

Original Research Article

Susceptibility of Groundnut Genotypes/Varieties against *Spodoptera litura* (Fab.) with respect to Leaf Damage

ABSTRACT

A field experiment was conducted at Main Oilseeds Research Station, JAU, Junagadh, Gujarat in 2023 during the *kharif* season to investigate the susceptibility of groundnut genotypes/varieties against *Spodoptera litura* (Fab.) with respect to leaf damage. The field screening of thirty different genotypes/varieties of groundnut against *S. litura* revealed that JVB-2597 exhibited the minimum per cent leaf damage (4.69%), while JVB-2577 recorded the maximum per cent leaf damage (9.28%). From the categorization, it can be revealed that JVB-2597, JSSP-76, JB-1572, J-108, JVB-2607 and JB-1551 are resistant to *S. litura*, with infestations ranging from 4.69% to 5.92% leaf damage. Conversely, JSSP-69, JB-1585, J-118, J-111 and JVB-2577 are susceptible, recording infestation levels between 8.87% to 9.28% leaf damage.

Keywords: Screening, Groundnut, Genotypes/Varieties, S. litura, Leaf damage

1. INTRODUCTION

Groundnut (*Arachis hypogaea* L.) is a leguminous oilseed crop native to South America. As the king of oilseeds, it is the fourth most important oilseed in the world. It is the largest source of edible oil and ranks 13th among food crops in the world [8]. India comes ranked second to China in terms of groundnut production. Of all the groundnut growing states in India, Gujarat has the largest share in terms of area and production. In Gujarat, the area under groundnut cultivation is 17.09 lakh hectares, with an annual production of 28.14 lakh tonnes and a productivity of 1647 kg/ha [3].

Groundnut yield is affected by direct pest damage or by pests such as disease vectors. More than a hundred insect species have been reported on groundnut in India [1]. Among the various insect pests infesting this crop in Gujarat, the tobacco caterpillar *S. litura* is considered the most important pest due to its polyphagous nature and prevailing favorable climate, it occurs throughout the year. The newly hatched and early instar larvae of *S. litura* feed together on the underside of the leaf, resulting in leaf skeletonization and severe leaf destruction in later stages, leaving only petioles and branches, scraping chlorophyll and causing total yield loss up to 15-30 percent [5]; more than 180 crops [6].

There is scanty information on the susceptibility of different genotypes/varieties of groundnut in relation to *S. litura*. Therefore, screening of various genotypes/varieties is required in groundnut. The use of resistant or tolerant groundnut genotypes/varieties is a very important consideration to minimize the damage by *S. litura*. Therefore, simultaneous evaluation of susceptibility of groundnut genotypes/varieties against *S. litura* is needed.

2. MATERIAL AND METHODS

To study the susceptibility of groundnut genotypes/varieties against *Spodoptera litura* (Fab.) with respect to leaf damage, the crop was sown at Main Oilseeds Research Station, Junagadh Agricultural University, Junagadh, Gujarat during the *kharif*, 2023. Two lines of various thirty genotypes/varieties (Table 1) were laid out in a Randomized Block Design (RBD) with two replications. Each plot had a size of 5 m x 0.90 m with spacing of 45 cm between rows and 10 cm between plants. Throughout the experiment, standard agronomical practices were followed and no insecticides were applied. The observation on per cent leaf damage was recorded from randomly selected five plants from each genotypes/varieties during vegetative, flowering and post flowering stage. The data obtained was subjected to statistical analysis for assessment of least susceptible genotypes/varieties against *S. litura* on groundnut. Per cent leaf damage was calculated using the following formula [2].

$$\text{Per cent leaf damage} = \frac{\text{Number of damaged leaf}}{\text{Total number of leaf}} \times 100$$

Table 1. Treatment details of groundnut genotypes/varieties

1.	JSSP-69	11.	JVB-2602	21.	JB-1571
2.	JSSP-70	12.	JVB-2607	22.	JB-1572
3.	JSSP-71	13.	J-108	23.	JB-1583
4.	JSSP-73	14.	J-111	24.	JB-1584
5.	JSSP-76	15.	J-116	25.	JB-1585
6.	JSSP-78	16.	J-118	26.	JB-1589
7.	JVB-2577	17.	J-119	27.	JB-1590
8.	JVB-2596	18.	JB-1550	28.	JB-1595
9.	JVB-2597	19.	JB-1551	29.	GJG-9
10.	JVB-2598	20.	JB-1558	30.	GJG-32

2.1 Categorization of genotypes/varieties

The various groundnut genotypes/varieties were grouped into six categories of resistance to *S. litura* viz., highly resistant, resistant, moderately resistant, moderately susceptible, susceptible and highly susceptible based on per cent leaf damage. For this purpose, the mean value of individual genotype (\bar{X}_i) was compared with the mean value of all genotypes (\bar{X}) and standard deviation (SD). The retransformed data was used for computation of \bar{X} , \bar{X}_i and SD in case of this parameter. The scale used for categorizing different genotypes/varieties was under.

