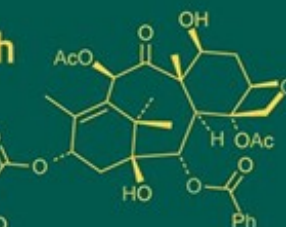


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Screening of chickpea genotypes for resistance to *Helicoverpa armigera* with emphasis on biophysical and biochemical traits

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ABSTRACT

A field experiment was conducted at the Pulses Improvement Project, Mahatma Phule Krishi Vidyapeeth, Rahuri, Maharashtra during Rabi 2025–26 to screen 36 chickpea genotypes comprising 29 desi and 7 kabuli types for resistance to *H. armigera*. Results revealed that Phule G-1703-6-6 recorded the lowest larval population (0.10 larvae/plant), minimum pod damage (4.38%) and highest yield (23.10 q/ha), whereas Phule G-1801-5-5 recorded the highest larval population (2.90 larvae/plant) and high pod damage (21.06%). Trichome length exhibited significant negative correlations with larval population ($r = -0.537^{**}$) and pod damage ($r = -0.559^{**}$). Correlation study also indicated that protein content showed positive correlations while, Phenol, flavonoid, tannin and trypsin inhibitor contents showed negative correlations with larval population and pod damage.

Keywords: Chickpea, *Cicer arietinum*, *Helicoverpa armigera*, Biophysical, Biochemical

Introduction

Pulses are important sources of proteins, vitamins and minerals and are popularly known as “Poor man’s meat” (Reddy *et al.*, 2018) [1]. According to Indian Council of Medical Research (ICMR), optimum per capita requirement of pulses per day to maintain normal health is 85 gm (Anonymous, 2024). Chickpea (*Cicer arietinum* L.), commonly known as gram, is cultivated across tropical, subtropical and temperate regions, with major production in Uttar Pradesh, Madhya Pradesh, Punjab, Rajasthan and Maharashtra. Chickpea seeds are nutritionally rich, comprising approximately 21.5% protein, 4.5% fat and 64.5% carbohydrates. (Gautam *et al.*, 2018) [2].

Chickpea is broadly classified into two cultivated types; Desi and Kabuli. The Desi type has brown seeds, smaller grain size and a thicker seed coat, whereas kabuli type has white seeds, larger grains and a thinner seed coat. Approximately 80-85% of chickpea cultivation in Asia and Africa consists of the desi type (Zhang *et al.*, 2024) [3]. Chickpea production is constrained by a range of biotic and abiotic factors. Among the biotic constraints, numerous insect pests inflict damage at different growth stages of the crop. A total of eleven insect pest species has been identified as major pests of chickpea. Among these, the gram pod borer, *Helicoverpa armigera* (Hübner), is the most destructive (Chowdappa *et al.*, 2026) [4].

Gram pod borer, *Helicoverpa armigera* (Hübner) (Lepidoptera: Noctuidae) is one of the most notorious insect pests infesting pulses. A single larva of *Helicoverpa armigera* can damage about 25 to 30 pods of chickpea during its lifetime. It feeds on tender shoots and young pods, creating holes in the pods and partially inserting its body inside to consume the developing seeds (Devi *et al.*, 2024) [5]. Plants have several morphological and physiological traits that are inherited from a basic defensive system that protects them from potential attackers like insects and other pests. The discovery and application of host plant resistance as a crucial part of pest management globally have received fresh impetus as a result of crop germplasm evaluation for insect resistance, Ghugal *et al.*, (2015) [6].

Material and methods

Thirty-six chickpea genotypes comprising 29 desi and seven kabuli types were evaluated at the Pulses Improvement Project, Mahatma Phule Krishi Vidyapeeth, Rahuri, during rabi 2025-26. The plot size was 4.0 × 2.6 m and crop spacing was 30 × 10 cm. The experiment was conducted in a randomized block design with two replications.

