The Pharma Innovation Journal 2023; SP-12(10): 1026-1030

www.ThePharmaJournal.com

The Pharma Innovation

ISSN (E): 2277-7695
ISSN (P): 2349-8242
NAAS Rating: 5.23
TPI 2023; SP-12(10): 1026-1030

www.thepharmajournal.com
Received: 26-07-2023
Accepted: 29-08-2023

Rajkumar Bajya
Department of Entomology, College of Agriculture Jabalpur, Jawaharlal Nehru Krishi Agriculture University, Jabalpur, Madhya Pradesh, India

Yogesh Patel
Department of Entomology, College of Agriculture Ganj-Basoda, Jawaharlal Nehru Agriculture University, College of Agriculture Ganj-Basoda, Vidisha, Madhya Pradesh, India

Vinod Kumar Garg
Department of Entomology, College of Agriculture Ganj-Basoda, Jawaharlal Nehru Agriculture University, College of Agriculture Ganj-Basoda, Vidisha, Madhya Pradesh, India

Suman Chopra
Department of Plant Pathology, College of Agriculture Gwalior, Rajmata Vijayaraje Scindia Krishi Vishwavidyalaya, Gwalior, Madhya Pradesh, India

Corresponding Author:
Rajkumar Bajya
Department of Entomology, College of Agriculture Jabalpur, Jawaharlal Nehru Krishi Agriculture University, Jabalpur, Madhya Pradesh, India

Screening of promising genotypes against gram pod borer (*H. armigera*) (Noctuidae: Lepidoptera) in chickpea

Rajkumar Bajya, Yogesh Patel, Vinod Kumar Garg and Suman Chopra

Abstract
The field experiment on Screening of promising genotypes against gram pod borer (*H. armigera*) on chickpea was conducted at the JNKVV, College of agriculture Ganj Basoda. During Seasion rabi 2020-21. The results showed that the larval population of *H. armigera*. The lowest mean larval population of *Helicoverpa armigera* was reported in chickpea genotype JG-2020-17, followed by JG-2020-16 and JG-2020- 18, that were considered least preferred genotypes, and the maximum mean larval population was found in chickpea genotypes JG-2020-22, followed by JG-2020-23. Genotype JG-2020-30 had the lowest amount of pod damage, followed by JG-2020- 17. The genotype JG-2020-17 produced the maximum yield.

Keywords: Chickpea, screening, *Helicoverpa*, promising genotypes

Introduction
Chickpeas are harmed by a variety of insect species, both in the field and in storage (Clement *et al*., 2000) [4]. Chickpea area, production, productivity in India 9.44/million hacter,10.13 m/ton,1073 kg/hac. and Madhya Pradesh 3.43/million hacter,4.61 m/ton,1344 kg/hac (Source-Agriculture at a Glance 2019 [11]. Directorate of Economics and Statistics, Department of Agriculture Cooperation & Farmers Welfare, Govt. of India, New Delhi.) Chickpeas, as a source of high-quality protein, supplement people's cereal-based diets and improve their nutritional balance (Saxena. 1996) [9]. *H. armigera* damage is reduced in part through host plant resistance (HPR), which can be used alone or in combination with other strategies. It has been shown that for every dollar invested in plant protection, farmers return $300 in return (Sharma, 2005) [10]. Leuck *et al*. (1967) [6]. were the first to report host plant resistance to *H. armigera* in legumes The *H. armigera* Hubner is a global pest with major economic implications for this crop. Despite several rounds of insecticidal sprays, this pest is the main constraint on chickpea production, producing severe losses of up to 100%. There may be a complete crop failure in certain severe cases. It's a polyphagous pest that consumes a wide variety of food, oil, and fiber crops. It has become a difficult pest to manage due to its vast host range, multiple generations, migratory behavior, high fecundity, and existing insecticidal resistance (Sarwar, 2013) [9].