Categorization of groundnut genotypes/varieties were under

Category of resistance	Scale for resistance
Highly resistant	$\bar{X}_i \leq (\bar{X} - 2SD)$
Resistant	$(\bar{X} - SD) \geq \bar{X}_i > (\bar{X} - 2SD)$
Moderately Resistant	$\bar{X} \geq \bar{X}_i > (\bar{X} - SD)$
Moderately susceptible	$\bar{X} < \bar{X}_i \leq (\bar{X} + SD)$
Susceptible	$(\bar{X} + SD) < \bar{X}_i \leq (\bar{X} + 2SD)$
Highly Susceptible	$\bar{X}_i > (\bar{X} + 2SD)$

3. RESULTS AND DISCUSSION

The data on per cent leaf damage by *S. litura* during vegetative stage, flowering stage and post flowering stage are presented in Table 2 and depicted in Figure 1. It indicated that lower leaf damage by *S. litura* was observed in JVB-2597 (4.69%) which was at par with JSSP-76 (5.04%). The next best genotypes/varieties were JB-1572 (5.31%), J-108 (5.49%), JVB-2607 (5.66%) and JB-1551 (5.92%). Higher leaf damage was registered in JVB-2577 (9.28%). Rest of genotypes/varieties recorded viz., J-119 (6.10%), JVB-2602 (6.20%), JB-1583 (6.55%), JSSP-73 (6.56%), JVB-2598 (6.63%), JB-1558 (6.75%), JB-1550 (6.96%), JB-1571 (7.25%), JB-1589 (7.35%), JSSP-71 (7.69%), JVB-2596 (7.72%), JB-1590 (7.75%), JB-1595 (8.00%), JB-1584 (8.30%), JSSP-78 (8.33%), J-116 (8.51%), GJG-32 (8.61%), JSSP-70 (8.66%), GJG-9 (8.69%), JSSP-69 (8.87%), JB-1585 (8.98%), J-118 (9.04%) and J-111 (9.20%) leaf damage by *S. litura*.

Table 2. Leaf damage by *S. litura* on groundnut genotypes/varieties during *kharif*, 2023

Sr. No.	Genotypes/ Varieties	Leaf damage (%)			Pooled
		Vegetative stage	Flowering stage	Post flowering stage	
1.	JSSP-69	18.23 (9.79)	20.68 (12.47)	13.44 (5.40)	17.33 (8.87)
2.	JSSP-70	17.97 (9.52)	20.44 (12.20)	13.28 (5.28)	17.11 (8.66)
3.	JSSP-71	17.01 (8.56)	19.48 (11.12)	12.18 (4.45)	16.10 (7.69)
4.	JSSP-73	16.02 (7.62)	17.92 (9.47)	11.06 (3.68)	14.84 (6.56)
5.	JSSP-76	14.60 (6.35)	15.41 (7.06)	9.57 (2.76)	12.97 (5.04)
6.	JSSP-78	17.72 (9.26)	20.09 (11.80)	12.89 (4.98)	16.78 (8.33)
7.	JVB-2577	18.65 (10.23)	21.31 (13.21)	13.63 (5.55)	17.74 (9.28)
8.	JVB-2596	17.23 (8.77)	19.16 (10.77)	12.45 (4.65)	16.13 (7.72)
9.	JVB-2597	13.22 (5.23)	15.23 (6.90)	9.36 (2.65)	12.51 (4.69)
10.	JVB-2598	16.09 (7.68)	18.01 (9.56)	11.14 (3.73)	14.92 (6.63)
11.	JVB-2602	15.73 (7.35)	17.23 (8.77)	10.81 (3.52)	14.42(6.20)
12.	JVB-2607	14.97 (6.67)	16.75 (8.31)	10.07 (3.06)	13.77 (5.66)
13.	J-108	14.75 (6.48)	16.46 (8.03)	9.92 (2.97)	13.55 (5.49)
14.	J-111	18.47 (10.04)	21.24 (13.12)	13.59 (5.52)	17.66 (9.20)
15.	J-116	17.88 (9.43)	20.29 (12.03)	13.09 (5.13)	16.97 (8.51)
16.	J-118	18.48 (10.05)	20.88 (12.70)	13.54 (5.48)	17.50 (9.04)
17.	J-119	15.50 (7.14)	17.32 (8.86)	10.55 (3.35)	14.29 (6.10)
18.	JB-1550	16.45 (8.02)	18.42 (9.98)	11.49 (3.97)	15.30 (6.96)
19.	JB-1551	15.10 (6.79)	17.28 (8.82)	10.29 (3.19)	14.09 (5.92)
20.	JB-1558	16.28 (7.86)	18.12 (9.67)	11.27 (3.82)	15.06 (6.75)
21.	JB-1571	16.62 (8.18)	18.92 (10.51)	11.72 (4.13)	15.62 (7.25)
22.	JB-1572	14.28 (6.08)	16.30(7.88)	9.76 (2.87)	13.32 (5.31)
23.	JB-1583	16.06 (7.65)	17.92 (9.47)	11.00 (3.64)	14.83 (6.55)
24.	JB-1584	17.65 (9.19)	19.98 (11.68)	12.95 (5.02)	16.74 (8.30)
25.	JB-1585	18.42 (9.98)	20.80 (12.61)	13.50 (5.45)	17.44 (8.98)
26.	JB-1589	16.84 (8.39)	18.86 (10.45)	11.92 (4.27)	15.73 (7.35)
27.	JB-1590	17.10 (8.65)	19.52 (11.16)	12.25 (4.50)	16.16 (7.75)
28.	JB-1595	17.48 (9.02)	19.62 (11.27)	12.60 (4.76)	16.43 (8.00)

