Artificial screening of sesame germplasm against shoot webber andcapsule borer

ABSTRACT

Ten promising germplasm lines and three checks (VRI 1-Local check; TC-25 Susceptible check; SI-250 Resistance check) of sesame (*Sesamumindicum* L.) exhibiting different genetic and regional diversity were screened against shoot webberand capsule borer (*Antigastracatalaunalis*Duponchel) under net house conditionduring *rabi*season 2019-20whichwere already found promising under open field condition at Regional Research Station, Vriddhachalam, Tamil Nadu. Among the entriestested,three entries *viz.*,B-7-11, SI 2116, and GRT-83148 under artificial screening as well as feeding preference studywere recorded less than 10 per cent plant damage and were classified as resistant.

Keywords: S*hoot webber and capsule borer, Resistance, Screening, Sesame*

INTRODUCTION

Sesame (*Sesamum indicum* L.) is an important oilseed crop grown primarily for its oil-rich seeds that contain approximately 46 to 52% oil and 25% protein. Sesame is an excellent edible oil, food, biomedicine, health care and usedin the manufacturing of soaps, insecticides, paints, pharmaceuticals, cosmetics and perfume industries.Sesame seeds are a rich source of protein and calcium, methionine, valine, and tryptophan. Bioactive components such as phenolics, vitamins, phytosterols, and polyunsaturated fatty acids are present in sesame seeds which provide health benefits to human.Sesamin, a lipid-soluble lignan has anticancer properties. Sesame seeds are rich source of phytates than soya beans (Sharma et al., 2020). Sesame is a short-duration crop grown throughout the year fits well with a variety of cropping systems.

Sesame is cultivated in every state of India.Nonetheless, the principal states are Andhra Pradesh, Tamil Nadu, Maharashtra, West Bengal, Gujarat, Rajasthan, Madhya Pradesh, and Uttar Pradesh. Sesame yields in India are low (421 kg/ha) and erratic. One of the main elements influencing sesame production, both in terms of quality and quantity, is insect pests. According to Ahuja and Kalyan (2002), the pest attack results in a significant loss of seed production, ranging from 25 to 90%. Sesame crop from seedling stage to maturity may be hampered by the shoot webber and capsule borer (*Antigastracatalaunalis* Dup.), despite the fact that other insect pests attack the plant. (Selvanarayanan and Baskaran, 1996; Choudhary et al., 1987).Sesame production in a nation like India is already far lower than anticipated, therefore *Antigastra*'s impact is undesired. Therefore, it is crucial to come up with ways to lessen the damage without having a negative impact on the agro-ecosystem. Using resistant/tolerant cultivars is one of the most successful eco-friendly management strategies that doesn't harm the ecosystem. Thus, choosing a resistant or tolerant cultivar is wise. Therefore sesame germplasm lines were assessed against shoot webber and capsule borer under net house condition to confirm the relative resistance.

MATERIAL AND METHODS

The experiment to screen the germplasm against shoot webber and capsule borer was conducted at RRS, Vriddhachalam during *rabi* 2019-20. Ten promising germplasm lines screened from 200 entries collected from different Geographical zones *viz.*, Amreli in

Gujarat, Mandor in Rajasthan, Jabalpur in Madhya Pradesh, Dharwad in Karnataka and Vriddhachalam in Tamil Nadu including Local check (VRI 1) resistant (SI-250) and susceptible check (TC-25) to determine each genotype's relative resistance or susceptibility to *A.catalaunalis*.The seeds were sown in a single row of 5 meters length with a spacing of 30cm x 10cm. The experiment was set up in a row-row fashion, screened in an artificial pest load environment by releasing 20 pupae of sesame shoot webber and capsule borer under net house condition. Fertilizer dosage recommendations (35:23:23 kg NPK/ha) together with other agronomic techniques (apart from pesticides) were followed. Random selection and tagging were done on ten plants from each genotype. Number of damaged and total leaves (30 DAS), flowers (45 DAS), and capsules (70 DAS) per plant were recorded at vegetative, blooming and capsule stages, respectively. Damage sustained by specific sesame germplasm lines at each of the three stages of plant growth was used to determine their resistance or susceptibility. The feeding preferenceof the sesame shoot webber cum capsule borer was carried out for the promising entries along with checks by releasing ten thirdinstar larvae of shoot webber in petri dishes along with sesame leaves under laboratory condition.