Materials and Methods
The study was conducted during Rabi season 2020-21 at research field of College of Agriculture, Ganjbasoda. The details of the trial are given: Design RBD, Replication : 3, Season : Rabi 2020-2021, Crop : chickpea, No. of row : 5, Spacing : 30×10 cm, Plot size : 4m× 1.5 m, No. Of genotypes: 15

Table 1: Show genotypes, RI, RII and RIII

Sr. No.	Genotypes	RI	RII	RIII
1	JG-2020-16	1	8	15
2	JG-2020-17	2	7	14
3	JG-2020-18	3	6	13
4	JG-2020-19	4	5	12
5	JG-2020-20	5	4	11
6	JG-2020-21	6	3	10
7	JG-2020-22	7	2	9
8	JG-2020-23	8	1	8
9	JG-2020-24	9	15	7
10	JG-2020-25	10	14	6
11	JG-2020-26	11	13	5
12	JG-2020-27	12	12	4
13	JG-2020-28	13	11	3
14	JG-2020-29	14	10	2
15	JG-2020-30	15	9	1

Method of observation

Method of Observations The observations of larval population of *H. armigera* were recorded at weekly interval on per meter row length at 5 sites in each plots. At the time of Harvesting, number of healthy and damaged pods of 10 randomly selected plants was counted. Percent pod damage were calculated by formula.

$$\text{Pod damage \%} = \frac{\text{Number of damaged pod}}{\text{Total no.of pods}} \times 100$$

At harvest, the yield of individual genotypes was recorded.

Results and Discussion

The study, titled "Screening of several promising genotypes against gram pod borer (*H. armigera* Hubner)," was conducted to evaluate 15 chickpea genotypes for resistance to *H. armigera* (Hubner), the crop's more serious pest at the national level. The link between morphological plant traits of genotypes and the incidence level of *H. armigera* in field circumstances was also considered. In the past, a number of scientists conducted studies to find tolerant genotypes. New genotypes, However, new genotypes are developed continuously, and their evaluation against pests is a spontaneous process. Earlier works described in this thesis generally used genotypes that were not compatible with the current plant material. In the current experiment, the seasonal mean larval population of *H. armigera* was considered.

The total average larval population among different chickpea genotypes was found to be statistically significant, ranged from 1.13 to 1.90 larvae/mrl. Genotypes show varying susceptibilities, with 1.13 to 1.39, 1.51 to 1.7, and 1.83 to 1.90 larvae/mrl for the least susceptible, moderate, and highly susceptible genotypes, respectively. The genotypes with the lowest sensitivity were JG-2020-17 (1.13 larvae/mrl), JG-2020-16 (1.14 larvae/mrl), JG-2020-18 (1.17 larvae/mrl), JG-2020-30 (1.17 larvae/mrl), and JG-2020-29 (1.20 larvae/mrl), followed by JG-2020-27 (1.39 larvae/mrl). And JG-2020-26 (1.51 larvae/mrl) genotype. JG-2020-25 (1.6 larvae/mrl) and JG-2020-21 (1.68 larvae/mrl) are moderately susceptible genotypes, followed by JG-2020-24 (1.70 larvae/mrl). JG-2020-22 genotypes (very sensitive) had the largest larval population (1.90 larvae/mrl), followed by JG-2020-23 (1.88 larvae/mrl). JG-2020-19 (1.85 larvae per mrl), JG-2020-20 (1.84 larvae per mrl), and JG-2020-28 (1.83 larvae per mrl) were the most productive.

Pod damaged by *H. armigera* in different promising chickpea genotypes varied from 10.23 to 20.15 percent and indicate significantly differences among different genotypes. Genotype JG-2020-17 had significantly lowest pod damage (10.23%) among all the genotypes, followed by JG-2020-30 (12.19%). JG-2020-18 (13.62%), JG-2020-29 (15.62%). JG-2020-16 (16.84%). JG-2020-21 (17.32%) JG-2020-24 (17.90%). JG-2020-25 (18.10%), JG-2020-26 (18.37%). JG-2020 27 (18.47%). which were at par. Next genotypes were observed to be JG-2020-28 (19.01%). JG-2020-20 (19.85%). JG-2020-19 (19.20%). JG-2020-23 (19.55%). JG-2020-22 (20.15) had percent pod damage respectively.

