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Influence of Terminal Clipping on Growth and Yield of Sesame Varieties

S. Kokilavani, R. Jagannathan, R. Selvaraju and N. Thavaprakaash
Agro Climate Research Center, Tamil Nadu Agricultural University, 3, Coimbatore

Abstract: A field experiment was conducted at eastern block of Tamil Nadu Agricultural University, Coimbatore during summer (Feb-May) 2005 to investigate the influence of morphological modification through terminal clipping in selected varieties of sesame with Factorial Randomized Block Design (FRBD) with three replications employing two factors viz., varieties (SVPR 1, TMV 3 and TMV 4) and morphological modification by terminal clipping (at 15, 25, 35, 45 days after sowing and no clipping). The results of the study indicated that terminal clipping done at 35 DAS found to improve the crop architecture, yield attributes and yield of the sesame variety SVPR 1. The variety TMV 4 was also considered as an appropriate alternative in recording equal growth and yield parameters and yield for the same clipping practice.

Key words: Sesame, varieties, terminal clipping, growth, yield

INTRODUCTION

Sesame (*Sesamum indicum* L.) adorned as Queen of oilseeds is one of the most important ancient edible oilseed crops grown in India. Even though it is grown all over the world for its importance in food, medicine and industries, India has leading edge over its area (29.3%) and by 25% production (Duhoon *et al*., 2003). Among the oilseed crops, sesame ranks first for its higher oil content (46-64%) with 6335 kcal kg^{-1} of dietary energy in seeds (Kumar and Goel, 1994). The sesame has yield potential of around 2.0 t ha^{-1} but low in productivity (346 kg ha^{-1}) and hence has tremendous options for management technologies. Yield is the manifestation of various physiological processes occurring in plants and they are usually modified by management practices in an environment. Besides, clipping of terminal leaves which activates the dormant lateral buds to produce more branches is an important operation for increasing sesame yield (Ramanathan and Chandrashekharan, 1998). Since management factors exert a profound effect on various growth and yield contributing characters in a given environmental condition, the present experiment was carried out to study the influence of morphological modification through terminal clipping in selected varieties of sesame.

MATERIALS AND METHODS

A field experiment was conducted during *summer* season (February-May) of 2005 at Eastern block of Tamil Nadu Agricultural University, Coimbatore, India. The farm situated in Western agro-climatic zone of Tamil Nadu at 11° N latitude and 77° E longitude at an altitude of 426.7 m above mean sea level. The initial soil analyses show that the soil was sandy clay loam in texture. The soil is optimum in bulk density (1.33 mg m^{-3}) and particle density (2.66 mg m^{-3}) with the porosity of 50%. The soil reaction was alkaline (pH: 8.10) and the Electrical Conductivity is low (0.43 dS m^{-1}). The soil was low in available nitrogen ($KMnO_4$-N: 237 kg ha^{-1}), medium in available phosphorous (Olsen-P: 14.4 kg ha^{-1}) and high potassium (NH_4OAc-K: 395 kg ha^{-1}). The experiment was conducted out in

Corresponding Author: S. Kokilavani, Agro Climate Research Center, Tamil Nadu Agricultural University, 3, Coimbatore

Factorial Randomized Block Design (FRBD) with three replications employing two factors {Factor I: varieties viz., SVPR 1, TMV 3 and TMV 4; Factor II: manual terminal clipping done at 15, 25, 35 and 45 Days after Sowing (DAS) and no clipping}. The crop was supplemented with nitrogen through urea, phosphorus through single super phosphate and potassium through muriate of potash as basal at the rate of 35: 23: 23 kg ha $^{-1}$, respectively. Thinning and gap filling were done on 15 and 25 DAS to achieve the required population. Five sample plants of sesame from each treatment plot were selected at random and labeled for biometric observations. The plant height, number of branches and number of capsule per plant were recorded at harvest stage. The leaf area was measured by using leaf area meter LICOR-2000 and Leaf Area Index (LAI) was calculated using the formula

$$\text{LAI} = \frac{\text{Total leaf area}}{\text{Ground area}}$$

$$\text{Ground area} = \text{Spacing}\,(30 \times 30\ \text{cm})$$

The Dry Matter Production (DMP) was recorded by shade drying the plant samples in air for one hour and then oven dried at 65±5°C till the constant weight was attained and DMP was expressed in kg per hectare. The crop was harvested separately from the plots when the leaves and stems were turned yellow and processed and the seed yield was recorded.

RESULTS AND DISCUSSION

Growth and Yield Characters of Varieties

The data of growth parameters such as branches per plant, Leaf Area Index (LAI), DMP except plant height and yield attributes such as number of capsules per plant and seed yield were superior in the variety SVPR 1 and TMV 4 was found to be remained on par with SVPR 1 (Table 1). The plant height values remind higher for TMV 4 compared with other two varieties. Increased LAI was mainly

Table 1: Influence of clipping management (C) on growth and yield sesame varieties (V)