RESULTS AND DISCUSSION

Nonetheless, notable variations in the level of infection were noted amongst the genotypes. Damage ranged from 7.02 to 34.48 percent at the vegetative stage. Flower damage was varying from 9.08 to 16.45 per cent. while capsule damage was 3.63 to 16.36 per cent. Based on performance of the screened entries at various stages of plant growth, they were further divided into different (Resistant, Moderately Resistant, Moderately Susceptible, Susceptible) categories. According to the results, three entries *viz*.,GRT-83148, SI 2116, and B-7-11recorded less than 10 per cent plant damage during the vegetative stage and were classified as resistant; Entry B-7-11 recorded 9.08 per cent damage at flowering, and entry KMR-77 recorded 3.63 per cent at capsule stage and classified as resistant. In summary, the entry B-7-11 was found superior followed by SI-2116. The entries B-7-11, SI 2116and GRT-83148 were classified as resistant under artificial pest load conditions, having the least amount of damage at all three plant growth stages. (Table 1). The per cent leaf area damage caused by the shoot webber cum capsule borer among the entries were varied from 4.80 to 15.66. The entriesB-7-11, SI 2116, and GRT-83148 andSI-7192registered the minimum leaf area damage(>10%) when compared with susceptible check, TC 25 (17.56%) (Table2).*Antigastracatalaunalis*resistance in germplasm can be transferred to commercially viable sesame varieties. Cultivars that are only partially resistant may also be able to provide sufficient control with less insecticide application. By preventing the emergence of insect strains resistant to pesticides, it will contribute to extending the viable economic life of currently available insecticides. (Fig.1). Swetha and co workers (2024) reported that 46 germplasm were observed to be highly resistant to *Antigastracatalaunalis* across both the seasons and also based on the combined mean percent leaf damage analysisout of 276 germplasm evaluated. Thus, these germplasm can be used as donors in future breeding programmes.

Vijaykumar andco workers (2018) stated that out of 60 genotypes evaluated under high pest pressure, 43 genotypes were designated as highly susceptible (HS) with the mean leaf, flower and pod damage of more than 40.00, 20.00 and 8.00%, respectively.Prior research by Murali Bhaskaran and Thangavelu (1990) also documented resistance in terms of capsule damage in other sesame germplasm lines with results that were largely comparable. Five entries *viz*., SI-241 (6.16%), NIC-8262 (6.42%), NIC-16359 (6.51%), JLT-8 (6.55%)and KMR-4 (6.83), were found promising with least susceptibility to *Antigastra* at capsule stage. Baskaran *et al.,* (1994) and Ahuja and Kalyan (2001) reported that three genotypes *viz*., SI-1146, EC-303454-A and TC-25 were considered as highly susceptible (>50%). The genotypes *viz*., KMR -14 and TKG- 22 were recorded as moderately resistant. (Miteshet al., 2023;Parveenet al., 2024; Ahuja and Kalyan (2001); Manisegaran, 2001;Singh, 2002).

CONCLUSION

Using resistant/tolerant cultivars is one of the most successful eco-friendly management strategies that doesn't harm the ecosystem. Thus, choosing a resistant or tolerant cultivar is wise. Furthermore, the response of three entries *viz*., B-7-11, SI 2116,and GRT-83148 under conditions of artificial pest load as well as feeding preference study revealed that they had recorded less than 10 per cent plant damage and were classified as resistant.

REFERENCES

Ahuja, D.B.,&Kalyan, R.K. (2001). Field screening of genotypes of sesame against leaf webber and capsule borer, *Antigastracatalaunalis* Dup., gallfly, *Asphondyliasesami* Felt and mite, *Polyphagotarsonemuslatu*s Banks. *Pest Management in Economic Zoology*, 9(1):409-412.

Ahuja, D.B &Kalyan, R.K. (2002). Losses in seed yield due to insect pests in different varieties of sesame, *Sesamum indicum* L., *Annals of Plant and Soil Research*, 4(1):99-103.

Balaji, K., &Selvanarayanan. V. (2016).Evaluation of Indian Sesame Germplasm for Resistance Against Shoot Webber and Capsule Borer, *Antigastracatalaunalis* Duponchel (Lepidoptera: Pyraustidae).*African Entomology*, 24(2):376-381. https://doi.org/10.4001/003.024.0376

Baskaran, M.R.K. Ganesh, S.K.,&Thangavelu, S. (1994). Germplasm screening against sesame shoot webber and pod borer. *Madras Agricultural Journal*, 81 (11): 618-621.

Choudhary, R., Rai, S.,& Singh, K.M. (1987). Economic injury level of the sesame leaf webber, *Antigastracatalaunalis* (Dup.) in Delh. *Indian Journal of Plant Protection*, 15(2): 136-141.