Highest seed yield (23.49 q/ha) was observed in genotypes JG-2020-17 which different significantly from the remaining genotypes. Next higher seed yield was found in genotypes of JG-2020-18 (23.29 q/ha). JG-2020-30(23.24 q/ha), JG-2020-16 (22.92 q/ha) JG-2020-29 (22.61 q/ha) JG-2020-27 (15.13 q/ha) JG-2020-26 (16.89 q/ha) JG-2020-24 (16.44 q/ha) JG-2020-21 (19.44 q/ha) JG-2020-20 (15.47 q/ha) JG-2020-28 (15.22 q/ha) JG-2020-23 (17.11 q/ha) grain yield respectively and lowest seed yield (13.22q/ha) was observed in genotypes JG-2020-22 followed by JG-2020-19 (14.84 q/ha), JG-2020-25 (14.86 q/ha)

Banchhor (1998) [1]. reported on 67 genotypes of chickpea against pod borer *H. armigera* (Huber) at Raipur Highest grain yield (15.74 Q/ha) was obtained from RG-995 followed by jak 9226 (15.20 Qa/ha), jaki 9218 Phule G-41 (14.08 Q/ha). GCP-101 (13.64 Q/ha), CSG 90019 (13.26 Q/ha). BKG5020 (12.14 Q/ha) all being at par with each other PBG-5 had the highest pod damage (27.93%) and lowest grain yield (2.98 Q/ha).

Mishra *et. al.* (2007) [7]. worked that the 43 genotypes that the mean larval population in different genotype ranged between 3.26-6.42 larvae/mrl during different phages of crop growth. Pod damage by *H. armigera* in different chickpea genotype varied from 8.45-58.55%. Genotype C2-35 has significantly lowest pod damage (18.45). Highest seed yield (22.40q/ha) was observed in genotype ICC-14872.

Birle (2014) [2] reported that the chickpea genotypes namely C-410, C-426, C-424 and C-415 registered lowest population (0.10, 0.23, 0.27 and 0.28 larva) of *H. armigera* followed by genotype C-409, C-417 and C-416 that registered mean population of 0.32 larva/0.5 m2.

Kumar *et. al.* (2018) [4] studies overall lowest mean larval population on Pusa 391 closely followed by RSG 888. The overall highest mean larval population (4.46) was recorded on JGK 1 which was at par with GJG 3, JAKI 9218, JG 315, JG 63 and JG 218. The maximum percent pod damage (15.52%) was observed on JKG 1 genotype and minimum percent pod damage (2.27%) in Pusa.

Choudhary *et. al.* (2014) [3] worked on screening of chickpea genotypes, dates of sowing of *H. armigera* (Hub.) on chickpea at experimental farm, College of Agriculture, Bikaner during *Rabi* season in 2005-06. Ten genotypes of chickpea were tested for relative incidence of the pest. Among these varieties RSG-44 and RSG-945 were found to be highly susceptible followed by CSJ-104, RSG-959, RSG-895, RSG-888, RSG-897 and RSG-973 as moderately susceptible while, CSJD-884 and RSG-931 as least susceptible. The maximum yield was obtained in CSJD-884 (14.54 q per ha) at par with RSG-931 (14.36 q per ha), while lowest yield was from RSG-44 (11.13 q per ha). The experiment on dates of sowing revealed that early sown crop (5th October) had the lowest larval population (2.50 larvae per five plants) of gram pod borer, minimum pod damage (14.50 percent) with relatively

better yield (13.04 q per ha) as compared to late sown (20th November) crop with higher larval population (6.13 larvae per five plants), higher pod damage (28.96 percent) and lower yield (9.77 q per ha).