The observation on number of larvae was made at weekly interval from five randomly tagged plants on of each genotype. For estimation of per cent pod damage, no. of healthy and injured pods per plant was recorded and the per cent pod damage was calculated and final grain yield was also assessed (q/ha) at harvest stage. The pest susceptibility rating was calculated and rated as per the method given by Lateef and Sachan (1990).

$$\text{Pest susceptibility} = \frac{\% \text{ Pod damage in Check cultivar} - \% \text{ Pod damage in Test cultivar}}{\% \text{ Pod damage in Check cultivar}} \times 100$$

Pest susceptibility rating

Pest susceptibility (%)	PSR	Category
100%	1	Highly Resistant
75 to 100%	2	Highly resistant
50 to 75%	3	Least Susceptible
25 to 50%	4	Least Susceptible
10 to 25	5	Least Susceptible
-10 to 10	6	Moderately susceptible
-25 to -10	7	Moderately susceptible
-50 to -25	8	Highly susceptible
< -50	9	Highly susceptible

All the data recorded were subjected to statistical analysis as per the standard Randomized Block Design. The data on larval population were transformed with square root transformation and pod damage data were transformed by Arcsine transformation method.

Assessment of biophysical traits

Thirty pods were selected randomly from each genotype for recording pod length, pod width and pod wall thickness using an electronic vernier caliper.

Trichome density and length were assessed on pods using a binocular microscope. The methodology was based on the procedure described by Bozzola and Russell (1999), with plant material cleared using glacial acetic acid before microscopic examination.

Estimation of biochemical constituents

Total phenol

Total phenolic content was estimated using the Folin-Ciocalteu method given by Singleton *et al.*, (1999) [7], using catechol as the standard.

Flavonoid

Flavonoid content was estimated following Chang *et al.*, (2002) [8]. The sample was extracted using 80% aqueous methanol. The extract was reacted with aluminium chloride and potassium acetate. Quercetin was used as the standard.

Tannin

Tannin content was estimated using the Folin-Dennis procedure described by Sadasivam *et al.* (1992) [9], and the results were expressed in relation to tannic acid standards.

Protein

Protein content was estimated by the Lowry *et al.*, (1951) [10] method using the Folin-Ciocalteu reagent.

Trypsin inhibitor

Trypsin inhibitor activity was estimated according to Kakade *et al.*, (1969) [11] using BAPNA as the substrate.

Results and discussion

Larval population of *H. armigera* on different chickpea genotypes

The population of *H. armigera* larvae was observed in the range of 0.10 to 2.90 larvae per plant on the chickpea genotypes. Among desi genotypes the least number of larval population was recorded on genotypes Phule G-1703-6-6 (0.10 larvae/plant) followed by Phule G-1823-15-21 (0.20 larvae/plant). In contrast, the highest larval population was observed in Phule G-1801-5-5 (2.90 larvae/plant). Among kabuli genotypes *Kripa* (0.30 larvae/plant) recorded minimum num-

ber of larval population followed by ICCV 211306 (1.18 larvae/plant). The highest population recorded in the check Virat 2.30 larvae/plant.

Per cent pod damage due to *H. armigera*

The pod damage due to pod borer was observed to vary from 4.38 to 22.58 per cent on different genotypes. The lowest per cent pod damage among the desi genotypes was recorded in Phule G-1703-6-6 (4.38%) followed by Phule G-1823-15-21 (5.73%). The highest per cent pod damage recorded in Phule G-1801-5-5 (21.06%). Among the kabuli genotypes, *Kripa* recorded the lowest pod damage (5.22%), followed by ICCV 211306 (8.33%) while the check Virat recorded highest per cent pod damage (22.58%).

Grain yield

The grain yield of genotypes under study ranged from 11.22 to 23.10 q/ha. Among the desi genotypes, the highest grain yield was recorded in Phule G-1703-6-6 (23.10 q/ha), followed by Phule G-1623-3-4 (21.30 q/ha). The lowest grain yields were recorded in Phule G-1801-5-5 (11.22 q/ha). Among the kabuli genotypes, ICCV 211306 recorded the highest yield (20.87 q/ha), followed by ICCV 211303 (18.87 q/ha). The lowest grain yields were recorded in Phule G-191327 (12.22 q/ha).

