

Screening of various sesame genotypes against leaf webber and capsule borer, *Antigastra catalaunalis* Dup.

Abstract

A study was conducted at experimental farm of PC Unit, Sesame and Niger, College of Agriculture, JNKVV, Jabalpur, Madhya Pradesh, during *Kharif* 2021. Seventy five genotypes including resistance and susceptible checks were screened against leaf webber and capsule borer (*Antigastra catalaunalis* Dup.) under field conditions (natural infestation). The observations were recorded at different phonological stages *viz.*, vegetative, flowering and capsule stage of the plant growth. Based on per cent damages at different phonological stages of plant growth, the entries were categorized in to different resistance categories. None of the screened genotypes were found free from infestation. At vegetative and flowering stage thirteen genotypes were found resistant showing plant damage less than 10 per cent, however, at capsule maturity stage nineteen genotypes were found resistant showing capsule damage less than 5 per cent. On the basis of overall performance (mean damage) at all the three stages of plant growth the entries *viz.*, S-0644 (7.48 per cent), TKG-306 (7.48 per cent), VCR/81/NO/80/NS/972 (7.63 per cent), IC-1025-A (7.64 per cent), SI- 250 RC (7.67 per cent), NIC-8473 (7.67 per cent), BM-59, (7.69 per cent), NIC-8224-A (7.78 per cent), 75-120 (7.80 per cent), S-0351 (7.82 per cent) and NIC-8368 (7.88 per cent) were found promising against leaf webber and capsule borer and utilized in the resistance breeding programme.

Keywords: *Antigastra catalaunalis*, genotypes screening, damage and healthy plant

Introduction

Sesame (*Sesamum indicum* Linnaeus) is a significant oilseed crop, renowned for its high oil content and adaptability to tropical and subtropical climates. India, being one of the major producers of sesame, plays a crucial role in its global production and export. The versatility of sesame extends beyond its nutritional value. Its oil is not only utilized in cooking but also finds applications in Ayurvedic medicine and various industries such as cosmetics, pharmaceuticals, and even insecticides [10,11,12,13]. Sesame is highly nutritive (oil 50% and protein 25%) and its high contents of antioxidants such as sesamin, sesamol and sesamolol and its fatty acid composition Suja *et al.*, (2004). However, the cultivation of sesame faces challenges, particularly from insect pests like, whitefly, leafhopper, mired bug

etc. the sesame leaf webber and capsule borer (*Antigastra catalaunalis*; Crambidae). These pests can significantly reduce yields by damaging foliage, flowers and capsule. The larvae of *A. catalaunalis* can cause significant damage throughout the growth stages of the crop. They feed on tender foliage by webbing the top leaves which hinder photosynthesis and nutrient absorption, leading to reduced plant vigor. During flowering and pod formation stage they bore into the flowers and pods and feeds on floral contents and developing seeds. Efforts to mitigate pest damage are crucial for realizing the full potential of sesame cultivation in India. Despite these challenges, the growing demand for edible oils, coupled with sesame's potential as an export crop, presents a promising opportunity for farmers. With effective pest management strategies and support, farmers can enhance productivity and capitalize on the market demand for sesame products.

Material and methods

The experiment was conducted at the Experimental farm ICAR-Project Coordinating Unit Sesame and Niger, College of Agriculture, Jawaharlal Nehru Krishi Vishwa Vidyalaya, Jabalpur (Madhya Pradesh) during the *Kharif* season of 2021 aimed to evaluate 75 different genotypes of sesame against *Antigastra catalaunalis*. Jabalpur, situated in the agro-climatic zone of Kymore Plateau and Satpura Hills, has specific geographical coordinates and altitude that influence its agricultural characteristics. Sesame seeds were sown in rows of three-meter length, replicated thrice using a randomized block design. The spacing between rows was maintained at 30 cm, while the distance between individual plants within a row was kept at 10 cm. This arrangement allowed for systematic observation and assessment of each genotype's performance. To monitor the infestation of insect pests, particularly the larval populations of the leaf webber and capsule borer, weekly observations were conducted starting from one week after germination and continuing until crop maturity. Larval populations were recorded from five randomly selected plants representing each genotype. This rigorous monitoring process provides valuable data on the susceptibility of different genotypes to pest infestations and helps in identifying potentially resistant varieties/donor. Overall, this experiment provides valuable insights for evaluation of different sesame genotypes against *Antigastra catalaunalis*, providing resistance donor for the development of improved cultivars for sustainable sesame cultivation.

