Journal of Entomology and Zoology Studies

Available online at www.entomoljournal.com

E-ISSN: 2320-7078
P-ISSN: 2349-6800
JEZS 2018; 6(3): 1821-1824

Received: 20-03-2018
Accepted: 24-04-2018

Anubhav Galav
Department of Agriculture Entomology, Jawaharlal Nehru Krishi Vishwa Vidyalaya Jabalpur Madhya Pradesh, India

AK Bhowmick
Department of Agriculture Entomology, Jawaharlal Nehru Krishi Vishwa Vidyalaya Jabalpur Madhya Pradesh, India

Anubhuti Pandey
Department of Agriculture Entomology, Jawaharlal Nehru Krishi Vishwa Vidyalaya Jabalpur Madhya Pradesh, India

Ravindra Meena
Department of Soil Science & Agricultural Chemistry, Institute of Agriculture Science, Banaras Hindu University Varanasi, Uttar Pradesh, India

Correspondence
Anubhav Galav
Department of Agriculture Entomology, Jawaharlal Nehru Krishi Vishwa Vidyalaya Jabalpur Madhya Pradesh, India

Study on resistive effect in different genotypes of deshi chickpea against *Helicoverpa armigera* (H)

Anubhav Galav, AK Bhowmick, Anubhuti Pandey and Ravindra Meena

Abstract
Chickpea (*Cicer arietinum* L.) are one of the oldest and most widely consumed legumes in the world, particularly in tropical and subtropical areas. This study was conducted at Breeding farm of AICRP chickpea JNKVV Jabalpur. Screening of different genotypes of chickpea against *Helicoverpa armigera* (H) was done within the 15 genotypes of deshi chickpea named as T_1 (JG 31), T_2 (ICCV 07117), T_3 (JG 130×ICC 11551), T_4 JG 14-16×JG 11), T_5 (JG 24), T_6 (DRRJ 2×KAK 2), T_7 (JG 30), T_8 (JG 9605), T_9 (JG 14-11), T_{10} (JG 14), T_{11} (JG 14×IPC 4958), T_{12} (JG 14-16), T_{13} (JG 32), T_{14} (JG 74×IPC 4958), T_{15} (JGG2). The experiment is replicated thrice under randomized block design. Significantly least (0.46 larvae/plant) population was recorded in the genotype JG14-16XJG11 and genotypes ICCV 07117 (0.48 larvae/plant), while the genotype JG 130 X ICC 11551 had the highest population (0.81 larvae/plant) and JGG 2 (0.75 larvae/plant) and JG 14-16 X JG 11 had significantly lowest pod damage (09.73%) among all the deshi genotypes, followed by ICCV 07117 (11.23%), on the other side highest pod damage percentage was noted in the genotypes JG 130 X ICC 11551 (23.91%), followed by JG 9605 (23.73%).

Keywords: Chick pea, genotype, larval population, *Helicoverpa armigera*

Introduction
Chickpea (*Cicer arietinum* L.) is one of the oldest and most widely consumed legume in the world, particularly in tropical and subtropical areas. India is the largest producer of chickpea followed by Pakistan, Turkey and Iran. In fact, about 70% of total world production of chickpeas is dominated by India. (Anonymous, 2016).India occupies the first position in the world in terms of area (69%) and production (77%). In India crop occupies 9.01 million hectare area with production of 7.70 million tonnes and 915 kg/ha productivity. In Madhya Pradesh chickpea is cultivated in 3.07 million hectare with an annual production of 3.29 million tonnes and productivity of 1082 kg/ha and in Rajasthan production is 0.91 million tonne (STAT 2014-15).

Abiotic and Biotic stresses are the major factors affecting the productivity of chickpea in India in both positive and negative manner. To keep pace with the demand of the ever increasing human population of the country, there is an urgent need to increase the production of chickpea for the fulfillment of protien. One of the most practical means of increasing chickpea production is to minimize losses caused by the biotic factors, which include insect-pests, diseases and weeds under field conditions. Gram pod borer, *Helicoverpa armigera* (H) in field is considered a key pest. Gram pod borer, *Helicoverpa armigera* (H) causing around 29% yield losses in chickpea at the national level. In M.P., it infested mainly chickpea and linseed in rabi and pigeonpea, tomato and cotton in *kharif* and so in other states

This pest is highly polyphagous and has been reported to feed on more than 181 plant species belonging to 45 families, 40 dicots and 5 monocots. The young larvae feed on tender portion of the leaves and shoots by making scratches. Second instar and subsequent grown-up larvae consume whole leaf, leaf buds, flower buds, and flowers. Under Severe pest infestation, whole crop may get defoliated. On development of pods, the larvae make hole in the pods and move inside to feed on grains. A single larva is capable of destroying 30-40 pods in its larval period (Chaudhary and Chaudhary, 1975) [7].

