CONTEMPORARY RESEARCH IN INDIA
ISSN 2231 - 2137

EFFECT OF DIFFERENT PLANTING GEOMETRY (SPACINGS) ON YIELD CONTRIBUTING CHARACTERS IN SUMMER SESAMUM

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Received: 18/07/2017	Edited: 24/07/2017	Accepted: 29/07/2017

Abstract: *Planting geometry significant effect on growth and yield on summer sesamum. All growth contributing characters were significantly influenced by the spacing S_4, 45 cm × 10 cm which resulted in the best of all growth contributing characters like number of capsules plant^{-1}, seed weight plant^{-1}, weigh^t of capsules plant^{-1} and test weight (1000 seed weight) in the summer sesamum crop.*

Key words: *spacing effect, planting geometry, Summer seasamum.*

Introduction

Sesamum (*Sesamum indicum* L.) is an East Indian important oilseed crop belongs to family*Pedaliaceae* and the genus *Sesamum*. Sesame seeds have been a source of food and oil. It has one of the highest oil content of any seed, some varieties exceeding 50 percent oil content as compared to soybean having 20 percent. Sesame oil is one of the most stable vegetable oils with long shelf life because of the high level of natural antioxidants *viz*., sesamin, sesamolin, and sesamol. The word *sesame* is derived from Latin *sesamum*, borrowed from Greek*sesamon* "seed or fruit of the sesame plant, the plant sesamumis a tropical annual herb having white and purple flowers. It is also known as til, sesame, sisim, hawari, benniseed and gingelly.

Increase in the production of oil can be achieved by increasing the area under sesamum crop, evolving new technologies which can help to increase the seed yield and oil yield of sesamum and also by approaching the modern crop production technologies that particularly include the spacing which increase the number of branches and number of capsules per plant and enhance the production of sesamum crop.

The planting geometry helps in altering canopy architecture affecting light interception and CO_2 assimilation which further affects productivity (Brar *et al.* 1998) so spacing is important factor for altering the architecture to increase the production of sesamum. Light interception is also affected by changing plant architecture.

The spacing aspects are beneficial and gives significantly higher yield. Terminal bud topped at 25 DAS with 30 cm x 30 cm spacing improved the growth characters like number of capsules plant^{-1}, seed yield, biomass production and growth rate of sesamum (Sarkar and Pal, 2005).

Material and Methods

1. Experiment details:

The field experiment was conducted during summer, 2014 at Experimental Farm, College of Agriculture, Pune- 411005, Maharashtra State, India. Geographically the campus of Agriculture College, Pune is situated on 18^{0}32'N latitude and 73^0 32' E longitude. The altitude is about 557.74 m above mean sea level.

The experiment was laid out in split plot design with three replications. Twelve treatment combinations were formed considering main plot treatments comprise four spacings and three sub-plot treatments of topping management. The details of spacing treatments are listed below

A. Main plot treatments (Spacings)

S_1: 22.5 cm x 20 cm
S_2: 30.0 cm x 15 cm
S_3: 37.5 cm x 12 cm
S_4: 45.0 cm x 10 cm

JLT-408 Variety of summer Sesamum crop was used. Experiment was carried out in March 2014. Plot size for gross was5.00 m x 5.00 m and for net was 4.50 m x 4.50 m.

2. Yield contributing characters

2.1 Number of capsules plant^{-1}

Five representative plants from each net plot were selected randomly and total number of the capsules per plant was counted individually to determine the total number of capsules per plant.

2.2 Weight of seeds plant^{-1} (g)

At harvest, the seed yield of five observational plants was recorded and from this per plant seed weight was calculated.

2.3 Weight of capsules plant^{-1} (g)

At harvest, the weights of capsules of five observational plants were recorded at random and from this per plant weight of capsules were calculated.

2.4 Test weight i.e. thousand seed weight (g)

A representative sample was taken from the produce of each treatment and from the sample, thousand grains were counted at random and weight was recorded for each treatment.

2.5 Grain yield (kg ha^{-1})

The produce was dried in sun for a week. After threshing, the seeds were cleaned from dried leaves, soil and other foreign material. The yield of seed per net plot was recorded and then converted on hectare basis by multiplying with hectare factor.

2.6 Straw yield (kg ha^{-1})

After removing the seeds from capsules, the straw along with empty capsules were dried in the sun. Upon drying, the weight of the bundles of straw per plot was recorded. The weight per plot was transferred on hectare basis by utilizing hectare factor.

Results and Discussion

Yield contributing characters

The important yield contributing characters *viz.,* number of capsules plant^{-1}, seed weight plant^{-1}, weight of capsules plant^{-1} and test weight (1000 seed weight) of sesamum are presented in the Table 1.

