIAS AND METHODS

Experimental site and location

The experiment was conducted at research field of Agricultural Research Station, Tamil Nadu Agricultural University, Bhavanisagar during February 2025 and February 2026. The experimental site is geographically located at 11°29' N latitude, 77°59' E longitude and 256 meters above Mean Sea Level altitude with a tropical climatic condition. The region experiences a warm climate with moderate rainfall, suitable for sesame cultivation. The soil of the experimental field was well-drained sandy loam, with medium fertility status, conducive for oilseed crops

Plant material

Genetically pure and healthy seeds of sesame (*Sesamum indicum* L.) variety and VRI 5 obtained from the Regional Research Station, Tamil Nadu Agricultural University, Virudhachalam was used for the study. Prior to sowing, seeds were cleaned and graded to remove damaged, shriveled, and diseased seeds.

Experimental design and treatments

The experiment was laid out in a Randomised Block design with seven replications. The unit plot size of the experiment was 4 m × 3 m. The treatments comprised of three plant spacings viz., 10 cm, 15 cm and 20 cm by adopting 20 cm as row spacing along with farmers practice namely broad casting method. The crop was cultivated as per recommended package of practices to ensure normal growth and development of the plants. The observations on plant growth, yield and yield contributing characters viz., plant height at vegetative and harvesting stage (cm), days to 50% flowering, number of capsules plant⁻¹, number of seeds capsule⁻¹, 1000 seed weight (g), seed yield plant⁻¹ (g) and seed yield ha⁻¹ (kg) were recorded. The harvesting was done when 80% of the pods attained their maturity color. Seed yields per plot were recorded after proper threshing and sun drying.

STATISTICAL ANALYSIS

The data recorded were subjected to statistical analysis using Analysis of Variance (ANOVA) appropriate for a Randomized Block Design. The significance of treatment effects was tested at 5 per cent probability level. The standard error of difference (SED) and critical difference (CD) values were calculated to compare treatment means, following the procedure outlined by Panse and Sukhatme (1954).

RESULTS AND DISCUSSION

Plant height at vegetative stage (cm)

The differences in the plant height of sesame crop was significant with respect to spacing treatments in the crop raised during 2025 and 2026. Among the spacing, the crop raised by adopting 20 x 20 cm showed significant superiority by registering the maximum height of 43.83 cm during 2025 and 42.00 during 2026 over other spacing and broad casting method (40.50 cm 40.17 cm, respectively) at vegetative stage. The similar trend of plant height at harvesting stage due to different spacing was registered in the crop raised during both the year (Table 1). This result indicates that plant height decreases with closer spacing which might be due to wider plant spacing often leads to greater plant height primarily due to reduced competition for essential resources and unrestricted physical and physiological growth. The current result is in line with findings of Singh *et al.* (1988) and Sawadadkar *et al.* (2023) in sesame.

Days to 50% flowering

Due to different spacing compared with broad casting method, the days to 50% flowering showed non significant difference in the crop raised during both the years viz., 2025 and 2026 (Table 1) may be due to the applied spacing difference is meager and did not cause a statistically meaningful difference in the speed of flowering among treatments.

Number of capsules plant⁻¹

In both the year spacing showed a significant influence on the number of capsules plant⁻¹. It was observed that the maximum number of capsules plant⁻¹ (62.86) was produced at crop raised with 20 x 20 cm spacing which was followed by 20 x 15 cm (62.54) but the lowest number of capsule (58.07) was recorded at 20 x 10 cm during 2025. Similarly, in the crop raised during 2026 recorded the highest number of capsules plant⁻¹ (69.86) and the lowest capsule (63.59) was recorded at 20 x 10 cm during 2026. Whereas the broad casting method registered 65.83 number of capsules plant⁻¹ (Table 1). Singh *et al.* (1988), Kamal *et al.* (1989) and Imoloame *et al.* (2007) also reported that the number of capsules plant⁻¹ decreased with increase in density. Higher plant density offers higher interplant competition and due to limited space plants cannot produce more capsules plant⁻¹. That's the reason the lowest number of capsule was recorded in closer spacing in the present study are in line with Ahmad *et al.* (2002) and Islam *et al.* (2008).