However, such high quantum in yield and farmers economy losses can be lowered by the adoption of improved technologies for its cultivation, which include the sowing of pest resistant/tolerant variety at the optimum time supported with recommended agronomic manipulations. It is considered as a simple, easy, cheap and ideal method of combating pest problems from farmer point of view, this can be most acceptable from pest control technique. Therefore the present investigation study on resistive effect in different genotypes of deshi chickpea against *Helicoverpa armigera* (H) is done.

Material and Methods

This chapter includes details of the material used and methodology followed during the course of present investigations. In accordance with the objectives, the studies were divided into three sections as detailed below. Study on resistive effect in different genotypes of deshi chickpea against *Helicoverpa armigera* (H)

Location

The present investigation entitled, "Studies on different genotypes of chickpea against *Helicoverpa armigera* (Hubner) in field and *Callosobruchus chinensis* (L) in storage" was carried out in the Plant Breeding farm of AICRP in Chickpea (Lead Center) ICAR and practical lab of AICRP in Chickpea (Lead Center) ICAR respectively at JNKVV campus during *rabi* 2013-14.

Study on resistive effect in different genotypes of deshi chickpea against *Helicoverpa armigera* (H)

Details of experiment

Crop	: -	Chickpea (Deshi)
Number of genotypes	: -	15
Design	: -	R.B.D.
Replications	: -	Three (03)
Treatments	: -	15 (Untreated)
Plot size	: -	4 m X 1.2 m
Row to row spacing	: -	0.30 m
Date of sowing	: -	18/11/2013

Observation for Experiment No. 1

1. The observations on Screening of susceptibility was recorded twice in a week by counting the number of larvae on plants of one meter row length at 5 random places in each plot without any insecticidal treatment.
2. Observations on the pest population were recorded at each meteorological week, from one week after germination to harvest of the crop.
3. Percent pod damage and seed yield was recorded at the time of maturity by counting the number of total pods and damage pods per plants and average.

Results

In the present investigation on "Study on resistive effect in different genotypes of deshi chickpea against *Helicoverpa armigera* (H)" Larval population of *Helicoverpa armigera* were recorded on different chickpea genotypes at standard week interval and presented in table. All the genotypes of chickpea grouped into categories (least, moderate, and highly susceptible) on the basis of larval population.

The data showed significant different among the screened deshi genotypes of chickpea. Significantly least (0.46 larvae/plant) population was recorded in the genotype JG14-16XJG11. The genotypes ICCV 07117 (0.48 larvae/plant), JG 24 (0.50 larvae/plant), JG 32 (0.51 larvae/plant), JG 74 X IPC 4958 (0.52 larvae/plant), were found at par to each other respect of larval population/plant but significantly lower than remaining genotypes.

The genotypes JG 14 X IPC 4958, JG 30, JG 14-16, DRRJ 2 X KAK 2 were found more or less susceptible to *Helicoverpa armigera* and on the other side significantly highest population (0.81 larvae/plant) was recorded in the genotype JG 130 X ICC 11551. And it was at par with the genotypes JGG 2 (0.75 larvae/plant), JG 9605 (0.73 larvae/plant), JG 31 (0.70 larvae/plant), JG 14 (0.70 larvae/plant), JG 14-11 (0.70 larvae/plant),

Damaged pod (%)

Pod damage by *H. armigera* in different chickpea genotypes varied from 09.73 to 31.99 and indicated significant difference among the screened genotypes. In chickpea deshi genotypes pod damage ranges from 09.73 to 23.91 in which JG 14-16 X JG 11 had significantly lowest pod damage (09.73%) among all the deshi genotypes, followed by ICCV 07117 (11.23%), JG 74 X IPC 4958 (11.48%), JGG 2 (12.06%), JG 14 (12.17%), JG 32 (15.41%), JG 14-16 (16.15%), JG 31 (17.40%), JG 24 (18.98%), DRRJ 2 X KAK 2 (19.82%), JG 30 (21.31%), JG-14 X IPC 4958 (22.67%), were found at par to each other.

On the other side highest pod damage percentage was noted in the genotypes JG 130 X ICC 11551 (23.91%), followed by JG 9605 (23.73%), JG 14-11 (23.07%).

Discussion

The investigation on the Study on resistive effect in different genotypes of deshi chickpea against *Helicoverpa armigera* (H), results obtained are discussed in the light of available literature.