1. Number of capsules plant^{-1}

The mean number of capsules plant^{-1} increased progressively with the advancement of the age of crop. The maximum mean number of capsules plant^{-1} was recorded at harvest (66.83).

The significant effect of spacing on number of capsules plant^{-1} was noticed from 56 DAS up to harvest. The mean number of capsules plant^{-1} (69.71) at 45 cm x 10 cm spacing was significantly maximum than other spacings at harvest (Table 1). Similar results were obtained by Udom *et al.* (2006) and Hemalatha *et al.* (1999) at 45 cm x 10 cm spacing.

2. Seed weight plant^{-1} (g)

Seed weight plant^{-1} was significantly affected by different spacings management and their combinations are presented in Table 1.

Treatments of spacing showed significant effect on the seed weight Plant^{-1}. Higher seed weight plant^{-1} (4.14 g) was observed with the spacing of 45 cm x 10 cm as compared with the other spacings. The seed weight plant^{-1}(4.02 g) in spacing 37.5 cm x 12 cm was observed to be on par with the spacing 45 cm x 10 cm (Table 1). Same results were obtained by Shinde *et al.* (2011).

3. Weight of capsules plant^{-1} (g)

Weight of capsules plant^{-1} was significantly affected by the different spacing. The data on weight of capsules plant^{-1} influenced by different treatments are presented in Table 1.

The weight of capsules plant^{-1} was significantly influenced by different spacings. The highest weight of capsules plant^{-1} was obtained with the spacing of 45 cm x 10 cm (28.00 g) when compared with the rest of the spacings.

The weight of capsules plant^{-1} in spacing 37.5 cm x 12 cm (27.08 g) was observed to be on par with spacing 45 cm x 10 cm (Table 25). Same results was found by Shinde *et al.* (2011) and Gaur and Trehan (1974).

4. Test weight (g)

Test weight was not significantly affected by different spacings were presented in Table 1. Treatments of spacing showed statistically non significant effect on the test weight (Table 1).The

findings of Shinde *et al.* (2011), Roy*et al.* (2009), Kathiresan (2002) and Kadam *et al.* (1989) collaborate with the present results.

5. Grain yield (kg ha^{-1})

The data pertaining to seed yield as influenced by different treatments are presented in Table 2. The grain yield was significantly influenced by the treatments of spacings. The mean grain yield was observed 869.47kg ha^{-1}.

Treatments of spacing showed significant effect on the grain yield. Maximum grain yield was observed with the spacing 45 cm x 10 cm (919.71 kg ha^{-1}) whereas, it was on par with spacing 37.5 cm x 12 cm (892.86 kg ha^{-1}) Table 1. Shinde *et al.* (2011), Roy*et al.* (2009), Sarkar and Banik (2002), Chimanshette and Dhoble (1992), Nirval *et al.* (1995) and Kadam *et al.* (1989) observed same results.

6. Straw yield (kg ha^{-1})

Straw yield affected by different spacings treatments and their combinations is presented in Table 2.

The straw yield influenced by different spacings. The highest straw yield was obtained with the spacing of 45 cm x 10 cm (1524.33 kg ha^{-1}) when compared with rest of the spacings (Table 2). Same trend was also found by Shinde *et al.* (2011).

Harvest index (%)

The harvest index was influenced due to different treatments. The data presented in Table 26revealed that the mean harvest index was 36.50 per cent.The harvest index of sesamum was maximum with spacing 45 cm x 10 cm (36.81 %).

Table 1: Yield contributing characters of summer sesamum as influenced by different spacings at harvest

Treatment	Number of capsules plant^{-1}	Seed weight (g) plant^{-1}	Weight of capsules (g) plant^{-1}	Test weight (1000seed weight)g
A. Main plot treatments : Spacings				
S_1 : 22.5 cm x 20 cm	64.36	3.68	25.61	3.05
S_2 : 30 cm x 15 cm	66.14	3.80	27.11	3.08
S_3 : 37.5 cm x 12 cm	67.12	4.02	28.46	3.13
S_4 : 45 cm x 10 cm	69.71	4.14	29.46	3.16
S.Em. ±	0.30	0.05	0.25	0.03
C.D. at 5%	1.03	0.17	0.82	NS

Table 2: Yield of summer sesamum as influenced by different spacings

Treatment	Yield (kg ha^{-1})		Harvest Index (%)
	Grain	Straw	
A. Main plot treatments : Spacings			
S_1 : 22.5 cm x 20 cm	825.81	1356.68	36.23
S_2 : 30 cm x 15 cm	839.50	1380.51	36.37
S_3 : 37.5 cm x 12 cm	892.86	1461.36	36.52
S_4 : 45 cm x 10 cm	919.71	1524.33	36.81
S.Em. ±	8.21	16.07	-
C.D. at 5%	28.43	55.62	-

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