Manisegaran, S. Manimegalai, N. Puspha, J.,& Mohammed, S.N. (2001). Non preference mechanism of resistance in sesame to shoot webber and capsule borer *Antigastracatalaunalis* (Dup.). *Annals of Plant Protection Science*,9(1): 123-124,

MiteshMakwana, AK Panday, Sanju Singh & Rahul Patidar .(2023). Screening different genotypes of sesame against leaf webber and capsule borer (*Antigastracatalaunalis*).*The Pharma Innovation Journal* ,SP-12(11): 340-343.

Murali B., &R.K. Thangavelu, S. (1990). Germplasm screening against sesame leaf roller and pod borer.*Sesame- Safflower Newsletter*, 5:40-45.

Parveen S, Panday AK, Vishwakarma A, Das S, Sharma A, Dwarka, &Vishwakarma D. (2024).Screening of Various Sesame Genotypes Against Leaf Webber and Capsule Borer, *Antigastracatalaunalis* Dup. Journal of AdvancedBiology and Biotechnology, 27(7):803-12. https://journaljabb.com/index.php/JABB/article/view/1039

Selvanarayanan, V.,&Baskaran, B. (1996). Varietal response of sesame to the shoot webber and capsule borer, *Antigastracatalaunalis*Duponchel (Lepidoptera: Pyraustidae). *International Journalof Pest Management*, 42(4): 335-336.

Sharma Loveleen, SainiCharaniv Singh, PuniaSneh, Nain VikashSandhu&Kawaljit Singh.(2020).Sesame (*Sesamumindicum*) Seed. COLAB 305-330, https://colab.ws/articles/10.1007/978-981-15-4194-0-12

Singh, V.(2002). Reaction of sesame genotypes to leaf webber and capsule borer *Antigastracatalaunalis*(Duponchel) (Lepidoptera: Pyraustidae). *Sesame- Safflower Newsletter*,17:52-53.

SwethaN., Boopathi, T., B.S.L. Ramani, A. Tejaswini, A.L. Rathnakumar, K.T. Ramya, PradumanYadav&C. Narendra Reddy. (2024). Evaluation of Sesame Germplasm for Resistance against Leaf Webber, *Antigastracatalaunalis* (Duponchel), *Journal of scientific research and reports,* 30(7): 59-73 DOI: 10.9734/jsrr/2024/v30i72123

Vijaykumar L, J Jyothi, K Madhusudan&B.Shivanna. (2018). New source of resistance against sesame leaf webber and capsule borer, *Antigastracatalaunalis*Dupounchel (Pyraustidae: Lepidoptera) in Karnataka. *Journal of Entomology and Zoology Studies*, 6(1): 942-946

Table 1. Screening of promising entries against *A. catalaunalis* under artificial pest load condition in net house

S. No.	Entry	Per cent plant infestation	Per cent flower damage	Per cent capsule damage	Total damage	Reaction
1.	GRT-83148	7.41	12.07	9.44	28.92	MS
2.	EC-303445	18.57	12.94	8.15	39.66	S
3.	Kanpur local	34.48	12.87	10.63	57.98	HS
4.	KMR-77	19.63	10.21	3.63	33.47	S
5.	SI-2116	8.25	11.74	6.94	26.93	MS
6.	B-7-11	7.02	9.08	7.32	23.42	MS
7.	SI-2008	19.16	14.28	8.63	42.07	S
8.	SI-7192	21.05	11.94	12.95	45.94	S
9.	IC-14093	24.48	16.45	13.13	54.06	HS
10.	SI-3218	27.43	12.88	16.36	56.67	HS
11.	VRI 1 (LC)	21.52	19.16	10.84	51.52	HS
12.	TC-25	39.57	23.10	15.64	78.31	HS
13.	SI-250	20.72	12.62	6.98	40.31	S

Table.2.Feeding preference studies in promising lines of sesame against Antigastra

S.No.	Entries	Feeding Preference	
		No. 3rd instar of larvae released (per replication)	% Leaf damage
1.	SI-2008	10	13.36(21.42)
2.	B-7-11	10	4.80(12.64)
3.	Kanpur local	10	13.48(21.54)
4.	SI-2116	10	5.96(14.13)
5.	KMR-77	10	11.34(19.68)
6.	EC-303445	10	15.66(23.32)
7.	GRT-83148	10	6.30(14.54)
8.	SI-7192	10	7.40(15.78)
9.	IC-14093	10	14.20(22.13)
10.	SI-3218	10	16.46(23.94)
11.	VRI 1 (LC)	10	13.48(21.54)
12.	TC-25(SC)	10	11.80(20.09)

13.	SI-250 RC)	10	17.56(23.32)
SEd			1.81
CD (0.05%)			3.80
CV			7.52

Fig .1. Screening of promising entries against *A. catalaunalis*under artificial pest load condition