In the present experiment, 15 Deshi chickpea genotypes were evaluated for their performance against *H. armigera*. The genotypes were evaluated considering three important parameters namely, the buildup of larval population, extent of damage done by the *Helicoverpa armigera* larvae to chickpea pods and no. of damage pods per plant. Several scientists have conducted varietal screening trials in the past and gave weightage to the above parameters Ogenga-Latigo *et al*. (1994) [13], Bhagwat and Sharma, 2000 [2], Deshmuk *et al.*, (2010) [9], Das and Katariya (1999) [8], Mandal (2003), kushwah (2006) [11], Parsai (2005) [14], Bhatt and Patel (2001) [4], Chaturvedi and Masood Ali (2010) [6], Chandraker *et al.*, (2006) [5], Jitpure (2005) [10], Bhatnagar and Rao.

In present work, JG 14-16 x JG 11 (Deshi) registered lower larval population (0.46 larvae/mrl) and less pod damage. Ogenga-Latigo *et al*. (1994) [13], reported that the number of larvae and least pod damage were recorded on ICC506 genotype which supports the present finding. The genotype JG 130 x ICC 11551 (Deshi) was recorded moderately susceptible with (0.81 larvae/mrl) during present investigation, kushwah (2006) [11] observed 2.80 larvae/10plant on JG-2004-03. As per these findings, present studies indicated that the genotype of JG 14-16 x JG 11 (Deshi) was less susceptible with (0.46 larvae/mrl). Deshmuk *et al.*, (2010) [9] observed the cultivars; Dahod Yellow and BG-256 were also less susceptible and larval population (2.52 and 2.47 larvae/plant).

Pod damage by gram pod borer larvae per plant

The minimum pod damage was recorded in genotypes JG 14-16 x JG 11 (09.73% pods/plant) these finding was confirmed with the finding of Das and Katariya (1999) [8] they reported that pod damage ranged from 2.7 percent (JG 74) to 11.4 percent (JG 89-G).

Conclusion

Present experiment entitled "Study on resistive effect in different genotypes of deshi chickpea against *Helicoverpa armigera* (H) concluded that in the genotype JG 14-16 x JG 11 had lowest mean population (0.46 larvae/mrl) shows higher resistive effect and highest (0.81 larvae/mrl) population was recorded in the genotypes JG 130 x ICC 11551shows higher susceptible effect against *Helicoverpa armigera.*

Pod damage by *H. armigera* in genotype JG 14-16 x JG 11 had significantly lowest pod damage (09.73). Hence conclusion comes that above genotype is contain most resistive properties among 15 different deshi chickpea genotypes which are used for above experiment.

Table 1: Response of Different Genotypes of Chickpea Deshi Against the Infestation of *Helicoverpa armigera* (H)