29.	GJG-9	18.03 (9.58)	20.50 (12.26)	13.28 (5.28)	17.15 (8.69)
30.	GJG-32	17.99 (9.54)	20.40 (12.15)	13.16 (5.18)	17.06 (8.61)
V	S. Em. \pm	0.58	0.51	0.43	0.29
	C.D. at 5%	1.62	1.41	1.20	0.80
V \times P	S. Em. \pm	-	-	-	1.05
	C.D. at 5%	-	-	-	2.90
	C.V. (%)	8.49	8.56	11.58	9.45

Figures in parenthesis are original values, while outside are arc sin transformed values.

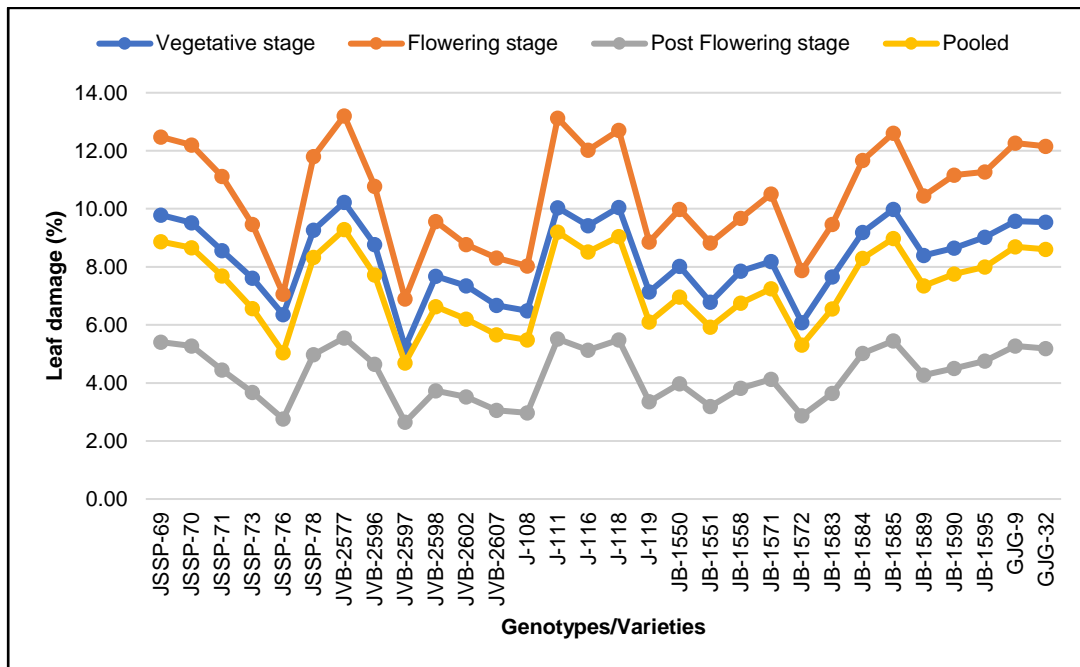


Figure 1. Leaf damage due to *S. litura* on different genotypes/varieties of groundnut during kharif, 2023

3.1 Categorization of groundnut genotypes/varieties for their resistance

The various groundnut genotypes/varieties were also grouped into six categories of resistance viz., highly resistant (HR), resistant (R), moderately resistant (MR), moderately susceptible (MS), susceptible (S) and highly susceptible (HS) based on per cent leaf damage on groundnut by comparing the mean incidence of individual genotypes/varieties (\bar{X}_i) with mean incidence of all genotypes/varieties (\bar{X}) and standard deviation (SD). The categorization of various groundnut genotypes/varieties is exhibited in Table 3.

