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Varietal screening of sesamum (*Sesamum indicum* L.) under organic management in mid hills of Sikkim

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ABSTRACT

A field experiment was undertaken to evaluate the yield potential of sesamum varieties under organic management at the Research Farm, ICAR-National Organic Farming Research Institute, Tadong, Sikkim in the pre-*kharif* season (Feb-March) of 2017. Six sesamum varieties e.g., TKG-308, Sabatri, GT-10, Prachi, Amrit and TRC-Til were laid out in a randomized complete block design and replicated thrice. The results indicated a significant variation among the varieties in growth and seed yield parameters. Among the varieties, GT-10 produced tallest plants (95.57 cm) and the smallest was in TRC-Til (74.80 cm). The varieties GT-10 and Prachi matured early and took 149 days for maturity. Sesamum variety Sabatri produced the maximum number of capsules per plant (54.6) while minimum number of capsules per plant (16.0) by TKG-308. Among the varieties, significantly higher seed yield was observed in GT-10 (7.6 q/ha) and TKG-308 (6.5 q/ha) over others.

1. Introduction

Sesamum is one of the important oilseed crops used by humankind. It is also known as *gingelly, simsim, til* etc. It is used as food, medicinal and religious crop in India (Shah 2013, Islam *et al*., 2016). Sesame oil is a known dietary source having high nutraceutical value (Gauthaman*et al*., 2009). The oil of sesame is used for cooking, baking, candy making, soaps and as alternative medicine (Kafiriti and Deckers, 2001). The sesame oil cake is a very good for cattle feed since it contains 32 percent crude protein of high biological value (Alam *et al*., 2007). Sesame is grown in different seasons in various parts of the country. The productivity of sesame in India is very low (432 kg/ha) against its yield potential (2000 kg/ha). Even with the potential for cultivation of sesame there are number of constraints inhibiting production and productivity (Pusadkar*et al*., 2016). Among the various production constraints, lack of improved cultivars and poor seed supply system restrict its cultivation to marginal land that has resulted in low and unpredictable yield with high production cost and low return to the growers. Sikkim has become a first Indian state in organic farming (Bhutia *et al*., 2014; Bhutia *et al*., 2016). The state is deficit in oilseeds supply to cater the need of its populace, mainly due to the low production and productivity of oilseeds crops (Babu *et al.,* 2015). The major oilseed crops from the region are rapeseed and mustard but the production is low which is not enough to meet the oilseed demand. It is, therefore, necessary to identify some other potential crop to maximize production and reduce the gap between demand and supply of oilseeds in the state. Hence, sesamum can be an alternative to reduce the gap between demand and supply of oilseed under organic management conditions. There is need to expand the area of production with the introduction of new crops in Sikkim to meet the demand of oilseed production. Therefore, the present investigation was carried out to ascertain the suitability of some sesame varieties for growth and yield parameters during pre-kharif season in Sikkim.

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2. Materials and Methods

A field experiment was conducted in the pre-*Kharif* season (Feb-March) of 2017 to evaluate the growth performance of six varieties of sesame *viz*. TKG -308, Sabatri, GT-10, Prachi, Amrit and TRC-Til at the Research Farm of ICAR-National Organic Farming Research Institute, Sikkim situated at 1300 meters above mean see level with latitude 27º33' N and longitude 88º62' E. The meteorological data was recorded at meteorological observatory (IMD) at Research Farm. The average meteorological data during growth period of the crop is shown in the Figure 1. During the cropping period total 1690.8 mm rainfall was received while maximum mean temperature of 29.7ºC was observed in June and minimum (14.9ºC) in April (Figure 1). The soil of experimental field was clay loam with pH 5.9 (1:2.5 soil and water ratio), 232.5 kg/ha alkaline permanganate oxidizable N, 24.6 kg/ha Brays' P1, 186.1 kg 1 neutral N ammonium acetate exchangeable K and 1.39% organic carbon. The experiment was laid out in a randomized complete block design with three replications. Each plot measuring 2.0 m × 2.5 m was separated from other by a spacing of 0.5 m. Sowing was undertaken on flats beds with a spacing of 30 cm between rows and 15 cm within rows. According to the needs intercultural operations were done during the cultivation period. Observations were recorded on plant height (cm), days to 50% flowering, days to maturity, number of capsules/plant and seed yield (q/ha). The 1000-seeds were taken in account for test weight. At harvest maturity, sesamum crop was harvested, and sun-dried, weighed and then converted into biological yield (q/ha). The grains were separated and weighed, and then converted into seed yield (q/ha). Harvest index (HI) was calculated according to the following formula given: Harvest index (%) = Economic yield (kg/ha) / biological yield (kg/ha) × 100. All the data obtained was statistically analysed using the *F*-test following Gomez and Gomez (1984). LSD values at $P = 0.05$ were used to determine the significance of difference between treatment means.