LARVAL POPULATION / ONE METER ROW LENGTH / WEEK																	
S. No.	**GENOTYPES**	**23-27 DEC**	**30-02 JAN**	**06-09 JAN**	**13-16 JAN**	**20-23 JAN**	**27-30 JAN**	**03-06 FEB**	**10-13 FEB**	**17-20 FEB**	**24-27 FEB**	**03-06 MAR**	**10-13 MAR**	**17-20 MAR**	**24-27 MAR**	**31-03 APR**	**MEAN**
T1	JG 31	0.07 (0.75)	0.10 (0.77)	0.07 (0.75)	0.23 (0.86)	0.43 (0.97)	0.40 (0.95)	0.57 (1.03)	0.20 (0.84)	0.03 (0.73)	0.00 (0.71)	0.77 (1.12)	1.23 (1.32)	1.90 (1.55)	2.53 (1.74)	1.90 (1.55)	0.70
T2	ICCV 07117	0.07 (0.75)	0.10 (0.77)	0.07 (0.75)	0.13 (0.80)	0.13 (0.80)	0.23 (0.86)	0.40 (0.95)	0.13 (0.80)	0.03 (0.73)	0.00 (0.73)	0.50 (1.00)	0.77 (1.12)	1.03 (1.24)	2.07 (1.60)	1.53 (1.42)	0.48
T3	JG 130×ICC 11551	0.00 (0.71)	0.07 (0.80)	0.10 (0.77)	0.30 (0.89)	0.40 (0.95)	0.50 (1.00)	0.60 (1.05)	0.27 (0.80)	0.03 (0.71)	0.00 (0.71)	0.83 (1.15)	1.60 (1.44)	2.13 (1.62)	2.60 (1.90)	1.70 (1.61)	0.81
T4	JG 14-16×JG 11	0.07 (0.75)	0.10 (0.77)	0.07 (0.75)	0.13 (0.80)	0.13 (0.80)	0.23 (0.86)	0.40 (0.95)	0.13 (0.80)	0.00 (0.71)	0.00 (0.71)	0.43 (0.96)	(1.03) (1.24)	1.43 (1.39)	1.77 (1.50)	0.93 (1.20)	0.46
T5	JG 24	0.00 (0.71)	0.07 (0.77)	0.07 (0.75)	0.23 (0.86)	0.23 (0.86)	0.40 (0.95)	0.57 (1.03)	0.20 (0.84)	0.07 (0.75)	0.00 (0.71)	0.67 (1.08)	1.00 (1.22)	1.30 (1.34)	1.77 (1.51)	0.83 (1.15)	0.50
T6	DRRJ 2×KAK 2	0.07 (0.75)	0.07 (0.77)	0.07 (0.75)	0.27 (0.88)	0.47 (0.98)	0.43 (0.96)	0.57 (1.03)	0.20 (0.84)	0.00 (0.71)	0.00 (0.71)	0.70 (1.09)	1.20 (1.30)	1.90 (1.55)	1.93 (1.72)	1.43 (1.51)	0.68
T7	JG 30	0.03 (0.73)	0.07 (0.77)	0.07 (0.75)	0.23 (0.86)	0.43 (0.97)	0.40 (0.95)	0.57 (1.03)	0.13 (0.80)	0.03 (0.73)	0.00 (0.71)	0.60 (1.05)	1.20 (1.30)	1.70 (1.48)	2.37 (1.69)	1.93 (1.56)	0.65
T8	JG 9605	0.00 (0.71)	0.07 (0.77)	0.07 (0.75)	0.20 (0.84)	0.37 (0.93)	0.50 (1.00)	0.60 (1.05)	0.20 (0.84)	0.07 (0.75)	0.00 (0.71)	0.77 (1.12)	1.50 (1.41)	2.00 (1.58)	2.43 (1.70)	2.13 (1.62)	0.73
T9	JG 14-11	0.07 (0.75)	0.07 (0.77)	0.07 (0.75)	0.27 (0.88)	0.47 (0.98)	0.47 (0.98)	0.67 (1.08)	0.20 (0.84)	0.00 (0.71)	0.00 (0.71)	(0.73) (1.11)	1.23 (1.32)	1.93 (1.56)	2.40 (1.70)	1.87 (1.54)	0.70
T10	JG 14	0.03 (0.73)	0.10 (0.77)	0.13 (0.79)	0.30 (0.89)	0.43 (0.97)	0.40 (0.95)	0.57 (1.03)	0.17 (0.82)	0.03 (0.73)	0.00 (0.71)	0.70 (1.09)	(1.33) (1.35)	1.80 (1.52)	2.60 (1.76)	1.93 (1.56)	0.70
T11	JG 14×IPC 4958	0.03 (0.73)	0.10 (0.77)	0.07 (0.75)	0.13 (0.80)	0.13 (0.80)	0.30 (0.89)	0.40 (0.95)	0.17 (0.82)	0.03 (0.73)	0.00 (0.71)	0.77 (1.12)	1.67 (1.47)	2.07 (1.60)	2.17 (1.63)	1.73 (1.49)	0.65
T12	JG 14-16	0.03 (0.73)	0.07 (0.77)	0.07 (0.75)	0.23 (0.86)	0.43 (0.97)	0.40 (0.95)	0.57 (1.03)	0.13 (0.80)	0.03 (0.73)	0.00 (0.71)	0.73 (1.10)	1.17 (1.29)	1.70 (1.48)	2.40 (1.70)	1.93 (1.56)	0.66
T13	JG 32	0.07 (0.75)	0.07 (0.77)	0.07 (0.75)	0.23 (0.86)	0.23 (0.86)	0.40 (0.95)	0.57 (1.03)	0.20 (0.84)	0.03 (0.73)	0.00 (0.71)	0.67 (1.08)	1.00 (1.22)	1.53 (1.42)	1.77 (1.51)	0.83 (1.15)	0.51
T14	JG 74×IPC 4958	0.03 (0.73)	0.10 (0.77)	0.07 (0.75)	0.13 (0.80)	0.13 (0.80)	0.23 (0.86)	0.40 (0.95)	0.13 (0.80)	0.00 (0.71)	0.00 (0.71)	0.67 (1.08)	1.27 (1.33)	1.57 (1.44)	1.93 (1.56)	1.20 (1.30)	0.52
T15	JG G2	0.00 (0.71)	0.07 (0.77)	0.07 (0.75)	0.20 ((0.84))	0.37 (0.93)	0.50 (1.00)	0.60 (1.05)	0.20 (0.84)	0.07 (0.75)	0.00 (0.71)	0.83 (1.15)	1.50 (1.41)	2.00 (1.58)	2.57 (1.74)	2.30 (1.67)	0.75
CD(P=0.05) Between Treatments = 0.03																	
CD(P=0.05) Between Periods Of Observations = 0.03																	
CD(P=0.05) Between Periods Of Observations × Treatments = 0.10																	