Results and discussion

Seventy five genotypes of sesame including resistant (SI-250) and susceptible checks (TC-25) were screened against leaf webber and capsule borer during *Kharif* 2021. Observations were recorded at different phonological stages of plant growth viz., vegetative, flowering and capsule maturity stage. The results in Table 1 revealed that all the screened entries were differed significantly from each other with respect to per cent plant, flower and capsule damage caused by *Antigastra catalaunalis*. Per cent plant damages were recorded at vegetative stage (30 DAS) and it was varied from 7.67 to 43.52%. Among the screened entries the lowest per cent plant damage (7.67%) was recorded from the treatment T₆₈ -SI-250 followed by treatment T₆₇ - VCR/81/NO/80/NS/972 (8.56%) and T₆₃ - SI-1004-B (8.57%) however the highest per cent plant damage (43.52%) was observed in the treatment T₇₅ -Prachi followed by T₁₅ - IC-204200 (42.49%) and T₆ -EC-334981-A (42.48%). Present findings are in conformity with the findings of Panday *et al.*, (2021) they tested the feeding preference studies of leaf webber and capsule borer against different genotypes of sesame and reported that the entries SI-271-B, IS-178-C, MT-67-25 and S-OO-17-B were least preferred by the leaf webber and capsule borer and recorded the lowest leaf area damage. All the screened genotypes were grouped in to different categories based on per cent plant damage (Table-2). None of the screened genotypes were found free from infestation. Thirteen genotypes viz., SI-250, BM-59, S-0351, NIC-8473, NIC-8368, VCR/81/NO/80/NS/972, IC-1025-A, 75-120 NIC-B-240-A, S-0644, TKG-306, NIC-8224-A, KMR-53 were found resistant and showing plant damage less than 10 per cent. The moderately resistant category includes thirty two genotypes showing *Antigastra* damage in the range of 10 -20 per cent. Twenty three genotypes were found moderately susceptible and showing plant damage in the range of 21-30 per cent and seven genotypes viz., SI-3100, JTS-8, S-0271, EC-334981-A, TC-25, ES-334974 and Prachi were categorized as susceptible, showing infestation in the range of 31-50 per cent. Present findings are corroborated with the findings of Makawana *et al.*, (2020) where they screened the genotypes based on per cent plant, flower and capsule damage. During vegetative stage (30 DAS), eight genotypes viz., EC-334990, SP-1144, ES-62, SI-2192, IS-446-1-64, ES-335005, SI-250 and IS-178-C were found resistant showing plant damage <10%.

Flower damage was recorded at 45 days after sowing which varied from 8.33 to 43.33%. Among the screened genotypes the lowest flower damage (8.33%) was received from the treatment T₆₈ - SI-250 followed by T₇₃ -TKG-306 (8.63%) and T₂ - BM-59 (8.90%) while the highest flower damage (43.33%) was noted in T₇₅ -Prachi followed by T₈ - ES-

334974 (42.10%) and T₆₉ - TC-25 SC (40.00%). Among the treatments, the treatments viz., T₆₈ -SI-250, T₇₃ -TKG-306, T₂ - BM-59, T₄₈ - NIC-8224-A, T₅₀ - NIC-B-240-A, T₁- 75-120, T₅₉ - S-0644, T₁₃ - IC-1025-A, T₅₇ - S-0351, T₃₈ - NIC-8368 and T₆₇ - VCR/81/NO/80/NS/972 were found at par to each other with respect to the lowest per cent flower damage. The sesame genotypes were grouped in to different categories based on per cent flower damage (Table-3). Twelve genotypes viz., SI- 250, BM-59,S-0351,NIC-8473, NIC-8368,VCR/81/NO/80/NS/972, IC-1025-A, 75-120 NIC-B-240-A,S-0644, TKG-306, NIC-8224-A, KMR-53 were found resistant showing flower damage less than 10 per cent. The moderately resistant category includes thirty two genotypes showing *Antigastra* damage in the range of 10 to 20 per cent. Twenty three genotypes were found moderately susceptible and showing flower damage in the range of 21 to 30 per cent and seven genotypes i.e.SI-3100, JTS-8, S-0271, EC-334981-A, TC-25, ES-334974 and Prachi were categorized as susceptible. Our findings are supported by the findings from the experiment conducted by Panday *et al.*, (2021) where tested different genotypes of sesame against *Antigastra catalaunalis* both under natural (field condition) and artificial pest load conditions. Under artificial pest load condition the entries viz., SI-271-B, NIC-9839 and MT-67-25 showed the lowest damage whereas under natural condition, the entries IS-178-C and SP-3267 were superior to others with respect to the lowest damage.