Pest susceptibility rating of chickpea genotypes

The pest susceptible rating of the present investigation was ranged from 2 to 7. Pest susceptibility rating (PSR) 2 is recorded in *Kripa*. 13 genotypes recorded with PSR 3 and 13 genotypes with PSR 4. PSR 5 was recorded in Phule G-1803-12-16. PSR 6 was found in Phule G-1620-7-3, Phule G-1822-19-1 and Phule G 191327. The genotype Phule G-1801-5-5, Phule G-1823-26-13 and Phule G-19508 showed highest pest susceptible rating of 7.

The present findings are in agreements with Ramegowda *et al.*, (2007) [12] who recorded lowest 1.16 larvae per plant Genotypes P-1772B which was at par with Phule – G-95412 (1.32). The pod damage was significantly less in Phule G-92028 (13.32%). Deepak *et al.*, (2018) [13] recorded the pest susceptible rating of the present investigation was ranged from 3 to 8. Jakhar *et al.*, (2018) [14] screened 15 chickpea genotypes maximum yield (326.94 kg/ha) minimum pod damage (33.26%) and PSR (3) was recorded on GNG 1581 while, in HK-2 minimum yield (136.94 kg/ha) and PSR (7) was observed. Similar findings found in Sadar *et al.*, (2018) [15] who reported 0.34 larvae/plant in Phule G 12403.

Biophysical attributes of chickpea against *H. armigera*

Biophysical characters (Table 3) showed that, pod length of chickpea genotypes varied from 1.23 to 2.48 cm, highest pod length was recorded in Phule G-1822-17-10 (1.96 cm) in desi genotype whereas, kabuli genotype recorded pod length of (2.48 cm) in ICCV 211303. Pod width ranged from 0.81 to 1.42 cm, NC-7 (1.13 cm) and ICCV 211303 (1.42 cm) showed highest pod width in desi and kabuli genotype respectively. Pod wall thickness varied from 0.21 to 0.49 mm. The thickest pod wall was recorded in Phule G-1623-3-4 (0.47 mm) in desi and *Kripa* (0.49 mm) in kabuli genotype.

Trichome density varied from 15.29 to 27.02 trichomes/mm². Phule G-1822-17-10 (25.49/mm²) and *Kripa* (27.02/mm²) showed highest Trichome density in desi and kabuli genotype respectively. Trichome length of chickpea genotypes from 235.95 to 413.35 µm. Phule Vikrant (394.50 µm) showed longest trichome length among desi genotypes while, *Kripa* (413.35 µm) showed longest trichome length among kabuli genotypes.

Correlation given in Table 4 revealed that, Pod length, Pod wall thickness and Trichome density showed a negative but non-significant correlation with larval population and pod damage. Pod width showed weak positive non-significant correlation and Trichome length exhib

ited significant negative correlation with larval population ($r = -0.537$) and pod damage ($r = -0.559$).

Yadav *et al.*, (2021) [16] also reported trichome number, length and density influenced the resistance/ susceptibility levels of *Helicoverpa armigera* in chickpea. Similar parameters investigated by Udavant *et al.*, (2024) [17]. Mishra *et al.*, (2025) [18] reported highest trichome density (39.40/mm²) and trichome length (368.20 μ m) in IPC 2021-16, suggesting enhanced mechanical resistance. Similarity is also seen in Dhivya *et al.*, (2025) [19] who assessed the density and length of trichomes on the leaves and pods.

Biochemical attributes of chickpea genotypes against *H. armigera*

Total phenol content in chickpea genotypes varied from 0.99 to 1.62 mg/g. The highest Total phenol was observed in Phule G-1823-15-21 (1.62 mg/g) and ICCV 211306 (1.39 mg/g) in desi and kabuli genotype respectively. Flavonoid content ranged from 0.38 to 1.58. Phule G-1822-17-10 (1.58 mg/g) showed highest flavonoid among desi and *Kripa* (1.08 mg/g) among kabuli genotypes. Tannin range of content varied from 4.69 to 9.34. Phule G-1805-5-4 and Phule G-1822-17-10 showed highest tannin (9.34 mg/g) among desi genotypes and *Kripa* (6.54 mg/g) among kabuli genotypes.