Table 1: Larval population of *H. armigera* on promising genotypes 21 DAS to 76 DAS during rabi 2020-21

Genotypes	Population of *H. armigera larvae*/mrl								
	21 DAS	27 DAS	34 DAS	41 DAS	48 DAS	55 DAS	62 DAS	69 DAS	76 DAS
JG-2020-16	0.38	0.39	0.40	0.44	0.74	0.81	1.00	1.51	1.56
	(0.94)	(0.94)	(0.95)	(0.97)	(1.11)	(1.14)	(1.22)	(1.42)	(1.44)
JG-2020-17	0.33	0.37	0.38	0.41	0.71	0.75	1.05	1.54	1.58
	(0.91)	(0.93)	(0.94)	(0.95)	(1.10)	(1.12	(1.24)	(1.43)	(1.44)
JG-2020-18	0.34	0.39	0.39	0.42	0.73	0.78	1.11	1.61	1.66
	(0.92)	(0.94)	(0.94)	(0.96)	(1.11)	(1.13)	(1.27)	(1.45)	(1.47)
JG-2020-19	0.79	0.79	0.79	0.85	1.21	1.27	2.10	2.56	2.59
	(1.14)	(1.14)	(1.14)	(1.16)	(1.31)	(1.33)	(1.61)	(1.75)	(1.76)
JG-2020-20	0.78	0.78	0.78	0.80	1.20	1.25	1.99	2.49	2.53
	(1.13)	(1.13)	(1.13)	(1.14)	(1.30)	(1.32)	(1.58)	(1.73)	(1.74)
JG-2020-21	0.63	0.68	0.65	0.70	1.09	1.10	1.90	2.37	2.40
	(1.06)	(1.09)	(1.07)	(1.10)	(1.26)	(1.26)	(1.55)	(1.69)	(1.70)
JG-2020-22	0.80	0.80	0.80	0.86	1.25	1.31	2.10	2.58	2.62
	(1.14)	(1.14)	(1.14)	(1.17)	(1.32)	(1.35)	(1.61)	(1.75)	(1.77)
JG-2020-23	0.82	0.82	0.82	0.87	1.28	1.33	2.00	2.49	2.51
	(1.15)	(1.15)	(1.15)	(1.17)	(1.33)	(1.35)	(1.58)	(1.73)	(1.73)
JG-2020-24	0.6	0.6	0.6	0.7	1.1	1.1	1.9	2.4	2.4
	(1.05)	(1.05)	(1.05)	(1.10)	(1.26)	(1.26)	(1.56)	(1.69)	(1.70)
JG-2020-25	0.6	0.6	0.6	0.6	1.0	1.1	1.9	2.4	2.4
	(1.05)	(1.05)	(1.05)	(1.05)	(1.22)	(1.26)	(1.55)	(1.70)	(1.71)
JG-2020-26	0.55	0.57	0.57	0.66	1.00	1.01	1.52	2.00	2.12
	(1.02)	(1.03)	(1.03)	(1.08)	(1.22)	(1.23)	(1.42)	(1.58)	(1.62)
JG-2020-27	0.50	0.55	0.55	0.60	0.95	0.99	1.20	1.72	1.76
	(1.00)	(1.02)	(1.02)	(1.05)	(1.20)	(1.22)	(1.30)	(1.49)	(1.50)
JG-2020-28	0.84	0.84	0.84	0.88	1.30	1.35	1.80	2.29	2.32
	(1.16)	(1.16)	(1.16)	(1.17)	(1.34)	(1.36)	(1.52)	(1.67)	(1.68)
JG-2020-29	0.35	0.40	0.41	0.43	0.75	0.80	1.22	1.69	1.73
	(0.92)	(0.95)	(0.95)	(0.96)	(1.12)	(1.14)	(1.31)	(1.48)	(1.49)
JG-2020-30	0.30	0.36	0.35	0.38	0.69	0.71	1.25	1.72	1.75
	(0.89)	(0.93)	(0.92)	(0.94)	(1.09)	(1.10)	(1.32)	(1.49)	(1.50)
SEm±	0.03	0.04	0.04	0.04	0.03	0.04	0.04	0.05	0.05
CD (p=0.05)	0.09	0.10	0.11	0.12	0.09	0.12	0.11	0.15	0.16