Capsule damage was recorded at 70 days after sowing and it varied from 4.00 to 23.45%. Among the screened genotypes the lowest capsule damage (4.00%) was observed from the treatment T₆₈ - SI- 250 followed by T₄₀ - NIC-8473 (4.10%) and T₅₉ - S-0644 (4.28%) however the highest capsule damage (23.45%) was recorded from the treatments T₆ - EC-334981-A followed by T₇₅-Prachi (23.25) and T₈ - ES-334974 (21.33). Present findings are supported by the findings of Panday *et al.*, (2021) they tested 197 entries of sesame at three diverse climatic locations of India viz., Jabalpur, Mandor and Vriddhachalam, against leaf webber and capsule. None of the screened entry was found to be free from infestation by leaf webber and capsule borer. Capsule damage over the locations varied from 3.33 to 15.43%. Among the screened entries, the entries SI-0018-B (3.33%), MT-67-25 (3.65%) and RJS- 56-A (3.80%) were recorded the lowest capsule damage.

The sesame genotypes were grouped in to different categories based on per cent capsule damage (Table - 4). None of the screened genotypes were found free from infestation. Nineteen genotypes viz., SI- 250, NIC-8368, NIC-8473, S-0644,75-120, IS-265-B , NIC-B-240-A, SI-1004-B, S-0351, SI-3315-6-1, BM-59, IS-3051, TKG-306 ,NIC-

8224-A, IC-1025-A, RJS-147-1-84-B, KMR-53, VCR/81/NO/80/NS/972, ES-47 were found resistant showing capsule damage in the range less than 5 per cent. Twenty five genotypes were found moderately resistant showing capsule damage in the range 5 to 10 per cent. The Moderately susceptible category includes twenty one genotypes showing *Antigastra* damage in the range of 11 to 15 per cent. Ten genotypes were found susceptible and showing capsule damage in the range of 16 to 25 per cent. Present findings are in conformity with the findings of Choudhary *et al.*, (2018) where screened 15 varieties of sesame against *A. catalaunalis* and ranked under different categories, RT-358 (4.63), RT-370 (4.38) and RT-371 (4.18) were ranked as least susceptible, while, LT8 (7.93), TC-25 (6.78) and RT-46 (7.88) as highly susceptible.

On the basis of overall performance (mean damage) at all the three stages of plant growth the entries viz., T₅₉ - S-0644 (7.48%), T₇₃ -TKG-306 (7.48%), T₆₇ - VCR/81/NO/80/NS/972 (7.63%), T₁₃ - IC-1025-A (7.64%), T₆₈ - SI- 250 RC (7.67%), T₄₀ - NIC-8473 (7.67%) T₂ - BM-59, (7.69), T₄₈ - NIC-8224-A (7.78%), T₁- 75-120 (7.80%), T₅₇ - S-0351 (7.82%) and T₃₈ - NIC-8368 (7.88%) were found promising against leaf webber and capsule borer and can be utilized in the resistance breeding programme after confirmation of resistance under artificial pest load condition. Present findings are corroborated with the findings of Makawana *et al.*, (2020) they also screened the genotypes based on per cent plant, flower and capsule damage that were observed to be from 7.94 to 54.43%, 8.67 to 45.45% and 7.73 to 32.15% respectively. On the basis of overall performance (damage) at different stages of plant growth the genotypes viz., SI-250 (8.11%), IS-178-C (8.75%) and ES-335005 (9.97%) were found promising. The present findings are also in conformity with the results of Baskaran *et al.* ,(1994), Ahuja and Kalyan (2001), Manisegaran *et al.*, (2001) and Singh (2002). They reported that the genotypes KMR-14 and TKG-22 were moderately resistant against *A. catalaunalis*.