Table 1. Effect of spacing on crop growth and yield attributing characters in sesame cv.VRI 5 raised during 2025 and 2026

Spacing	Plant height at vegetative stage (cm)		Plant height at harvest stage (cm)		Days to 50% flowering		No. of capsules plant ⁻¹	
	2025	2026	2025	2026	2025	2026	2025	2026
20 x 10 cm	42.31	41.50	90.49	79.80	43	44	58.07	63.59
20 x 15 cm	43.66	41.67	91.73	80.13	44	45	62.64	65.39
20 x 20 cm	43.83	42.00	93.91	81.46	44	46	62.86	69.86
Broadcasting	40.50	40.17	89.85	80.62	43	45	61.86	65.83
Mean	42.60	41.17	91.53	80.49	43	45	61.25	66.16
SEd	0.349	0.424	1.107	0.705	0.401	0.472	0.677	0.547
CD (P=0.05)	0.743	0.891	2.327	1.482	NS	NS	1.422	1.149

Number of seeds capsule⁻¹

The number of seeds capsules⁻¹ is significantly influenced by spacing during both the year. The maximum number of seeds capsules⁻¹ (82) was produced at 20 x 20 cm spaced crop followed by 20 x 15 cm (79) and 20 x 10 cm (72) in the crop raised during 2025. Likewise, significantly higher number of seeds per capsule was recorded in the crop raised during 2026 by registering 86 number in 20 x 20 cm spaced crop whereas the broad casting method showed 82.07 numbers of capsule per plant (Table 2). The number of seeds capsule⁻¹ decreased with increasing plant density as the capsule size decreases with increasing plant. Filimon and Worku (2018) and Islam *et al.* (2008) also reported similar results in sesame.

1000 seed weight (g)

Different spacing treatment exhibited significant variation in 1000 seed weight in the crop raised during 2025 and 2026. The highest 1000 seed weight (3.4 g) was recorded at 20 x 20 cm spacing and the lowest (2.8 g) at 20 x 10 cm spacing in the 2025 crop. Smartly, higher 1000 seed weight of 3.6 g was registered in 20 x 20 cm (3.09 g) followed by (3.5g) irrespective of spacing (Table 2). Closer spacing produced more plant population which exhibits high competition for nutrients, space, oxygen and light and this causes less development of seed weight (Hamza *et al.*, 2022 and Sawadadkar *et al.*, 2023).

Table 2. Effect of spacing on yield and yield attributing characters in sesame cv.VRI 5 raised during 2025 and 2026

Spacing	No. of seeds capsule ⁻¹		1000 seed weight (g)		Seed yield plant ⁻¹ (g)		Seed yield ha ⁻¹ (kg)	
	2025	2026	2025	2026	2025	2026	2025	2026
20 x 10 cm	72.00	78.00	2.8	2.9	7.00	7.80	619	628
20 x 15 cm	79.00	82.00	3.0	3.2	7.14	8.06	632	637
20 x 20 cm	82.00	86.00	3.4	3.6	7.30	8.79	690	708
Broadcasting	79.00	82.07	3.1	3.5	7.15	8.12	646	656
Mean	78.00	82.01	3.0	3.2	7.13	8.19	647	655
SEd	0.734	0.658	0.026	0.042	0.053	0.061	6.523	5.240
CD (P=0.05)	1.542	1.382	0.056	0.089	0.113	0.129	13.704	11.01

Seed yield plant⁻¹ (g)

Seed yield plant⁻¹ was significantly influenced by spacing in both the year of cultivation. The highest seed yield plant⁻¹ (7.30 g) was recorded at 20 x 20 cm followed by broadcasting (7.15 g) which was on par with 20 x 15 cm (7.14 g) and the lowest (7.00 g) was obtained at 20 x 10 cm during 2025. The same trend was recorded in the crop raised during 2026 (Table 2). The reason for higher seed yield in wider spacing was discussed in other yield attributing characters was evidenced by Narayan and Narayan (1987) and Islam *et al.* (2024).

Seed yield ha⁻¹ (kg)

The seed yield ha⁻¹ is significantly influenced by spacing in the crop raised during 2025 and 2026. Significantly superior seed yield ha⁻¹ (656 kg, 708 kg) was produced at 20 x 20 cm spaced crop followed by broadcasting method (646 kg, 656 kg), 20 x 15 cm (637 kg, 632) and 20 x 10 cm (619 kg, 628kg) spaced crop during 2025 and 2026, respectively (Table 2) because of registering higher yield attributing characters such as higher number of capsule plant⁻¹, number of seeds capsule⁻¹ and 1000 seed weight. This might also due to population under wider spacing

resulted in higher photosynthetic activity along with proper grain filling and thus contributing to higher seed yield. These findings are supported by Ojikpong *et al.* (2007). It was also evident that the performance of line sowing method is superior to broadcast method in terms of seed yield and other parameters (Islam *et al.*, 2024).

CONCLUSION

Thus the study highlighted that to obtain higher seed set in sesame mono stem variety VRI 5, sowing should be taken up by adopting 20 x 20 cm spacing which recorded higher plant growth and yield attributing characters followed by broadcasting which is existing farmer practice method.

DISCLAIMER (ARTIFICIAL INTELLIGENCE)

Author(s) hereby declare that NO generative AI technologies such as Large Language Models (ChatGPT, COPILOT, etc) and text-to-image generators have been used during writing or editing of this manuscript.

COMPETING INTERESTS

Authors have declared that no competing interests exist.

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Field view 2025



Field view 2026



Number of capsules per plant

20x10 20x15 20x20 BC