Figures in the parentheses are √ X +0.5 values

Table 2: Larval population of *H. armigera* on promising genotypes 83 DAS to 111 DAS with Means all genotypes during rabi 2020-21

Genotypes	Population of *H. armigera*/ mrl					
	83 DAS	90 DAS	97 DAS*	104 DAS	111 DAS	Mean
JG-2020-16	1.81	2.19	3.49	2.32	1.22	1.14
	(1.52)	(1.64)	(2.00)	(1.68)	(1.31)	1.28
JG-2020-17	1.86	2.29	3.35	2.25	1.26	1.13
	(1.54)	(1.67)	(1.96)	(1.66)	(1.33)	1.28
JG-2020-18	1.93	2.33	3.40	2.29	1.31	1.17
	(1.56)	(1.68)	(1.97)	(1.67)	(1.35)	1.29
JG-2020-19	2.85	3.74	4.51	3.76	2.28	1.85
	(1.83)	(2.06)	(2.24)	(2.02)	(1.67)	1.53
JG-2020-20	2.82	3.70	4.45	3.75	2.18	1.84
	(1.82)	(2.05)	(2.22)	(2.06)	(1.64)	1.53
JG-2020-21	2.89	3.21	3.96	3.28	2.08	1.68
	(1.84)	(1.93)	(2.11)	(1.94)	(1.61)	1.48
JG-2020-22	2.90	3.75	4.55	3.80	2.30	1.90
	(1.84)	(2.06)	(2.25)	(2.07)	(1.67)	1.55
JG-2020-23	2.79	3.71	4.59	3.81	2.20	1.88
	(1.81)	(2.05)	(2.26)	(2.08)	(1.64)	1.54
JG-2020-24	2.7	3.2	3.9	3.3	2.1	1.7
	(1.77)	(1.92)	(2.10)	(1.95)	(1.60)	1.47
JG-2020-25	2.7	3.2	3.9	3.2	2.1	1.6
	(1.79)	(1.92)	(2.10)	(1.92)	(1.61)	1.46
JG-2020-26	2.31	3.15	3.82	3.19	1.71	1.51
	(1.68)	(1.91)	(2.08)	(1.92)	(1.49)	1.42
JG-2020-27	2.03	3.05	3.75	3.12	1.41	1.39
	(1.59)	(1.88)	(2.06)	(1.90)	(1.38)	1.37

JG-2020-28	2.60	3.75	4.60	3.83	2.00	1.83
	(1.76)	(2.06)	(2.26)	(2.08)	(1.58)	1.53
JG-2020-29	2.01	2.25	3.44	2.30	1.40	1.20
	(1.58)	(1.66)	(1.98)	(1.67)	(1.38)	1.30
JG-2020-30	2.06	2.25	3.29	2.21	1.43	1.17
	(1.60)	(1.66)	(1.95)	(1.65)	(1.39)	1.29
SEm+	0.05	0.06	0.08	0.06	0.04	0.07
CD (p=0.05)	0.13	0.18	0.23	0.17	0.13	0.20

