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Evaluation of sesame genotypes for their relative resistance against leaf webber and capsule borer, *Antigastra catalaunalis* Duponchel (Crambidae: Lepidoptera)

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Abstract
Investigation on evaluation of sesame genotypes for their relative resistance against leaf webber and capsule borer, *Antigastra catalaunalis* (Crambidae: Lepidoptera) was conducted at RARS, Jagtial during *summer*, 2020. A total of 68 sesame genotypes including TKG-22 (resistance check) and Swetha thil (susceptible check) were evaluated for their relative resistance/susceptibility. The intensity of leaf damage at 30 DAS is ranged from 5.00% (FFAT-10-5) to 25.00% (FFAT-142) whereas the mean leaf damage, 2.20% and 22.00% was found in resistant (TKG 22) and susceptible checks (Swetha thil), respectively. The mean percent flower damage at 50 DAS was recorded between 5.50% (JCS 3886 and JCS 4120) to 22.50% (FFAT-142 and JCS-3899) as against 4.50% and 19.00% in resistant (TKG-22) and susceptible (Swetha thil) checks respectively. The average percent capsule damage at 70 DAS is ranged from 2.75% (SI-225) to 9.00% (JCS 3603, JCS 3596 and JCS 4096) whereas, the mean capsule damage of 3.00% and 9.50% was recorded in resistant (TKG-22) and susceptible (Swetha thil) checks respectively. The sesame genotypes were categorized as highly resistant (HR), resistant (R), moderately resistant (MR), susceptible (S) and highly susceptible (HS) based on the cumulative score (0-9) and grade (1-9) of the individual genotype. Among 68 genotypes a total of 10 genotypes *viz.*, IC-14120-1, SI-225, Jagtiala til-1, JCS 3980, JCS 3981, JCS 4053, JCS 3886, JCS 4120, YLM 11 and YLM 66 were showed less susceptibility to *A. catalaunalis*. These germplasm lines might be exploited in hybridization programme for development of the resistant cultivars.

Keywords: sesame, leaf webber and capsule borer, resistance, hybridization

Introduction
Sesame crop is ravaged by 29 insect pests which belong to defoliators, borers and sucking pest complex which dwindling the yield. Among them, leaf webber and capsule borer, *Antigastra catalaunalis* (Duponchel) (Crambidae: Lepidoptera) attacking the crop right from seedling stage till maturity of capsule [7]. The pest infestation is high at capsule formation stage which intern causes seed yield loss up to 90% [1]. In order to subdue the intensity of damage, farmers primarily rely on synthetic insecticides which had led to several problems *viz.*, destruction of natural enemies, development of resistance in different pests, insecticide residues, resurgence of major insect pests and environmental disharmony [11]. Development of the resistant cultivars is one of the ecofriendly approach to mitigate the yield loss caused by this pest. Keeping in this view, the present investigation was undertaken to evaluate the sesame germplasm lines for their relative resistance against *A. catalaunalis*. The resistant lines would be exploited as donars in hybridization programme to develop resistant cultivars.

Materials and Methods
A total of 68 sesame genotypes including TKG-22 (national resistant check) and Swetha thil (Local susceptible check) were screened for their relative resistance/susceptibility against leaf webber and capsule borer, *A. catalaunalis* in natural field conditions during *summer*, 2020. The experiment laid at Regional Agricultural Research Station, Jagtial. The germplasm lines sown in two replications with a spacing of 30 X 15 cm between rows and plants, respectively. In each genotype, 10 plants selected for recording percent leaf (30 DAS), flower (50 DAS) and capsule damage (70 DAS) caused by *A. catalaunalis*.

The resistance reaction of germplasm lines classified into Highly Resistant (HR), Resistant (R), Moderately Resistant (MR), Susceptible (S) and Highly Susceptible (HS) based on the cumulative score (0-9) and grades (1-9) [10, 11]. The percent leaf/flower/capsule damage was calculated using the following formula

$$\text{Percent leaf/flower/capsule damage (\%)} = \frac{\text{No. of leaf/flower/capsule damaged}}{\text{Total no. of leaf/flower/capsules/plant}} \times 100$$

Table 1: Scoring methodology for evaluation of sesame genotypes against *A. catalaunalis.*

Per cent damage			
Leaf (A)	**Flower bud (B)**	**Pod (C)**	**Cumulative score (A+B+C)/3**
0-10	0-5	0-2	1
10-20	5-10	2-4	3
20-30	10-15	4-6	5
30-40	15-20	6-8	7
>40	>29	>8	9