Conclusion

Among the screened genotypes the lowest per cent plant (7.67%), flower (8.33%) and capsule damage (4.00%) was recorded from the genotype SI-250 however the highest plant (43.52%) flower (43.33%) and capsule damage (23.45%) was recorded from the genotype Prachi. At vegetative stage the entries VCR/81/NO/80/NS/972 (8.56%) and SI-1004-B (8.57%) at flowering stage the genotypes TKG-306 (8.63%) and BM-59 (8.90%) and at capsule stage the entries NIC-8473 (4.10%) and S-0644 (4.28%) were found promising against leaf webber and capsule borer. On the basis of overall performance (mean damage) at all the three stages of plant growths the entries viz., T₅₉ - S-0644 (7.48%), T₇₃ -TKG-306

(7.48%) and T₆₇ - VCR/81/NO/80/NS/972 (7.63%) were found promising against leaf webber and capsule borer.

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Table 1: Damage due to leaf webber and capsule borer at different phonological stages of plant growth

S. No.	Genotypes	Per cent damages due to leaf webber and capsule borer at different phonological stages of plant growth			
		Plant damage (30 DAS)	Flower damage (45 DAS)	Capsule damage (70 DAS)	Mean damage
1.	T ₁ -75-120	9.66 (18.11)	9.28 (17.73)	4.46 (12.17)	7.80
2.	T ₂ - BM-59	9.33 (17.78)	8.90 (17.34)	4.83 (12.67)	7.69
3.	T ₃ -EC-303304	12.97 (21.10)	12.37 (20.58)	12.63 (20.81)	12.66
4.	T ₄ -EC-303441-B	12.35 (20.55)	12.67 (20.83)	6.15 (14.36)	10.39
5.	T ₅ - EC-334976	17.33 (24.51)	18.30 (25.33)	9.51 (17.94)	15.05
6.	T ₆ -EC-334981-A	42.48 (40.68)	41.83 (40.30)	23.45 (28.96)	35.92
7.	T ₇ -ES-47	10.83 (19.21)	11.33 (19.67)	5.33 (13.29)	9.16
8.	T ₈ - ES-334974	38.00 (38.06)	42.10 (40.45)	21.33 (27.50)	33.81
9.	T ₉ - ES-52-1-84	17.27 (24.36)	17.33 (24.60)	10.63 (19.02)	15.08
10.	T ₁₀ - GRT-8245	23.60 (29.06)	22.00 (27.97)	12.13 (20.38)	19.24
11.	T ₁₁ - GRT-839-A	17.60 (24.80)	14.00 (21.96)	7.55 (15.94)	13.05
12.	T ₁₂ - GRT-8330-B	19.14 (25.94)	18.27 (25.30)	9.17 (17.61)	15.53
13.	T ₁₃ - IC-1025-A	8.73 (17.17)	9.30 (17.75)	4.88 (12.76)	7.64
14.	T ₁₄ - IC-131943	28.67 (32.37)	23.07 (28.70)	15.22 (22.95)	22.32
15.	T ₁₅ - IC-204200	42.49 (40.68)	29.17 (32.68)	16.21 (23.74)	29.29
16.	T ₁₆ - IC-204550	19.25 (26.02)	21.80 (27.83)	9.63 (18.06)	16.89
17.	T ₁₇ - IC-132186-A	22.33 (28.19)	27.92 (31.89)	14.38 (22.28)	21.54
18.	T ₁₈ - IC-204832-A	28.59 (32.32)	27.33 (31.51)	13.41 (21.48)	23.11
19.	T ₁₉ - IS-245	19.63 (26.30)	18.17 (25.23)	8.63 (17.08)	15.48
20.	T ₂₀ - IS-294	22.11 (28.04)	22.19 (28.10)	11.82 (20.04)	18.71