	Plant height (cm)						No. of branches per plant					
	15	25	35	45	No clipping	Mean	15	25	35	45	No clipping	Mean
	DAS						DAS					
SVPR 1	72.8	77.7	81.5	92.2	97.3	84.3	20.9	22.7	24.6	18.8	21.4	21.7
TMV 3	82.1	83.9	88.7	100.0	103.8	91.7	17.3	21.0	22.2	16.4	17.8	18.9
TMV 4	84.0	89.2	96.2	106.9	108.8	97.0	18.6	21.9	24.1	17.5	19.0	20.2
Mean	79.6	83.6	88.8	99.7	103.3		18.9	21.9	23.6	17.6	19.4	
		V	C	V×C				V	C	V×C		
SED		2.9	3.1	3.3				0.9	1.0	1.3		
CD		6.4	6.8	7.3				2.0	2.2	2.9		
LAI							**DMP (kg ha^{-1})**					
SVPR 1	1.02	1.05	1.16	0.92	1.04	1.04	3076	3345	3711	2665	3155	3190
TMV 3	0.74	0.89	0.99	0.63	0.76	0.80	2118	2622	2958	1950	2185	2367
TMV 4	0.94	1.10	1.16	0.86	0.96	1.00	2737	3287	3474	2585	2182	2979
Mean	0.90	1.01	1.10	0.80	0.92		2644	3085	3381	2400	2717	
		V	C	V×C				V	C	V×C		
SED		0.03	0.04	0.05				102	109	145		
CD		0.07	0.08	0.10				224	240	318		
No. of capsules per plant							**Seed yield (kg ha^{-1})**					
SVPR 1	95.9	108.5	122.7	78.4	99.8	101.1	995	1075	1185	860	936	1010
TMV 3	53.4	70.6	78.3	45.2	55.4	60.6	733	880	1020	645	733	802
TMV 4	90.0	102.4	115.4	81.0	91.6	96.1	956	1044	1171	834	966	994
Mean	79.8	93.8	105.5	68.2	82.3		895	1000	1125	780	878	
		V	C	V×C				V	C	V×C		
SED		5.5	5.2	6.1				40	42	45		
CD		12.0	11.5	13.5				82	86	94		

due to enhanced number of leaves and large sized leaf in SVPR 1 variety. Similar results are reported by Sarkar and Pal (2005). SVPR 1 recorded higher number of capsules per plant (101.1) and this was comparable with TMV 4. The total DMP of the crop mostly depends on leaf area, photosynthetic rate and dry matter partition. The positive increase in number of branches per plant (more than 15% over TMV 3 and 7% over TMV 4) might have offered higher chance for the increased production of leaves per plant and LAI, which subsequently resulted in higher DMP of SVPR 1 (more than 28% over TMV 3 for crop period). The results of Rao *et al.* (1990) lend support to this finding. SVPR 1 recorded maximum seed yield of 1010 kg ha^{-1} and was found to on par with TMV 4. This was due to more number of branches per plant that helped in production of more number of matured or productive capsules. Similar results are given by Kathiresan *et al.* (1997).

Growth and Yield Characters Influenced by Terminal Clipping Practices

In terminal clipping practice, the maximum plant height was noticed in without clipping treatment when compared to all manual terminal clipping treatments. Terminal clipping done at 35 DAS recorded more number of branches per plant, DMP and LAI, except variation noticed in 30 DAS. In plants, the development of auxillary buds are inhibited normally by Indole Acetic Acid (IAA) produced in the apical meristem. If the source of auxin is removed by excising the apical meristem, the lateral branching gets accelerated. Moreover, under terminal clipping, the utilization of photosynthates by the crop for the production of lateral branches would be higher and this might be the reason for increased number of branches per plant at 35 DAS (23.6) over 45 DAS (17.6). Imayavaramban *et al.* (2004) reported more number of branches with manual clipping of leaves, leaving two pair of leaves above cotyledonary leaf. The increased number of branches and production of more leaves which alter the crop canopy that in turn increased the value of LAI. The terminal clipping practice at 35 DAS recorded more number of capsules per plant (105.5). The clipping practice might have efficiently altered the crop architecture, which in turn increased the lateral branches that led to greater chance for development of source and sink features in sesame. The beneficial impact of terminal clipping on yield attributes was reported by Imayavaramban (2000). Clipping at 35 DAS recorded maximum seed yield of 1125 kg ha^{-1}. This was due to induction of more number of lateral branches per plant.

Growth and Yield Characters of Varieties and Clipping Practices

The variety TMV 4 in combination with no clipping recorded maximum value of 108.8 cm in producing taller plants than all other treatment combinations. The maximum height by this treatment combination might be due to continuous supply of auxin to apical meristematic tissues. This is in accordance with findings of Venkadachalam (2003). In terms of production of branches per plant, all the varieties clipped at 35 DAS produced higher number of branches owing to the practice of terminal clipping which might have induced the formation of equally dominant branches. This is in accordance with the result of Tewolde *et al.* (1994). As known that for individual effect the rest of the growth parameters was favourably influenced by the combination of variety SVPR 1 for 35 DAS clipping owing to the positive response of the variety for the clipping practice. Sesame variety SVPR1 when clipped at 35 DAS registered the highest seed yield of 1185 kg ha^{-1}. The increase in seed yield of sesame in clipped plants over non clipped plants was due to increase in more number of branches per plant and capsules per plant. Similar results were reported by Venkadachalam (2003).

CONCLUSION

Among the varieties studied SVPR 1 showed its superiority in all the growth and yield characters namely number of branches per plant, LAI, DMP, number of capsules per plant and seed yield. In view of terminal clipping practice done at different crop growth stages, clipping at 35 Days After

Sowing (DAS) recorded higher values over no clipping for all the growth parameters and yield attributes evaluated. Both SVPR 1 and TMV 4 were found to be highly amenable for clipping at 35 Days after Sowing (DAS) over rest of the combinations studied in improving growth characters, yield attributes and finally yield.

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