Table 2: Grading method for evaluation of sesame genotype against *A. catalaunalis.*

Cumulative score	Grade	Degree of resistance
0-1	1	Highly resistant(HR)
1.1-2	3	Resistant (R)
2.1-3	5	Moderately resistant (MR)
3.1-5	7	Susceptible (S)
5.1-9	9	Highly Susceptible (HS)

Results and Discussion

In the present investigation, a total of 68 sesame genotypes including TKG-22 (resistance check) and Swetha thil (susceptible check) were evaluated for their relative resistance/susceptibility against leaf webber and capsule borer, *A. catalaunalis* in field conditions during *summer*, 2020. The intensity of damage assessed on different plant parts at various stages. The infestation of *A. catalaunalis* was observed from early vegetative
(30 DAS), flowering (50 DAS) and capsule formation stages (70 DAS). It is found that none of the genotypes were free from the infestation by *A. catalaunalis*. This finding was in conformity with the study made by [4, 5, 11] who also reported that incidence of *A. catalaunalis* from early vegetative stage to capsule maturation stage.

The intensity of leaf damage at 30 DAS is ranged from 5.00% (FFAT-10-5) to 25.00% (FFAT-142) whereas the mean leaf damage, 2.20% and 22.00% was found in resistant (TKG 22) and susceptible checks (Swetha thil) respectively (Plate 1and Table 3). The mean percent flower damage at 50 DAS was recorded between 5.50% (JCS 3886 and JCS 4120) to 22.50% (FFAT-142 and JCS-3899) as against 4.50% and 19.00% in resistant (TKG-22) and susceptible (Swetha thil) checks, respectively. The average percent capsule damage at 70 DAS is ranged from 2.75% (SI-225) to 9.00% (JCS 3603, JCS 3596 and JCS 4096) whereas, the mean capsule damage of 3.00% and 9.50% was recorded in resistant (TKG-22) and susceptible (Swetha thil) checks respectively [7] reported that the percent capsule damage ranged from 6.16 to 21.82% (Table 3). This variation might be due to difference in the damage potential, pest pressure and high temperatures and relative humidity which hinder the development of this pest during the present investigation.

The sesame genotypes were categorized as highly resistant (HR), resistant (R), moderately resistant (MR), susceptible (S) and highly susceptible (HS) based on the cumulative score (0-9) and grade (1-9) of the individual genotype. Among 68 genotypes evaluated for their relative resistance, none of the germplasm was categorized as highly resistant (HR). It was found that only the resistant check (TKG 22) was classified under Resistant (R) category with average leaf damage (2.20%), flower damage (4.50%) and capsule damage of 3.00% along with the cumulative score of 1.67. A total of 10 genotypes *viz.*, IC-14120-1, SI-225, Jagtiala Til-1, JCS 3980, JCS 3981, JCS 4053, JCS 3886, JCS 4120, YLM 11 and YLM 66 were categorized under moderately resistant (MR) with 5.50-10.25%, 5.50%-9.85% and 2.75-5.50% of leaf, flower and capsule damage respectively along with the lowest cumulative score of 2.33. Thirty five (35) genotypes were classified under susceptible (S) category with leaf, flower and capsule damage of 5.00-20.00%, 7.00-16.63% and 4.50-9.00% respectively along with the lowest cumulative score of 3.67. A total of 22 sesame germplasm lines were classified under highly susceptible (HS) category with 10.50-25.00%, 13.50-22.50% and 4.50-9.50% leaf, flower and capsule damage respectively along with the lowest cumulative score of 5.67 (Table 3 and 4).

These results are in conformity with the findings of [4,6] reported that none of the accession was categorized under highly resistant/immune to *A. catalaunalis*, but the results are contradicted by the findings of [8, 11] who found that two genotypes *(*OS-15 and OS-5) and five genotypes (IVT 9, IVT 15, IVT 5-1, AVT 8 and Kanakapura) respectively were tolerant to *A. catalaunalis* and also [2] rated IVTS-2001-20, IVTS2001-23, IVTS-2001-24, IVTS-2001-25 and IVTS-2001-26 as highly resistant to *A. catalaunalis.* This might be due to the variation in the grading pattern, damage potential, pest pressure, different environmental conditions across the locations. In the present investigation 35 and 22 genotypes were classified under susceptible and highly susceptible category respectively. Similar results are found with [6, 9, 3] who reported that more than 50% of the genotypes showed susceptibility to *A. catalaunalis*. The variation in the relative resistance/susceptibility across the locations is attributed to seasonal variation for the pest growth and development, differential pest pressure and antibiosis reaction of the genotypes. Among 68 genotypes a total of 10 genotypes *viz.*, IC-14120-1, SI-225, Jagtiala til-1, JCS 3980, JCS 3981, JCS 4053, JCS 3886, JCS 4120, YLM 11 and YLM 66 were showed less susceptibility to *A. catalaunalis*. These germplasm lines might be exploited in hybridization programme for development of the resistant cultivars.