Protein per cent in chickpea ranged from 17.22 to 24.24%. Phule G-1801-5-5 (24.24%) and Virat (22.09%) showed highest protein per cent in desi and kabuli genotypes, respectively. Range of trypsin inhibitor varied from 2.09 to 9.76. Phule G-1703-6-6 (9.76 TIU/g) showed highest trypsin inhibitor content in desi genotypes while, ICCV 211306 showed highest trypsin inhibitor content (5.95 TIU/g) in kabuli genotypes of chickpea.

Total phenol, flavonoid, tannin and trypsin inhibitor also showed a significant negative correlation with larval population and per cent

pod damage (Table 6). Protein content showed a significant positive correlation with larval population ($r = 0.805^{**}$) and per cent pod damage ($r = 0.721^{**}$).

Present findings are also similar with Sai *et al.*, (2021) where phenol, flavonoid, tannin and trypsin inhibitor showed negative correlation with per cent pod damage and Protein content showed a significant positive correlation. Similarly, Divija *et al.*, (2024) [20] reported germplasm with higher phenol, tannin, flavonoid and trypsin inhibitor content recorded minimum per cent pod damage, while protein content showed positive correlation with the per cent pod damage by *H. armigera*. Sane *et al.*, (2025) [21] reported antibiosis is linked to pod thickness and higher levels of phenolics, flavonoids, and proteinase inhibitors, which negatively affect insect growth and survival. Flavonoids can inhibit digestive enzymes in the pest, reducing protein digestion.

Conclusion

Among the 36 chickpea genotypes evaluated, Phule G-1703-6-6 (desi) recorded the lowest larval population (0.10 larva/plant) and pod damage (4.38%), while *Kripa* (kabuli) recorded 0.30 larva/plant and 5.22% pod damage. Highest yield observed in Phule G-1703-6-6 (desi) and ICCV 211306 (kabuli). The pest susceptible rating was ranged from 2 to 7 and Pest Susceptibility Rating 2 is recorded in *Kripa*. *Kripa* (kabuli) was found highly resistant and Phule G-1703-6-6 (desi) was found least susceptible.

Larval population of *H. armigera* and per cent pod damage showed significant positive correlation with protein, significant negative correlation with trichome length, phenol, flavonoid, tannin and trypsin inhibitor, non-significant positive correlation with pod width and non-significant negative correlation with pod length, pod wall thickness and trichome density.

Table 1. Field screening of different genotypes against pod borer *H. armigera* on chickpea