The data shows that none of the genotypes/varieties fell under highly resistant. Considering the leaf damage, JVB-2597 (4.69%), JSSP-76 (5.04%), JB-1572 (5.31%), J-108 (5.49%), JVB-2607 (5.66%) and JB-1551 (5.92%) were categorized as resistant genotypes/varieties, while J-119 (6.10%), JVB-2602 (6.20%), JB-1583 (6.55%), JSSP-73 (6.56%), JVB-2598 (6.63%), JB-1558 (6.75%), JB-1550 (6.96%) and JB-1571 (7.25%) categorized as moderately resistant. Genotypes/varieties, JB-1589 (7.35%), JSSP-71 (7.69%), JVB-2596 (7.72%), JB-1590 (7.75%), JB-1595 (8.00%), JB-1584 (8.30%), JSSP-78 (8.33%), J-116 (8.51%), GJG-32 (8.61%), JSSP-70 (8.66%) and GJG-9 (8.69%) were rated as moderately susceptible. Whereas, JSSP-69 (8.87%), JB-1585 (8.98%), J-118 (9.04%), J-111 (9.20%)

and JVB-2577 (9.28%) proved to be susceptible to *S. litura*, whereas no any genotypes/varieties were found to be highly susceptible to *S. litura*.

Naik (2019) [7] reported that the leaf damage due to *S. litura* was 14.87% and 11.5% in GJG-9 and GJG-32, respectively and fell under moderately susceptible category. Dharne and Patel (2000) [4] reported that the lowest leaf damage (5%) by *S. litura* was found in ICGV 86156, ICGV 86400, ICGV 86528, ICGV 87128, ICGV 87141, ICGV 87290, ICGV 87411 and ICGV 91214.

Table 3. Categorization of different genotypes/varieties of groundnut for their susceptibility against *S. litura* based on per cent leaf damage

Category of resistant	Scale	Varieties \bar{X}_i
1	2	3
Based on per cent leaf damage (%): $\bar{X} = 7.34$ SD = 1.35		
Highly resistant	$\bar{X}_i \leq 4.64$	-
Resistant	$5.99 \geq \bar{X}_i > 4.64$	JVB-2597 (4.69), JSSP-76 (5.04), JB-1572 (5.31), J-108 (5.49), JVB-2607 (5.66), JB-1551 (5.92)
Moderately Resistant	$7.34 \geq \bar{X}_i > 5.99$	J-119 (6.10), JVB-2602 (6.20), JB-1583 (6.55), JSSP-73(6.56), JVB-2598 (6.63), JB-1558 (6.75), JB-1550 (6.96), JB-1571 (7.25)
Moderately susceptible	$7.34 < \bar{X}_i \leq 8.69$	JB-1589 (7.35), JSSP-71 (7.69), JVB-2596 (7.72), JB-1590 (7.75), JB-1595 (8.00), JB-1584 (8.30), JSSP-78 (8.33), J-116 (8.51), GJG-32 (8.61), JSSP-70 (8.66), GJG-9 (8.69)
Susceptible	$8.69 < \bar{X}_i \leq 10.04$	JSSP-69 (8.87), JB-1585 (8.98), J-118 (9.04), J-111 (9.20), JVB-2577 (9.28)
Highly Susceptible	$\bar{X}_i > 10.04$	-

Note: Figures in parentheses are per cent leaf damage
 Where, \bar{X}_i = Mean value of individual genotype/variety
 \bar{X} = Mean value of all genotype/variety
 SD = Standard deviation

4. CONCLUSION

A minimum of 4.69 per cent leaf damage was recorded in the genotype JVB-2597, while the genotype JVB-2577 recorded a maximum 9.28 per cent leaf damage. The genotypes JVB-2597, JSSP-76, JB-1572, J-108, JVB-2607 and JB-1551 were categorized as resistant (R) to *S. litura*, while the genotypes JSSP-69, JB-1585, J-118, J-111 and JVB-2577 were classified as susceptible (S). Eight genotypes/varieties were moderately resistant (MR)

ranging from 5.99 to 7.34 per cent leaf damage and eleven genotypes/varieties were moderately susceptible (MS) ranging from 7.34 to 8.69 per cent leaf damage.

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