S. No.	Genotypes	Per cent damages due to leaf webber and capsule borer at different phonological stages of plant growth			
		Plant damage (30 DAS)	Flower damage (45 DAS)	Capsule damage (70 DAS)	Mean damage
21.	T ₂₁ - IS-722-1	28.18 (32.06)	24.07 (29.37)	14.78 (22.60)	22.34
22.	T ₂₂ - IS-1672	22.88 (28.57)	13.33 (21.41)	8.13 (16.57)	14.78
23.	T ₂₃ - IS-3051	12.78 (20.94)	12.69 (20.87)	5.00 (12.88)	10.16
24.	T ₂₄ - IS-3131	12.28 (20.50)	16.67 (24.08)	5.67 (13.76)	11.54
25.	T ₂₅ - IS-265-B	15.52 (23.19)	15.83 (23.42)	4.33 (11.90)	11.89
26.	T ₂₆ -IS-319-B	23.00 (28.65)	21.00 (27.27)	12.83 (20.99)	18.94
27.	T ₂₇ - IS-526-2-84-B	27.60 (31.69)	23.00 (28.64)	11.47 (19.78)	20.69
28.	T ₂₈ - KIS-306	20.30 (28.30)	22.00 (27.97)	14.33 (22.23)	18.88
29.	T ₂₉ - KMR-48-A	25.00 (26.78)	22.00 (27.97)	12.50 (20.69)	19.83
30.	T ₃₀ - KMR-49	29.25 (32.74)	23.50 (28.99)	14.00 (21.97)	22.25
31.	T ₃₁ -KMR-53	9.33 (17.84)	11.00 (19.36)	7.38 (15.75)	9.24
32.	T ₃₂ - KMR- 74	21.00 (27.27)	21.52 (27.63)	14.69 (22.53)	19.07
33.	T ₃₃ - KMR-79-B	14.69 (22.53)	12.30 (20.53)	7.63 (15.99)	11.54
34.	T ₃₄ - KMR-83-A	17.46 (24.69)	12.43 (20.64)	6.33 (14.57)	12.07
35.	T ₃₅ -NAL/78/3041431/2	15.59 (23.26)	18.17 (25.23)	7.23 (15.59)	13.66
36.	T ₃₆ - NIC-7935	15.14 (22.89)	17.67 (24.84)	9.81 (18.25)	14.21
37.	T ₃₇ - NIC-8164	17.37 (24.62)	19.33 (26.07)	6.85 (15.17)	14.52
38.	T ₃₈ - NIC-8368	9.55 (17.99)	9.43 (17.87)	4.65 (12.45)	7.88
39.	T ₃₉ - NIC-8463	29.41 (32.84)	22.40 (28.25)	11.17 (19.51)	20.99
40.	T ₄₀ - NIC-8473	9.80 (18.24)	9.10 (17.55)	4.10 (11.68)	7.67
41.	T ₄₁ - NIC-8502	13.85 (21.85)	14.92 (22.71)	10.83 (19.21)	13.20

S. No.	Genotypes	Per cent damages due to leaf webber and capsule borer at different phonological stages of plant growth			
		Plant damage (30 DAS)	Flower damage (45 DAS)	Capsule damage (70 DAS)	Mean damage
42.	T ₄₂ - NIC-16248	21.33 (27.51)	23.30 (28.86)	13.30 (21.37)	19.31
43.	T ₄₃ - NIC-16256	13.15 (21.26)	11.97 (20.23)	5.30 (13.30)	10.14
44.	T ₄₄ -NIC-17452	12.99 (21.11)	13.22 (21.31)	9.17 (17.61)	11.79
45.	T ₄₅ -NIC-17930	12.48 (20.67)	14.17 (22.11)	6.03 (14.19)	10.89
46.	T ₄₆ - NIC-16227-A	14.33 (22.24)	19.48 (26.19)	6.97 (15.30)	13.59
47.	T ₄₇ - NIC-16387-A	14.97 (22.76)	15.33 (23.05)	5.63 (13.71)	11.98
48.	T ₄₈ - NIC-8224-A	9.67 (18.11)	9.00 (17.44)	4.67 (12.42)	7.78
49.	T ₄₉ - NIC-8423-B	25.16 (30.11)	22.67 (28.42)	14.33 (22.23)	20.72
50.	T ₅₀ - NIC-B-240-A	8.88 (17.34)	9.25 (17.70)	4.33 (12.00)	7.49
51.	T ₅₁ - RJS-146-1-84	19.88 (26.48)	12.17 (20.41)	7.67 (15.99)	13.24
52.	T ₅₂ - RJS-147-1-84-B	17.98 (25.09)	11.67 (19.96)	4.99 (12.91)	11.55
53.	T ₅₃ - S-0271	33.33 (35.26)	31.55 (34.17)	16.17 (23.70)	27.02
54.	T ₅₄ - S-0292	11.14 (19.50)	14.28 (22.20)	7.48 (15.86)	10.97
55.	T ₅₅ - S-0301	18.67 (25.59)	29.97 (33.19)	15.00 (22.78)	21.21
56.	T ₅₆ - S-0314	21.85 (27.87)	27.63 (31.71)	12.67 (20.85)	20.72
57.	T ₅₇ - S-0351	9.66 (18.10)	9.33 (17.78)	4.48 (12.21)	7.82
58.	T ₅₈ - S-0484	27.13 (31.39)	25.60 (30.39)	17.67 (24.85)	23.47
59.	T ₅₉ - S-0644	8.87 (17.31)	9.29 (17.73)	4.28 (11.94)	7.48
60.	T ₆₀ - SI-3257	15.26 (22.99)	15.00 (22.78)	7.33 (15.66)	12.53
61.	T ₆₁ - SI-3274	22.50 (28.31)	23.84 (29.22)	16.29 (23.80)	20.88
62.	T ₆₂ - SI-3100	33.80 (35.55)	34.17 (35.77)	19.19 (25.96)	29.05

