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## Screening of chickpea germplasm against gram pod borer, *Helicoverpa armigera* Hubner

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### Abstract

The field experiments on “Screening of chickpea germplasm against gram pod borer, *Helicoverpa armigera* Hubner” was conducted at Students’ Instructional Farm of C. S. Azad University of Agriculture & Technology, Kanpur during *Rabi* 2017-18 and 2018-19. Screening of fifty chickpea germplasm with one check variety KGD-1168 was carried out to evaluate for resistance to gram pod borer, *H. armigera*. Present study revealed during 48<sup>th</sup> SW till maturity i.e. 14<sup>th</sup> SW both years. The lowest larval population was recorded of 0.77, 0.71 larvae/m row in germplasm 425 and highest population with 6.72 and 6.01 larvae/m row in germplasm 471 and P-255, respectively. The minimum pod damage was recorded of 4.08 and 4.88 percent in germplasm 425 and W-48-75 and maximum i.e. 14.42 and 13.22 percent was recorded in germplasm 471, P-255, respectively. The insect pest susceptibility rating (PSR), declared that 7 and 8 germplasm were found highly susceptible, 26 and 26 were moderately susceptible and 16 and 15 least susceptible, respectively, both years.

**Keywords:** Screening, chickpea germplasm, *Helicoverpa armigera*

### Introduction

Pulses, the food legumes, have been grown by farmers since millennia providing nutritionally balanced food to the people of India (Nene, 2006) [3] and many other countries in the world. In India, pulses have been described as a “poor man’s meat and rich man’s vegetable”. Chickpea, *Cicer arietinum* L. is considered as “King of Pulses” and is commonly known as “Bengal Gram or *Chana*”, belongs to family fabaceae. It is an important winter season soil fertility restorative legume crop and is grown globally as food source. It plays an important role in the vegetarian diet as a major source of protein. It is consumed as a green vegetable, *dal*, *chhole*, germinated breakfast food and powder to prepare sweets and many other relishing dishes. It’s leaves are consumed both raw and cooked to take advantage of malic acid, citric acid, mineral matters and fiber, all of which are of medicinal value. The grain consists of 52-70 percent carbohydrates, 18-22.2 percent protein. Besides, it is a rich source of calcium, iron, vitamin C (green stage) and ‘B1’.

Amongst the several constraints affecting the yield, the insect pests, particularly the gram pod borer, *Helicoverpa armigera* Hubner is recognized as the most important which cause high economic losses to the chickpea crop Sharma *et al.* (1999) [7]. A single larva can consume 30-40 pods in its life time Srivastava and Srivastava (1990) [8]. Yield losses due to gram pod borer in chickpea may range from 75 to 95 percent Prakash *et al.* (2007) [4]. The development of crop germplasm resistant or tolerant to *H. armigera* has a major potential for integrated management particularly under subsistence farming in developing countries Sarwar *et al.* (2009) [6]. *Helicoverpa armigera* Hub. is known to be the key pest and most important limiting factor in the successful cultivation of chickpea (Reed *et al.*, 1987) [5] due to high reproduction rates, a fast generation on turn over, wide genetic diversity occurs location and an ability to withstand, metabolize and avoid toxic chemicals.

### Material and Methods

The experiment was conducted at Students’ Instructional Farm of C. S. Azad University of Agriculture & Technology, Kanpur (U.P.) during *Rabi* seasons 2017-18 and 2018-19. Study on relative resistance of different chickpea germplasm against incidence of gram pod borer, *Helicoverpa armigera* Hubner. Fifty chickpea germplasm were sown in first week of November with paired rows of four meter length at plant geometry of 30 x 10 cm. To record the larval population and pod damage percent of gram pod borer was observed at weekly

interval from randomly selected tagged plants one meter linear length from each row.

$$\text{Pest susceptibility/resistant} = \frac{\% \text{ check variety} - \% \text{ test variety}}{\% \text{ check variety}} \times 100$$