Table 3: Resistance reaction of sesame genotypes against leaf webber and capsule borer, *Antigastra catalaunalis* during *summer*, 2020

S. No.	Genotype	Per cent leaf damage at 30 DAS*	Score	Per cent flower damage at 50 DAS*	Score	Per cent capsule damage at 70 DAS*	Score	Cumulative Score	Grade	Reaction
1.	FFAT -147	13.00	3	13.38	5	4.50	5	4.33	7	Susceptible (S)
2.	IC-131546	20.00	3	16.63	7	5.00	5	5.00	7	Susceptible (S)
3.	IC-14120-I	9.00	1	9.85	3	3.25	3	2.33	5	Moderately Resistant (MR)
4.	FFAT -141	15.00	3	10.00	3	5.50	5	3.67	7	Susceptible (S)
5.	FFAT -140	15.00	3	12.50	5	7.00	7	5.00	7	Susceptible (S)
6.	IS -113-A	6.50	1	7.25	3	7.25	7	3.67	7	Susceptible (S)
7.	FFAT-135	16.50	3	12.75	5	7.75	7	5.00	7	Susceptible (S)
8.	SI -225	6.50	1	6.00	3	2.75	3	2.33	5	Moderately Resistant (MR)
9.	Chandana	22.00	5	19.25	7	8.50	9	7.00	9	Highly susceptible (HS)
10.	FFAT-148	18.50	3	21.50	9	7.00	7	6.33	9	Highly susceptible (HS)
11.	FFAT -146	13.00	3	16.75	7	7.00	7	5.67	9	Highly susceptible (HS)
12.	IC-14146-C	17.00	3	15.00	5	5.75	5	4.33	7	Susceptible (S)
13.	FFAT-142	25.00	5	22.50	9	4.50	5	6.33	9	Highly susceptible
14.	FFAT-10-5	5.00	1	8.25	3	4.50	5	3.00	7	Susceptible (S)
15.	IC-131485	14.50	3	17.00	7	8.50	9	6.33	9	Highly susceptible (HS)
16.	Jagtiala Til -1	10.00	1	9.55	3	3.50	3	2.33	5	Moderately Resistant (MR)
17.	JCS 3180	9.30	1	11.00	5	4.75	5	3.67	7	Susceptible (S)
18.	JCS 3880	20.00	3	18.50	7	7.00	7	5.67	9	Highly susceptible (HS)
19.	JCS 3899	18.50	3	22.50	9	8.50	9	7.00	9	Highly susceptible (HS)
20.	JCS 2454	10.75	3	13.00	5	4.50	5	4.33	7	Susceptible (S)
21.	JCS 3265	13.50	3	15.00	5	5.00	5	4.33	7	Susceptible (S)
22.	JCS 3887	11.50	3	12.50	5	5.00	5	4.33	7	Susceptible (S)
23.	JCS 3980	6.00	1	8.50	3	4.00	3	2.33	5	Moderately Resistant (MR)
24.	JCS 3981	10.25	3	7.00	3	3.75	3	3.00	5	Moderately Resistant (MR)
25.	JCS 3889	9.50	1	10.50	5	5.00	5	3.67	7	Susceptible (S)
26.	JCS 2420	12.25	3	9.50	3	7.00	7	4.33	7	Susceptible (S)
27.	JCS 3758	14.25	3	13.50	5	7.50	7	5.00	7	Susceptible (S)
28.	JCS 2611	9.00	1	7.00	3	8.50	9	4.33	7	Susceptible (S)
29.	JCS 3596	10.50	3	13.75	5	9.00	9	5.67	9	Highly susceptible (HS)