S. No.	Genotypes	Per cent damages due to leaf webber and capsule borer at different phonological stages of plant growth			
		Plant damage (30 DAS)	Flower damage (45 DAS)	Capsule damage (70 DAS)	Mean damage
63.	T ₆₃ - SI-1004-B	8.57 (17.01)	11.27 (19.60)	4.33 (11.96)	8.06
64.	T ₆₄ - SI-3315-6-1	9.85 (18.29)	11.17 (19.51)	4.82 (12.68)	8.61
65.	T ₆₅ - SI-7817-B	27.09 (31.36)	23.29 (28.85)	13.80 (21.80)	21.39
66.	T ₆₆ - TC-30	28.16 (32.05)	29.75 (33.05)	15.43 (23.12)	24.45
67.	T ₆₇ - VCR/81/NO/80/NS/972	8.56 (16.98)	9.50 (17.95)	4.83 (12.69)	7.63
68.	T ₆₈ - SI- 250 RC	7.67 (16.05)	8.33 (16.74)	4.00 (11.48)	6.67
69.	T ₆₉ - TC-25 SC	33.97 (35.63)	42.00 (40.40)	20.33 (26.80)	32.10
70.	T ₇₀ - JTS-8	32.49 (34.75)	36.00 (36.87)	16.45 (23.93)	28.31
71.	T ₇₁ -TKG-21	14.52 (22.39)	14.50 (22.37)	7.00 (15.32)	12.01
72.	T ₇₂ -TKG-22	13.00 (21.12)	16.67 (24.08)	8.00 (16.30)	12.56
73.	T ₇₃ -TKG-306	9.26 (17.71)	8.63 (17.08)	4.55 (12.16)	7.48
74.	T ₇₄ - TKG-308	13.44 (21.50)	14.52 (22.39)	8.09 (16.52)	12.02
75.	T ₇₅ -Prachi	43.52 (41.28)	43.33 (41.17)	23.25 (28.82)	36.70
Mean		19.14	18.97	9.94	16.02
SEm±		0.56	0.46	0.59	0.54
CD (p=0.05)		1.56	1.29	1.65	1.50

*Figures within parentheses are arcsine transformed values

Table 2: Classification of genotypes on the basis of per cent plant damage by leaf webber and capsule borer (*A. catalaunalis*).

Sl. No.	Plant damage (%)	Reactions	Number of genotypes	Name of genotypes
1.	No damage	Immune	0	-----
2.	<10	Resistance	16	SI- 250, BM-59, 75-120, S-0644, VCR/81/NO/80/ NS/972, IC-1025-A, SI-1004-B, TKG-306, S-0351, NIC-8473, NIC-8224-A, NIC-B-240-A, SI-3315-6-1,NIC-8368 KMR-53
3.	10-20	Moderately resistance	31	ES-47, TKG-22, EC-303441-BS-0292 ,NIC-17452, IS-3131, TKG-308, NIC-17930,EC-303304 ,NIC-8502, NIC-16387-A, SI-3257,TKG-21,NIC-16227-A, S-0301,NIC-16256, KMR-79-B,IS-265-B, IS-3051 , NAL/78/3041431/2, IS-245, NIC-7935, ES-52-1-84, NIC-8164, EC-334976, RJS-146-1-84 ,KMR-83-A, RJS-147-1-84-B, GRT-839-A, IC-204550, GRT-8330 -B , KIS-306
4.	21-30	Moderately Susceptible	21	KMR- 74,NIC-16248,SI-3274, IS-1672, IS-294, IC-132186-A, IS -319-B, S-0314 ,KMR-48-A , GRT-8245, IS-526-2-84-B, NIC-8423-B ,IS-722-1, S-0484 ,TC-30, SI-7817-B, IC-131943,KMR-49, IC-204832-A, NIC-8463, S-0271
5.	31-50	Susceptible	8	SI-3100, TC-25, JTS-8, ES-,334974, EC-334981-A, IC-204200, , ,Prachi
6.	>50	Highly susceptible	0	-----