**Table 1:** Pest susceptibility rating

Pest resistant/ susceptibility (%)	Resistant/ susceptibility grading	Category
100%	1	Highly resistant
75 to 100%	2	Highly resistant
50 to 75%	3	Least susceptibility
25 to 50%	4	Least susceptibility
10 to 25%	5	Least susceptibility
-10 to 25%	6	Moderately susceptibility
-25 to 10%	7	Moderately susceptibility
-50 to 10%	8	Highly susceptibility
Less than -50%	9	Highly susceptibility

## Result and Discussion

The results depicted in table-2 & Fig.-1 clearly showed that the initial observations on larvae of *H. armigera* were recorded from time of build-up of the population i.e. 48<sup>th</sup> SW till maturity of the crop i.e. 14<sup>th</sup> SW during 2017-18. The maximum larvae were observed in germplasm 471 (6.72

larvae/ meter row) followed by 395 (5.32 larvae/ meter row), 383 (4.95 larvae/ meter row), P-323 (4.55 larvae/ meter row) and 391 with 4.54 larvae/ meter row were recorded. The minimum larval population was recorded in germplasm 425 (0.77 larvae/ meter row) followed by 79 (0.82 larvae/ meter row), 473 (1.20 larvae/ meter row), W-48-75 (1.61 larvae/ meter row), and 399 (1.70 larvae/ meter row) in comparison to check variety KGD-1168 in which 3.38 larvae/ meter row were noticed.

The screenings of same germplasm were carried out during second season of *Rabi* 2018-19. The results are presented in table-3 & Fig.-2 showed that the maximum larvae (6.01 larvae/ meter row) was observed in germplasm P-255 followed by 471 (5.70 larvae/ meter row), P-323 (5.35 larvae/ meter row), 153/4615 (5.29 larvae/ meter row) and SD-101 in which 4.83 larvae/ meter row were recorded. The minimum number of larval population was recorded in germplasm 425 (0.71 larvae/ meter row) followed by 79 (0.76 larvae/ meter row), W-48-75 (0.79 larvae/ meter row), P-606 (0.93 larvae/ meter row) and P-1122 (1.17 larvae/ meter row) as compared to check variety KGD-1168 in which 3.08 larvae/ meter row were recorded. Chandra *et al.* (2013) [1] also reported mean larval population was lowest i.e. 4.75 larvae/5 plants on RSG-931 and GNG-1488, which were categorized as least susceptible to the gram pod borer.

**Table 2:** Screening of germplasm against gram pod borer in chickpea Year 2017-18.

S. No.	Germplasm	Mean larvae/m row	Pod damage (%)	Pest susceptibility	
1	P-1122	1.96	7.52	21.23	LS
2	GNG-257	2.69	9.18	4.57	MS
3	K-7785-1	2.77	8.83	8.21	MS
4	P-1214	3.35	10.45	-8.63	MS
5	P-606	3.30	10.06	-4.57	MS
6	P-2103	2.54	8.92	7.28	MS
7	79	0.82	6.77	29.62	LS
8	153/4615	3.87	10.68	-11.02	MS
9	82	2.65	8.27	14.03	LS
10	P-1233	3.25	11.19	-16.32	MS
11	79050	2.12	7.41	22.97	LS
12	P-1250	3.14	10.54	-9.56	MS
13	P-159	3.35	11.48	-19.34	MS
14	W-48-75	1.61	7.60	21.00	LS
15	P-1135-2	3.17	10.63	-10.50	MS
16	KPG-102	2.50	7.92	17.67	LS
17	SD-101	4.18	12.07	-25.47	HS
18	P-699	3.27	9.15	4.88	MS
19	P-1409	3.04	8.76	8.94	MS
20	P-323	4.55	12.04	-25.15	HS
21	P-6199	2.64	9.05	5.92	MS
22	80116	3.23	9.75	-1.35	MS
23	P-255	2.75	8.80	8.52	MS
24	381	3.37	11.07	-15.07	MS
25	382	3.59	9.18	4.57	MS
26	383	4.95	11.86	-23.28	MS
27	384	3.68	10.34	-7.48	MS
28	387	2.12	7.46	22.45	LS
29	388	2.86	6.74	29.94	LS
30	389	3.32	9.17	4.68	MS
31	390	3.50	9.49	1.35	MS
32	391	4.54	12.25	-27.33	HS
33	394	3.55	10.61	-10.29	MS
34	395	5.32	13.22	-37.42	HS
35	399	1.70	7.65	20.48	LS
36	422	4.25	11.70	-21.62	MS
37	423	3.18	8.55	11.12	LS