Figures in the parentheses are √ X +0.5 values

Table 3: Screening of promising genotypes pod damage (%) and yield in chickpea

Genotypes	Pod damage (%)	Yield q/ha.
JG-2020-16	16.84 (24.23)	22.92
JG-2020-17	10.23 (18.65)	23.49
JG-2020-18	13.62 (21.66)	23.29
JG-2020-19	19.20 (25.99)	14.84
JG-2020-20	19.85 (26.46)	15.47
JG-2020-21	17.32 (24.59)	19.46
JG-2020-22	20.15 (26.67)	13.22
JG-2020-23	19.55 (26.24)	17.11
JG-2020-24	17.9 (25.03)	16.44
JG-2020-25	18.1 (25.18)	14.86
JG-2020-26	18.37 (25.38)	16.89
JG-2020-27	18.47 (25.45)	15.13
JG-2020-28	19.01 (25.85)	15.22
JG-2020-29	15.62 (23.28)	22.61
JG-2020-30	12.19 (20.43)	23.24
Sem+	0.10	0.89
CD (p=0.05)	0.30	2.57

Figures in the parentheses are angular transformation values

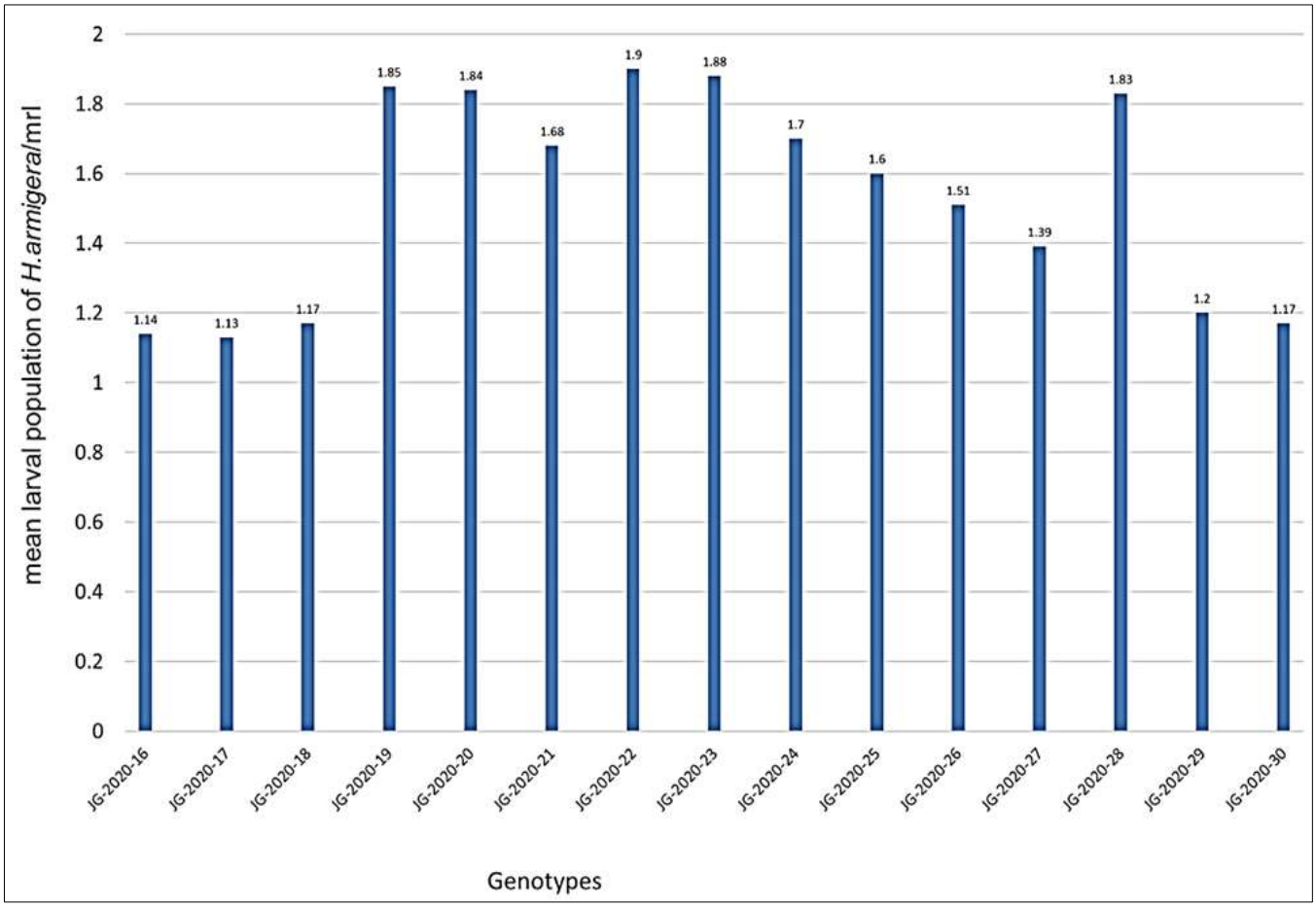

Fig 1: Mean larval pop of *H. armigera* /mrl on promising genotypes against gram pod borer in Chickpea.

4. Conclusion

The lowest mean larval population of *Helicoverpa armigera* was reported in chickpea genotype JG-2020-17, followed by JG-2020-16 and JG-2020-18, that were considered least preferred genotypes, and the maximum mean larval population was found in chickpea genotypes JG-2020-22, followed by JG-2020-23.

Genotype JG-2020-30 had the lowest amount of pod damage, followed by JG-2020-17. The genotype JG-2020-17 produced the maximum yield.

5. References

1. Banchhor G. Bio ecology and management of gram pod borer *H armigera* (Hub.) on chickpea M.Sc. Thesis, IGKV, Raipur; c1998. p. 70-71.
2. Birle L. Screening of chickpea against gram pod borer (*H. armigera* Hubner). M.Sc. Thesis, JNKVV, Jabalpur, 2014, 6p.
3. Choudhary OM, Anwala R, Sharma MM. Studies on varietal screening and date of sowing of *Helicoverpa armigera* (Hub.) on chickpea (*Cicer arietinum* (L.). Advance Research Journal of Crop Improvement. 2014;5(2):149-153.