Sr. No.	Genotype	No. of larval population of <i>H. armigera</i> /plant	% Pod damage	Yield (q/ha)
1	Phule G-231111	1.60 (1.45)*	12.63 (20.82)#	17.6
2	Phule G-1620-7-3	2.20 (1.64)	18.75 (25.66)	11.75
3	Phule G-1805-5-4	0.70 (1.10)	6.12 (14.33)	19.14
4	Phule G-1803-12-16	2.60 (1.76)	15.79 (23.41)	12.22
5	Phule G-1813-7-14	0.80 (1.14)	7.76 (16.17)	18.48
6	Phule G-1801-5-5	2.90 (1.84)	21.06 (27.32)	11.22
7	Phule G-1813-8-11	1.80 (1.52)	12.36 (20.58)	12.5
8	Phule G-1815-4-17	2.30 (1.67)	11.76 (20.06)	12.7
9	Phule G-1823-26-13	2.20 (1.64)	20.65 (27.03)	11.3
10	Phule G-1822-17-10	0.90 (1.18)	9.28 (17.73)	19.5
11	Phule G-1821-14-3	0.30 (0.89)	9.62 (18.06)	17.6
12	Phule G-1822-17-19	0.40 (0.95)	8.28 (16.72)	19.8
13	Phule G-1823-9-11	0.40 (0.95)	6.48 (14.75)	20.02
14	Phule G-1822-19-1	2.00 (1.58)	17.00 (24.35)	14.8
15	Phule G-1822-19-4	0.40 (0.95)	7.10 (15.46)	19.14
16	Phule G-1823-15-21	0.20 (0.84)	5.73 (13.85)	21.02
17	Phule G-1616-5-6	0.40 (0.95)	9.86 (18.30)	17.5
18	Phule Vikrant	0.30 (0.89)	6.36 (14.61)	14.88
19	Phule G-1724-1-11	0.30 (0.89)	6.67 (14.96)	15.88
20	RVG-202	0.30 (0.89)	6.90 (15.23)	15.85
21	Phule G-1703-6-6	0.10 (0.77)	4.38 (12.08)	23.1
22	Phule G-1705-2-9	0.30 (0.89)	6.25 (14.48)	19.14
23	Phule G-1705-8-20	1.60 (1.45)	11.27 (19.61)	17.82
24	Phule G-1623-3-4	1.30 (1.34)	10.71 (19.11)	21.3
25	Phule Vikram (Ch)	1.90 (1.55)	17.39 (24.65)	20.5
26	NC-7	0.60 (1.05)	9.76 (18.20)	13.86
27	Vijay	1.20 (1.30)	12.27 (20.50)	15.84

(continued on next page)

Sr. No.	Genotype	No. of larval population of <i>H. armigera</i> /plant	% Pod damage	Yield (q/ha)
28	Phule Vishwaraj	1.60 (1.45)	11.76 (20.06)	20.46
29	Phule G-19508	1.90 (1.55)	20.34 (26.81)	12.54
30	ICCV 211302	1.40 (1.38)	11.76 (20.06)	17.9
31	ICCV 211303	1.10 (1.26)	10.29 (18.71)	18.87
32	ICCV 211306	0.90 (1.18)	8.33 (16.78)	20.87
33	Phule G 231307	1.20 (1.30)	13.85 (21.85)	17.85
34	Phule G 191327	1.60 (1.45)	20.45 (26.89)	12.22
35	Virat (Ch)	2.30 (1.67)	22.58 (28.37)	16.82
36	Kripa	0.30 (0.89)	5.22 (13.20)	18.56
	SE (m) ±	0.21	1.62	2.44
	CD at 5 %	0.64	4.86	7.32
	CV %	12.65	16.86	18.11

*Figures of larval population in parenthesis are: $\sqrt{x} + 0.5$

#Figures of percentage in parenthesis are angular transformed values.

Table 2. Pest susceptibility rating of different genotypes against pod borer *H. armigera* on chickpea

Pest susceptibility rating	Genotypes
2	Kripa
3	Phule G-1805-5-4, Phule G-1813-7-14, Phule G-1822-17-10, Phule G-1822-17-19, Phule G-1823-9-11, Phule G-1822-19-4, Phule G-1823-15-21, Phule Vikrant, Phule G-1724-1-11, RVG-202, Phule G-1705-2-9, ICCV 211303, ICCV 211306

Pest susceptibility rating	Genotypes
4	Phule G-231111, Phule G-1813-8-11, Phule G-1815-4-17, Phule G-1821-14-3, Phule G-1616-5-6, Phule G-1703-6-6, Phule G-1705-8-20, Phule G-1623-3-4, NC-7, Vijay, Phule Vishwaraj, ICCV 211302, Phule G 231307
5	Phule G-1803-12-16
6	Phule G-1620-7-3, Phule G-1822-19-1, Phule G 191327
7	Phule G-1801-5-5, Phule G-1823-26-13, Phule G-19508

Table 3. Biophysical (Gram Pod attributes) character of chickpea genotypes against *H. armigera*