38	424	4.04	11.94	-24.12	MS
39	425	0.77	4.08	57.59	LS
40	426	3.60	8.87	7.80	MS
41	427	4.35	12.46	-29.52	HS
42	429	2.85	8.49	11.75	LS
43	430	3.80	6.56	31.81	LS
44	471	6.72	14.42	-49.90	HS
45	472	3.50	7.89	17.98	LS
46	473	1.20	5.20	45.94	LS
47	474	4.20	12.11	-25.08	HS
48	475	3.94	8.93	7.17	MS
49	477	2.80	7.87	18.19	LS
50	Check KGD-1168	3.38	9.62		

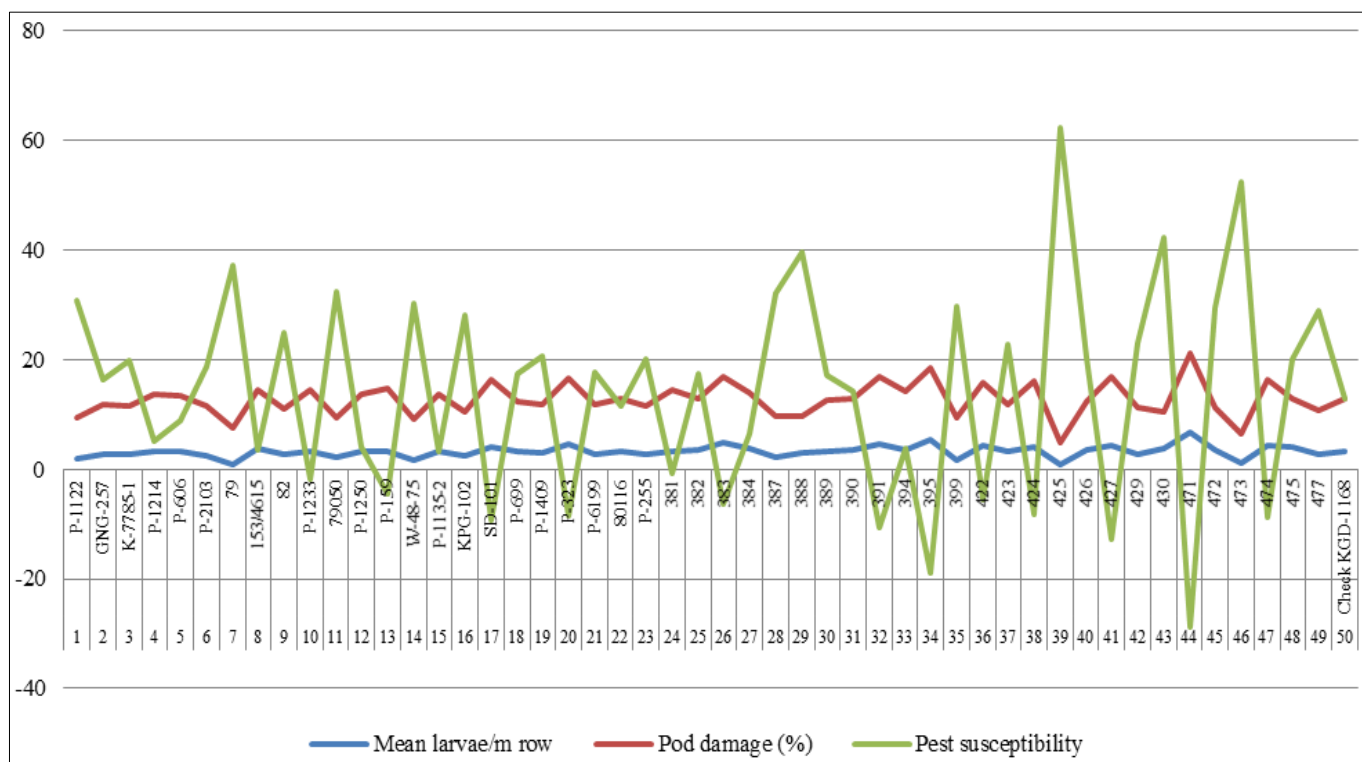


Fig 1: Screening of germplasm against gram pod borer in chickpea during 2017-18.