30.	JCS 3202	12.25	3	13.50	5	8.25	9	5.67	9	Highly susceptible (HS)
31.	JCS 4001	22.50	5	16.50	7	8.50	9	7.00	9	Highly susceptible (HS)
32.	JCS 3603	9.50	1	8.50	3	9.00	9	4.33	7	Susceptible (S)
33.	JCS 3890	11.00	3	14.50	5	8.50	9	5.67	9	Highly susceptible (HS)
34.	JCS 4049	15.25	3	11.50	5	5.50	5	4.33	7	Susceptible (S)
35.	JCS 3122	17.50	3	10.00	3	5.00	5	3.67	7	Susceptible (S)
36.	JCS 4036	14.75	3	12.50	5	5.50	5	4.33	7	Susceptible (S)
37.	JCS 3997	14.25	3	13.50	5	5.75	5	4.33	7	Susceptible (S)
38.	JCS 3287	14.25	3	13.00	5	5.00	5	4.33	7	Susceptible (S)
39.	JCS 3985	18.00	3	20.25	9	7.50	7	6.33	9	Highly susceptible (HS)
40.	JCS 3976	22.50	5	17.50	7	7.00	7	6.33	9	Highly susceptible (HS)
41.	JCS 3987	20.50	5	20.00	7	8.00	7	6.33	9	Highly susceptible
42.	JCS 3999	15.00	3	12.50	5	5.00	5	4.33	7	Susceptible (S)
43.	JCS 4053	8.00	1	7.00	3	5.50	5	3.00	5	Moderately Resistant (MR)
44.	JCS 3879	13.50	3	13.50	5	7.75	7	5.00	7	Susceptible (S)
45.	JCS 3886	7.75	1	5.50	3	5.50	5	3.00	5	Moderately Resistant (MR)
46.	JCS 4045	10.75	3	9.50	3	7.75	7	4.33	7	Susceptible (S)
47.	JCS 4057	8.25	1	13.50	5	8.50	9	5.00	7	Susceptible (S)
48.	JCS 4104	9.50	1	13.75	5	8.50	9	5.00	7	Susceptible (S)
49.	JCS 4096	16.00	3	13.50	5	9.00	9	5.67	9	Highly susceptible (HS)
50.	JCS 4105	15.60	3	17.50	7	8.75	9	6.33	9	Highly susceptible (HS)
51.	JCS 4120	7.45	1	5.50	3	5.00	5	3.00	5	Moderately Resistant (MR)
52.	JCS 4151	14.00	3	17.00	7	8.50	9	6.33	9	Highly susceptible (HS)
53.	JCS 4113	12.75	3	15.00	5	8.25	9	5.67	9	Highly susceptible (HS)
54.	JCS 4115	12.50	3	13.50	5	8.00	7	5.00	7	Susceptible (S)
55.	JCS 4154	16.75	3	18.50	7	8.50	9	6.33	9	Highly susceptible (HS)
56.	DS-28	12.50	3	14.00	5	5.50	5	4.33	7	Susceptible (S)
57.	DS-10	13.50	3	17.00	7	8.25	9	6.33	9	Highly susceptible (HS)
58.	DS-21	14.00	3	15.50	7	7.50	7	5.67	9	Highly susceptible (HS)
59.	JCS 3593	12.40	3	9.50	3	7.50	7	4.33	7	Susceptible (S)
60.	JCS 3762	11.00	3	7.00	3	5.75	5	3.67	7	Susceptible (S)
61.	GT 10	10.65	3	10.75	5	6.50	7	5.00	7	Susceptible (S)
62.	JCS 3599	15.50	3	11.50	5	8.00	7	5.00	7	Susceptible (S)
63.	Rajeshwari	16.50	3	12.50	5	7.50	7	5.00	7	Susceptible (S)
64.	YLM 17	8.50	1	7.50	3	6.00	7	3.67	7	Susceptible (S)