3. Result and Discussion

The results showed significant variations in growth and yield performance of sesamum varieties are presented in Table 1. Among the varieties, significantly taller plant was recorded in GT-10 (95.6 cm) over those under TRC-Til (74.8 cm) and Prachi (76.7 cm) but remained at par with rest of the varieties. Sabatri and Amrit also recorded significantly taller plants over TRC-Til and Prachi. Significant variation was also found in days to 50% flowering amongst the sesame varieties wherein Amrit recorded lowest duration to bloom.TKG-308 and GT-10 took maximum time for 50% flowering over others. In contrast with days to 50% flowering both the varieties had taken 149.3 days for maturity which is lesser than the other varieties. Similarly, number of capsules per plant also varied significantly amongst the varieties and the maximum value was observed in Sabatri (54.6 capsules per plant) and minimum in TKG-308 (16.0 capsules per plant). Sabatri (54.6 capsules per plant), GT-10 (48.3 capsules per plant) and TRC-Til (51.6 capsules per plant) remained at par amongst themselves but were significantly higher over rest of the varieties in respect of number of capsules per plant. Test weight also varied and significantly higher value was registered in TKG-308 (2.40 g) over all other varieties. The seed yield significantly and the highest yield was observed in GT-10 (7.6 q/ha) over all the other varieties tested. The seed yield of TKG-308 (6.5 q/ha) was also significantly higher than all other varieties except GT-10. The increase in seed yield in GT-10 was 57.9, 55.3, 53.9, 47.4 and 14.5 percent higher than Prachi, TRC-Til, Sabatri, Amrit and TKG-308, respectively. The biological yield was maximum in TKG-308 (8.67 q/ha) followed by GT-10 (8.27 q/ha) and TRC-Til (8.23 q/ha). The harvest index was greater in GT-10 (47.91) followed by TKG-308 (42.87). Variation in different parameters among the varieties may be due to varietal and genetic difference as well as environmental factors. The increase in yield in GT-10 might be due to more synchronization of transportation of photosynthates from the source to sink as compared to other varieties. It is in conformity with the earlier reports, that the high yielding cultivars like GT-2, GT-10 and GT-1 had stable performance over the environment with broad adaptability **(**Kumar *et al.,* 2013**).** The range in capsules per plants was similar as reported by Dey*et al*., (2016).

Conclusion

The study presented significant variation among the varieties in the performance at mid hills of Sikkim. It is also revealed that some of the varieties performed well in terms of seed yield which is comparable with other sesame producing areas of the country. However, though not commercially exploited in the Sikkim there is scope and potential to cultivate the sesamum as oilseed crop in the area for reducing the oilseed gap. Varieties GT-10 and TKG -308 which showed good performance may be recommended for cultivation in mid hills of Sikkim.

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Table 1. Performance in yield attributes and yields of different sesamum varieties under organic management conditions

Variety/ Hybrid	Plant height at harvest (cm)	Days to 50% flowering	Days to Maturity	Number of capsule/ plant	Test weight (g)	Seed yield (q/ha)	Biological yield (q/ha)	Harvest index (%)
TKG -308	88.1	71.3	150.6	16.0	2.4	6.5	8.7	42.9
Sabatri	95.0	68.6	151.3	54.6	2.0	3.5	7.3	32.1
GT-10	95.6	71.0	149.3	48.3	1.8	7.6	8.3	47.9
Prachi	76.7	68.6	149.3	19.2	2.0	3.2	7.9	28.9
Amrit	90.6	63.6	150.0	33.0	1.8	4.0	8.0	33.3
TRC-Til	74.8	68.0	151.3	51.6	2.1	3.4	8.23	29.0
SEm±	4.8	1.0	0.9	4.8	0.1	0.3	0.3	0.9
LSD(*P*=0.05)	14.5	3.1	NS	14.5	0.2	0.9	1.1	2.9

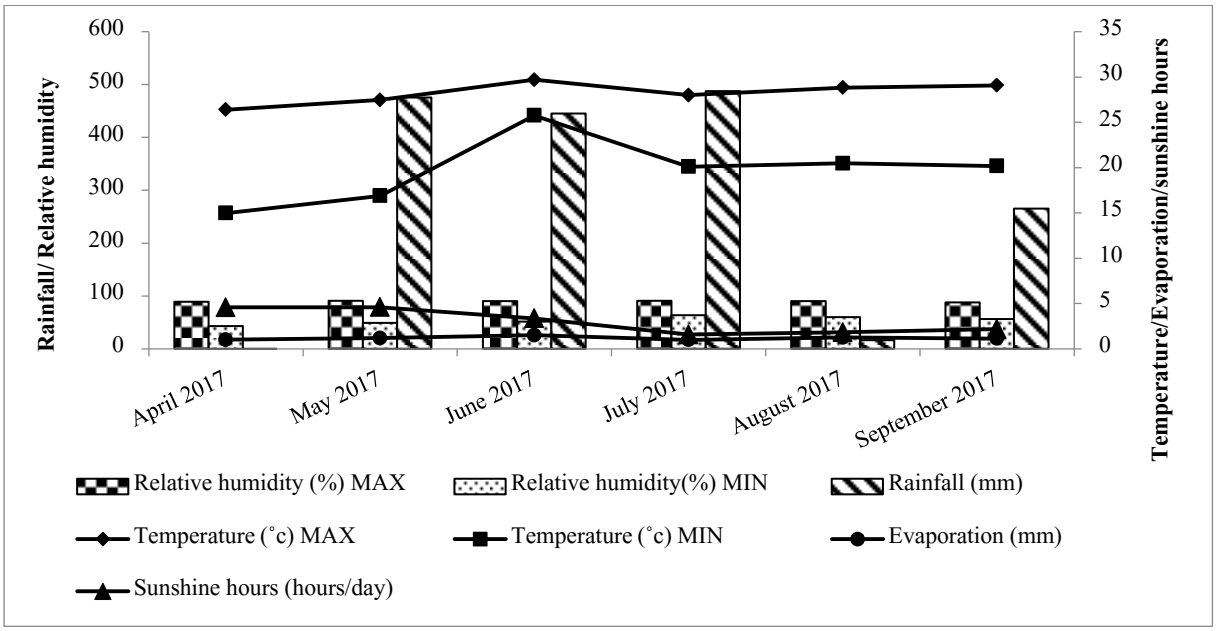

Figure 1. Meteorological data during experimental period

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