Table 3: Screening of germplasm against gram pod borer in chickpea Year- 2018-19

S. No.	Germplasm	Mean larvae/m row	Pod damage (%)	Pest susceptibility	
1	P-1122	1.17	6.92	24.37	LS
2	GNG-257	4.32	10.68	-16.72	MS
3	K-7785-1	2.50	8.73	4.59	MS
4	P-1214	4.14	9.13	-0.22	MS
5	P-606	0.93	8.44	7.76	MS
6	P-2103	3.18	7.98	12.79	LS
7	79	0.76	5.08	44.48	LS
8	153/4615	5.29	10.53	-17.65	MS
9	82	3.72	9.14	0.11	MS
10	P-1233	3.00	8.16	10.82	LS
11	79050	1.59	7.41	19.02	LS
12	P-1250	3.04	10.28	-12.35	MS
13	P-159	2.73	9.97	-8.96	MS
14	W-48-75	0.79	4.88	46.67	LS
15	P-1135-2	3.33	10.36	-13.22	MS
16	KPG-102	3.39	9.69	-5.90	MS
17	SD-101	4.83	11.45	-27.93	HS
18	P-699	3.55	10.57	-15.52	MS
19	P-1409	2.56	8.73	4.59	MS
20	P-323	5.35	12.15	-32.79	HS
21	P-6199	3.68	10.78	-17.81	MS

22	80116	2.43	8.45	7.65	MS
23	P-255	6.01	13.22	-44.48	HS
24	381	3.25	9.38	-2.51	MS
25	382	3.02	8.14	11.04	LS
26	383	2.08	7.45	18.58	LS
27	384	3.79	11.27	-23.17	MS
28	387	3.50	10.30	-12.57	MS
29	388	2.06	7.78	14.97	LS
30	389	3.81	9.43	-3.06	MS
31	390	1.80	6.15	32.79	LS
32	391	2.61	12.42	-38.77	HS
33	394	2.68	8.74	4.48	MS
34	395	3.71	11.08	-21.09	MS
35	399	3.75	11.32	-23.71	MS
36	422	2.74	8.36	8.63	MS
37	423	3.81	10.21	-11.58	MS
38	424	4.35	12.55	-37.16	HS
39	425	0.71	5.17	43.50	LS
40	426	1.43	6.57	28.20	LS
41	427	3.86	11.42	-27.60	HS
42	429	2.80	8.65	5.46	MS
43	430	3.64	10.52	-14.97	MS
44	471	5.70	14.96	-63.50	HS
45	472	2.95	7.22	19.33	LS
46	473	1.46	7.48	18.25	LS
47	474	4.08	11.80	-28.96	HS
48	475	1.58	7.44	18.69	LS
49	477	2.00	8.67	5.24	MS
50	Check KGD-1168	3.08	8.95		