4. Clement SL, Wightman JA, Hardie DC, Bailey P, Baker G, Mcdonald G. Opportunities for integrated management of insect pests of grain legumes. In: Knight, R. (ed.) Linking Research and Marketing opportunities for Pulses in the 21st Century Kluwer Academic, Dordrecht. The Netherlands; c2000. p. 467-480.
5. Kumar P, Ahmad MA, Kumari L, Kumar R, Kumar A, Singh A. Population dynamics of gram pod borer (*Helicoverpa armigera* Hubner) on chickpea. Journal of Pharmacognosy and Phytochemistry. 2018;7(5):967-969.
6. Leuck B, Hammons R, Morgan IW, Harvey JE. Insect preference for peanut varieties. Journal of Economic Entomology; c1967. p. 1546-1549.
7. Mishra A. Performance of chickpea genotypes against *Helicoverpa armigera* (Hub.) M.Sc. (Ag) Entomology. thesis submitted to JNKVV, Jabalpur, (M.P.). (unpublished); c2007.
8. Sarwar M. Survey on screening resistance resources in some chickpea (*Cicer arietinum* L.) genotypes against gram pod borer *Helicoverpa armigera* (Hubner) (Lepidoptera: Noctuidae) pest. International Journal of Agriculture Science. 2013;3(3):455-458.
9. Saxena MC. Chickpea in the WANA region: An overview: Adaptation of chickpea in the West Asia and North Africa Region, ICRISAT Patancheru, India; c1996, p. 3-6.
10. Sharma HC. Techniques to screen for resistance to cotton bollworm/ legume pod borer. *Helicoverpa armigera*. In Souvenir, National Symposium on *Helicoverpa* Management: A National Challenge, Feb 2005. Indian Society of Pulses Research and Development, Indian lnstitute of Pulses Research. Kanpur, Uttar Pradesh, India; c2005.
11. Source-Agriculture at a Glance. Directorate of Economics and Statistics, Department of Agriculture Cooperation & Farmers Welfare, Govt. of India, New Delhi; c2019.