Value in the paranthesis are the transformed value

References

1. Anonymous. Agriculture Statistics at a glance Department of Agriculture Govt. of India, New Delhi, 2016.
2. Bhagwat VR, Sharma SB. Evaluation of chickpea genotypes for resistance to legume pod borer (*Helicoverpa armigera*) and root-knot nematode (Meloidogyne javanica). Indian Journal of Plant Protection. 2000; 28(1):69-73.
3. Bhatnagar A, Rao SS. Screening of chickpea against *Helicoverpa armigera* Hubner under rainfed conditions in the Bastar region of Madhya Pradesh India. International Chickpea and Pigeon pea Newsletter. 1997; 4:24-26
4. Bhatt NJ, Patel RK. Screening of chickpea cultivars for their resistance to gram pod borer, Helicoverpa armigera. Indian Journal of Entomology. 2001; 63(3):277-280.
5. Chandraker MK, Shrivastava SK, Arvind Kumar. Field screening of resistant varieties of chickpea against gram pod borer, *Helicoverpa armigera* Environment and Ecology. 2006; 24(3):728-729.
6. Chaturvedi SK, Masood Ali. Development of early maturing chickpea varieties for diversification of rice-wheat cropping system. Indian Institute of Pulses Research, 2010.
7. Chaudhary JP, Chaudhary SD. Insect pests of gram and their control Haryana Farming. 1975; 5:27-28
8. Das SB, Kataria VP. Relative susceptibility of chickpea genotypes against *Helicoverpa armigera* Hubner, 1999.
9. Deshmukh SG, Sureja BV, Jethva DM, Sonune VR, Joshi MD. Field Screening Of Chickpea Germplasms Against Pod Borer, *Helicoverpa armigera* (Hubner). Legume Research an International Journal. 2010; 33:2.
10. Jitpure LR. Screening of chickpea genotypes for resistance against gram pod borer (*Helicoverpa armigera* Hubner) M.Sc. Agriculture thesis submitted to J.N.K.V.V. Jabalpur (M.P.) (unpublished), 2005.
11. Kushwah VS. Reaction of deshi chickpea genotypes against gram pod borer (*H. armigera*). M.Sc. Agriculture thesis submitted to JNKVV, Jabalpur (M.P) (unpublished), 2006.
12. Narayanamma V, Sriramulu M, Gowda CLL, Ghaffar MA, Sharma HC. Tolerance to *Helicoverpa armigera* damage in chickpea genotypes under natural infestation. Indian Journal of Plant Protection. 2007; 35(2):227-231.
13. Ogenga N, Latigo W, Obuo JE, Orolin. Infestation and pod damage by *Helicoverpa armigera* (Hubner) on chickpea. International Journal Pest Management. 1994; 40(3):245-248.
14. Parsai SK. Damage by pod boer, H. armigera (Hub.) to different varieties of chickpea. *Food legumes.* 2005; 21(2):135-136.
15. Patel GK, Kashiya DJ. Population dynamic of *Helicoverpa armigera* (Hub.) hardwick on cotton,

pigeonpea and chickpea. Gujrat agriculture University Research Journal. 1999; 24(2):62-67.
16. Reddy, Singh PV, Yeshbir, Singh SP. Chickpea varietal response to pod borer (*H. armigera*) crop. Indian Journal. Entomology. 1996; 59(4):359-361.
17. Sarwar M, Ahmad N, Toufiq M. Indentification of susceptible and tolerant gram (*Cicer arietinum* L.) genotypes against gram pod borer *Helicoverpa armigera* (Hubner) Pakistan Journal of Botanical. 2011; 43(2):1265-1270.
18. Shrivastava SK. Relative preference of different chickpea genotypes by *Helicoverpa armigera* (Hubner) and estimation of yield losses under late sown condition. Indian Journal of Pulses Research. 2003; 16(2):144-146.
19. Singh SS, Yadav SK. Evaluation of chickpea varieties for their resistance against gram pod borer, *Helicoverpa armigera* (Hubner). Indian Journal of Entomology 2006; 68(4):321-324