Table 3: Classification of genotypes on the basis of per cent flower damage by leaf webber and capsule borer (*A. catalaunalis*).

S. No.	Plant damage (%)	Reactions	Number of genotypes	Name of genotypes
1.	No damage	Immune	0	-----
2.	<10	Resistance	13	SI- 250, BM-59 , S-0351, NIC-8473, NIC-8368,VCR/81/NO/80/NS/972, IC-1025-A, 75-120 NIC-B-240-A,S-0644, TKG-306, , NIC-8224-A,KMR-53
3.	10-20	Moderately resistance	32	SI-1004- B, NIC-16256, KMR-79-B, RJS-146-1-84, SI- 3315-6, ES-47, EC-303441-B,EC-303304,NIC-17452, RJS-147-1-84-B, NIC-17930, S-0292, IS-1672, NIC-8502, TKG-308, IS-3131, GRT-8330-B, TKG-22, NIC-16387-A, IS-3051, KMR-83-A, NIC-16227-A, ES-52-1-84, SI-3257, GRT-839-A,TKG-21,IS-265-B, NAL/78/3041431/2 , IS-245, NIC-8164, EC-334976, NIC-7935
4.	21-30	Moderately Susceptible	23	IS-319-B ,KMR-48-A, IC-131943,IS-204550, GRT-8245 ,IS-294, NIC-8423-B, KIS-306, NIC-8463, IS-526-2-84-B, KMR-74,KMR-49, SI-3274,SI-7817-B, NIC-16248, S-0484, IS-722-1 ,IC-204200,S-0314,IC- 204832-A, IC-132186-A TC-30, S-0301
5.	31-50	susceptible	07	SI-3100, JTS-8, S-0271, EC-334981-A,TC-25, ES-334974, Prachi
6.	>50	Highly susceptible	00	-----

Table 4: Classification of genotypes on the basis of per cent capsule damage by leaf webber and capsule borer (*A. catalaunalis*) at capsule stage.

S. No.	Plant damage (%)	Reactions	Number of Genotypes	Name of genotypes
1.	No damage	Immune	0	-----
2.	<5	Resistance	19	SI- 250, NIC-8368, NIC-8473,S-0644, 75-120, S-0644, IS-265-B, NIC-B-240-A, SI-1004-B,S-0351, SI-3315-6-1, BM-59, IS-3051, TKG-306, NIC-8224-A, IC-1025-A, RJS-147-1-84-B,VCR/81/NO /80/NS/972, ES-47
3.	5-10	Moderately resistance	25	NIC-8164, NIC-16256, NIC-16227-A,IS-3131, SI-3257,TKG-21, NIC-16387-A, KMR-79-B NIC-17930, EC-303441-B , IS-245, S-0292,TKG-22 ,KMR-83-A, NAL/78/3041431/2 ,RJS-146-1-84 , GRT-839-A, TKG-308, GRT-8330 -B,IS-1672, NIC-7935 EC-334976,NIC-17452,IC-204550
4.	11-15	Moderately Susceptible	21	ES-52-1-84 ,IS-294, S-0314, IS-526-2-84-B, NIC-8502, IS-319-B KMR-48-A, GRT-8245, EC-303304 ,KIS-306 , IC-204832-A, KMR-49, NIC-8423-B, SI-7817-B, S-0301, NIC-16248, IC-132186-A ,KMR- 74, IS-722-1,TC-30, IC-131943
5.	16-25	susceptible	10	IC-204200, JTS-8, S-0484, SI-3100, SI-3274, S-0271, TC-25, EC-334981-A, ES-334974, Prachi
6.	>25	Highly susceptible	0	-----