Sr. No.	Genotype	Pod length (cm)	Pod width (cm)	Pod wall thickness (mm)	Trichome Density (No. /mm ²)	Trichome Length (µm)
1	Phule G-231111	1.85	1.01	0.44	16.35	309.85
2	Phule G-1620-7-3	1.77	1.03	0.29	17.39	274.15
3	Phule G-1805-5-4	1.67	0.90	0.33	21.60	328.11
4	Phule G-1803-12-16	1.62	0.92	0.45	23.85	296.77
5	Phule G-1813-7-14	1.73	0.94	0.29	18.40	283.46
6	Phule G-1801-5-5	1.64	0.90	0.32	15.29	303.60
7	Phule G-1813-8-11	1.88	0.94	0.35	21.75	311.35
8	Phule G-1815-4-17	1.67	1.10	0.29	22.75	305.23
9	Phule G-1823-26-13	1.92	1.02	0.35	18.36	235.95
10	Phule G-1822-17-10	1.96	1.07	0.45	25.49	388.28
11	Phule G-1821-14-3	1.77	0.99	0.37	19.29	348.50
12	Phule G-1822-17-19	1.84	1.00	0.34	19.55	364.50
13	Phule G-1823-9-11	1.81	0.97	0.42	19.70	318.20

(continued on next page)

Sr. No.	Genotype	Pod length (cm)	Pod width (cm)	Pod wall thickness (mm)	Trichome Density (No. /mm ²)	Trichome Length (μm)
14	Phule G-1822-19-1	1.68	0.91	0.34	19.80	336.30
15	Phule G-1822-19-4	1.69	0.85	0.32	19.05	372.10
16	Phule G-1823-15-21	1.94	0.85	0.26	19.15	378.30
17	Phule G-1616-5-6	1.71	0.96	0.27	19.70	276.50
18	Phule Vikrant	1.89	0.91	0.33	22.77	394.50
19	Phule G-1724-1-11	1.77	1.01	0.32	19.52	366.50
20	RVG-202	1.78	0.94	0.26	22.70	382.36
21	Phule G-1703-6-6	1.75	0.81	0.35	21.15	352.50
22	Phule G-1705-2-9	1.81	0.89	0.29	23.13	316.40
23	Phule G-1705-8-20	1.91	1.06	0.33	23.15	337.10
24	Phule G-1623-3-4	1.71	1.07	0.47	24.88	298.30
25	Phule Vikram (Ch)	1.68	1.02	0.30	19.15	258.38
26	NC-7	1.82	1.13	0.32	21.31	376.50
27	Vijay	1.70	0.94	0.34	20.40	347.05
28	Phule Vishwaraj	1.83	0.97	0.32	21.55	374.35
29	Phule G-19508	2.00	1.15	0.33	23.60	342.50
30	ICCV 211302	1.92	1.19	0.36	25.80	402.40
31	ICCV 211303	2.48	1.42	0.45	26.65	400.02
32	ICCV 211306	2.24	1.29	0.41	25.80	390.50
33	Phule G 231307	2.03	1.03	0.32	21.27	352.78
34	Phule G 191327	1.99	1.09	0.43	22.80	298.20
35	Virat (Ch)	2.00	0.96	0.21	26.19	306.87
36	Kripa	2.40	1.39	0.49	27.02	413.35
	SE (m) ±	0.02	0.03	0.02	0.34	5.15
	CD at 5 %	0.06	0.08	0.05	0.97	14.78
	CV %	1.48	4.09	7.20	2.21	2.16

Table 4. Correlation of biophysical attributes with mean larval population and pod damage percentage.

Sr. No.	Biophysical parameters	Larval population of <i>H.armigera</i> /plant	Per cent pod damage (%)
1	Pod length (cm)	-0.149NS	-0.063NS
2	Pod width (cm)	0.057NS	0.049NS
3	Pod wall thickness (mm)	-0.015NS	-0.113NS
4	Trichome Density (No. /mm ²)	-0.077NS	-0.132NS
5	Trichome Length (μm)	-0.537**	-0.559**

**Correlation is significant at 0.01 levels, *Correlation is significant at 0.05 levels, NS- Non-significant

(continued on next page)

Table 5. Biochemical attributes of chickpea genotypes against *H. armigera*.