65.	YLM 11	8.25	1	7.00	3	5.50	5	3.00	5	Moderately Resistant (MR)
66.	YLM 66	5.50	1	8.50	3	5.00	5	3.00	5	Moderately Resistant (MR)
67.	Swetha thil (Check)	22.00	5	19.00	7	9.50	9	7.00	9	Highly susceptible (HS)
68.	TKG 22 (Check)	2.20	1	4.50	1	3.00	3	1.67	3	Resistant (R)

*Mean of two replications

Table 4: Classification of sesame genotypes based on cumulative score of damage caused by *Antigastra catalaunalis*

S. No.	Reaction/ Response	Cumulative score	Grade	No. of genotypes	Genotypes
1.	Highly Resistant (HR)	0-1.0	1	-	-
2.	Resistant (R)	1.1-2.0	3	1	TKG 22
3.	Moderately Resistant (MR)	2.1-3.0	5	10	IC-14120-I, SI -225, Jagtiala Til-1, JCS 3980, JCS 3981, JCS 4053, JCS 3886, JCS 4120,YLM 11, YLM 66.
4.	Susceptible (S)	3.1-5.0	7	35	FFAT -147, IC-131546, FFAT -141, FFAT-140, IS -113-A, FFAT-135, IC-14146-C, FFAT-10-5, JCS 3287, JCS 3265, JCS 3887, JCS 2454 JCS 3889, JCS 2420, JCS 3758, JCS 2611, JCS 3603, JCS 4049, JCS 3122, JCS 4036, JCS 3997, JCS 3999, JCS 3879, JCS 4045, JCS 4057, JCS 4104, JCS 4115, DS-28, JCS 3593, JCS 3180, JCS 3762, GT 10, YLM 17, JCS 3599and Rajeshwari.
5.	Highly susceptible (HS)	5.1-9.0	9	22	FFAT-148, FFAT -146, FFAT-142, IC-131485, JCS 3880, JCS 3899, JCS 3596, JCS 3202, JCS 4001, JCS 3890, JCS 3985, JCS 3976, JCS 3987, JCS 4096, JCS 4105, JCS 4151, JCS 4113, JCS 4154, DS-1O, DS-21, Chandana and Swetha thil

Plate 1: Damage symptoms caused by *A. catalaunalis* at vegetative stage

Conclusion

Among 68 genotypes screened for their relative resistance/susceptibility against *A. catalaunalis*, TKG-22 was found resistant to *A. catalaunalis*. A total of 10 genotypes *viz.*, IC-14120-I, SI-225, Jagtiala Til-1, JCS-3983, JCS -3981, JCS-4053, JCS-3886, JCS-4120, YLM-11 and YLM-66 genotypes were found moderately resistant. These resistant genotypes identified during the experimental period can be used as donors in resistance breeding through back cross programme for development of resistant cultivars.

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References

1. Ahuja DB, Kalyan RK. Losses in seed yield due to insect pests in different varieties of sesame, *Sesamum indicum* L. Annals of Plant and Soil Research 2002;4(1):99-103.
2. Anandh VG, Selvanarayanan V. Reaction of sesame germplasm against shoot webber *Antigastra catalaunalis* Duponchel and phyllody. Indian Journal of Plant Protection 2005;33(1):35-38.
3. Balaji K, Selvanarayanan V. Evaluation of resistance in sesame germplasm against shoot webber and capsule borer. Indian Journal of Plant Protection 2009;37(12):35-38.
4. Karuppaiah V, Nadarajan L. Evaluation of sesame genotypes for resistance to leaf roller and capsule borer, *Antigastra catalaunalis* duponchel (Pyraustidae: Lepidoptera). Phytopathology and plant protection 2011;44(9):882-887.
5. Kumar K, Shamshad A, Lal MN, Kumar K. Field screening of sesame germplasm against leaf webber and capsule borer, *Antigastra catalaunalis* (Dup.). Indian journal of entomology 2010;72(2):104-106.
6. Makwana M, Panday AK, Kuldeep S, Prince M. Evaluation of sesame genotypes against leaf webber and capsule borer *Antigastra catalaunalis* (Dup.). Indian journal of Entomology 2020;82(24):819-822.
7. Mishra M, Thakur SR, Gupta MP, Yogranjan. Field screening of sesame accessions against leaf roller and capsule borer, *Antigastra catalaunalis Dup.* Indian

journal of plant genetic resources 2016;29(1):8-10.
8. Pandy AK, Bisen R, Panse R, Ranganatha ARG. Screening of different germplasm lines of sesame against capsule borer (*Antigastra catalaunalis*). Journal of environment empowerment and economics 2014;1(1):25-28.
9. Patil SK, Dharne PK, Shambharka DA. Response of different promising genotypes of sesame to major insect pests and leaf spot disease. Sesame and Safflower Newsletter 2001;16:72-74.
10. Shrivastava N, Duhoon SS, Jharia HK, Singh BR. Screening of sesame germplasm for resistance against leaf roller and capsule borer (*Antigastra catalaunalis* Dup.). Indian Journal of Plant Genetic Resources 2001;14:203.
11. Sridhar PR, Gopalan M. Studies on screening and mechanism of resistance against the shoot webber, *Antigastra catalaunalis* (Duponchel). Entomol 2002;27(4):365-373.
12. Vijaykumar L, Jyothi J, Madhusudan K, Shivanna B. New source of resistance against sesame leaf webber and capsule borer, *Antigastra catalaunalis* Dupounchel (Pyraustidae: Lepidoptera). Journal of Entomology and Zoology Studies 2018;6(1):942-946.