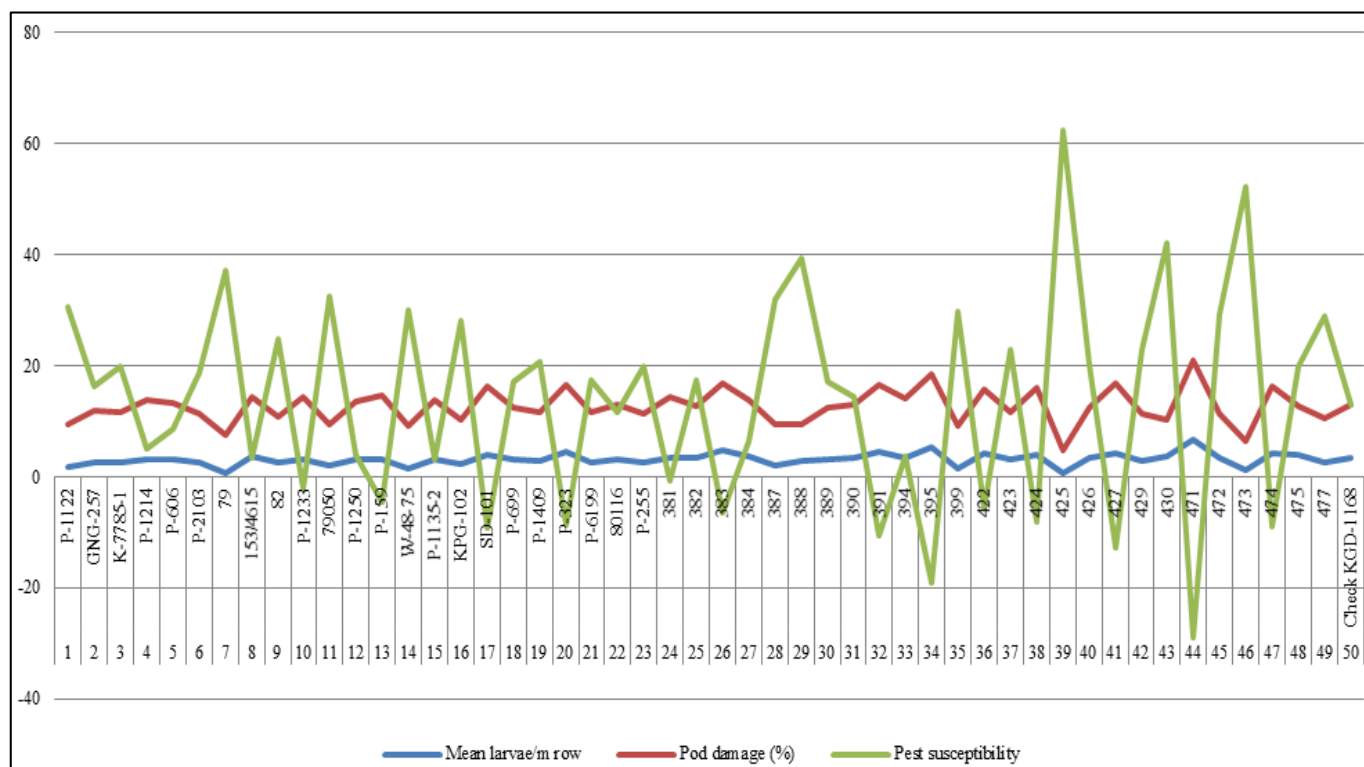


Fig 2: Screening of germplasm against gram pod borer in chickpea during 2018-19.

**Pod damage percent**

During 2017-18, the experimentation the percent pod damage ranged from 4.08 to 14.42 percent (Table-2 & Fig.-1). Minimum pod damage was recorded in germplasm 425 (4.08 percent) followed by 473 (5.20 percent), 430 (6.56 percent), 79 (6.77 percent) and 79050 with 7.41 percent. However, the maximum pod damage percent was observed in 471 (14.42

percent) followed by 395 (13.22 percent), 427 (12.46 percent), 391 (12.25 percent) and 474 (12.11 percent) as compared to check variety KGD-1168 in which 9.62 percent. During 2018-19, this season of study the percent pod damage ranged from 4.88 to 14.96 (Table-3 & Fig.-2). Minimum pod damage was observed in germplasm W-48-75 (4.88 percent) followed by 79 (5.08 percent), 425 (5.17 percent), 390 (6.15

percent) and 426 with 6.57 percent. However, the maximum pod damage percent was recorded in 471 (14.96 percent) followed by P-255 (13.22 percent), 424 (12.55 percent), 391 (12.42 percent) and P-323 (12.15 percent) as comparison to check variety KGD-1168 in which 8.95 percent pod damage was recorded. Similar results were also reported by Deshmukh *et al.* (2010) [2] also observed genotypes/germplasm of chickpea screened against *H. armigera* in which lower larval population (1.07 to 1.32 larvae/plant), with lower damage to pods (11.41 to 14.16%) were recorded.

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