Sr. No.	Genotype	Phenol (mg/g)	Flavonoid (mg/g)	Tannin (mg/g)	Protein (%)	Trypsin Inhibitor TIU/g
1	Phule G-231111	1.43	0.59	6.07	22.37	3.28
2	Phule G-1620-7-3	1.28	0.45	5.04	23.85	2.55
3	Phule G-1805-5-4	1.46	0.98	9.34	19.43	7.12
4	Phule G-1803-12-16	1.18	0.53	4.69	24.12	2.17
5	Phule G-1813-7-14	1.44	0.89	7.17	21.80	7.84
6	Phule G-1801-5-5	0.99	0.50	5.01	24.24	2.26
7	Phule G-1813-8-11	1.34	0.60	6.01	20.55	3.58
8	Phule G-1815-4-17	1.37	0.66	6.06	23.03	3.23
9	Phule G-1823-26-13	1.01	0.56	4.82	24.07	2.09
10	Phule G-1822-17-10	1.60	1.58	9.34	18.34	8.92
11	Phule G-1821-14-3	1.38	0.77	8.09	19.64	7.32
12	Phule G-1822-17-19	1.49	0.87	8.53	18.96	6.57
13	Phule G-1823-9-11	1.50	1.35	9.01	17.22	9.39
14	Phule G-1822-19-1	1.25	0.49	5.48	23.25	3.90
15	Phule G-1822-19-4	1.42	0.93	8.66	18.84	6.71
16	Phule G-1823-15-21	1.62	0.62	9.19	17.49	9.51
17	Phule G-1616-5-6	1.37	1.11	7.26	21.25	7.82
18	Phule Vikrant	1.28	0.83	7.97	19.64	7.12
19	Phule G-1724-1-11	1.42	0.92	8.39	19.43	7.91
20	RVG-202	1.32	0.92	8.06	19.33	8.63
21	Phule G-1703-6-6	1.45	0.83	8.70	19.23	9.76
22	Phule G-1705-2-9	1.40	1.45	9.21	18.56	8.94
23	Phule G-1705-8-20	1.38	0.63	6.27	21.35	5.49
24	Phule G-1623-3-4	1.37	1.05	6.85	21.70	6.93
25	Phule Vikram (Ch)	1.35	0.55	6.05	22.94	3.30
26	NC-7	1.43	0.93	6.23	19.31	6.69
27	Vijay	1.54	1.36	6.43	21.46	5.75
28	Phule Vishwaraj	1.42	1.25	6.67	20.37	5.77
29	Phule G-19508	1.17	0.63	5.13	22.99	2.68
30	ICCV 211302	1.35	0.68	6.01	18.41	4.09
31	ICCV 211303	1.25	0.91	6.05	19.99	4.93
32	ICCV 211306	1.39	0.86	6.38	19.54	5.95
33	Phule G 231307	1.29	0.72	6.22	19.27	4.61
34	Phule G 191327	1.06	0.60	6.00	20.08	3.22
35	Virat (Ch)	1.23	0.38	4.81	22.09	2.54
36	Kripa	1.29	1.08	6.54	21.27	3.73
	SE (m) ±	0.01	0.01	0.13	0.17	0.07
	CD at 5 %	0.04	0.03	0.37	0.49	0.19
	CV %	1.48	1.58	2.66	1.16	1.69

Table 6. Correlation of biochemical attributes with mean larval population and pod damage percentage.

Sr. No.	Biophysical parameters	Larval population of <i>H. armigera</i> /plant	Per cent pod damage (%)
1	Phenol (mg/g)	-0.625**	-0.725**
2	Flavonoid (mg/g)	-0.595**	-0.617**
3	Tannin (mg/g)	-0.845**	-0.824**
4	Protein (%)	0.805**	0.721**
5	Trypsin Inhibitor TIU/g	-0.862**	-0.827**

**Correlation is significant at 0.01 levels, *Correlation is significant at 0.05 level

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