



STUDY OF LARVAL PARASITOID (*CAMPOLETIS CHLORIDEAE* UCHIDA) PARASITIZE TO GRAM POD BORER (*HELICOVERPA ARMIGERA* HUB.) ON CHICKPEAS (*CICER ARIETINUM* LINN.) CROP

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Abstract- The experiment was conducted during the *rabi* season of 2012-13 at live stock farm, Adhartal, JNKVV, Jabalpur (MP) variety i.e. JG-315 plot size 5x3 sq. m. and replication 3 times. The pod borer *Helicoverpa armigera* is the most serious insect pest in the most of the chickpea growing areas of the country. Study the parasitization (%) of *H. armigera* by *Campoletis chloridae* Uchida in the laboratory. The observation of natural enemies (*C. chloridae*) were also recorded by collecting the larvae from one meter row length and reared in the laboratory. The numbers of healthy and parasitized larvae were recorded and calculate the per cent parasitization of *H. armigera* larvae under field condition. Second instar larvae of *H. armigera* were collected from the untreated chickpea plot and put separately into the Petridis. Fresh leaves were provided daily and counted the parasitized larvae. No. of *H. armigera* larvae were changed weekly and parasitization (%) per week were calculated. Only one species of parasitoid *C. chloridae*, (Hymenoptera: Ichneumonidae) was observed parasitizing early in star larvae of *H. armigera* on chickpea under field conditions. The per cent parasitization of *H. armigera* by *C. chloridae* was observed ranging from 10% to 35% during the period of investigation. In the 1st SW, (first week of January 2013) 20% parasitization was observed, when the maximum and minimum temperature was (25.3°C & 7.1°C) respectively, and morning & evening relative humidity was (88% & 29%) respectively. The peak per cent parasitization (35 %) was observed in the 52nd SW, fifth week of December when the maximum and minimum temperature was (23.8°C & 5.0°C) respectively, and morning & evening relative humidity was (90% & 30%) respectively and there was no rainfall. Then after the per cent parasitization was decreased in the 1st and 2nd SW, (20% & 13.33%) respectively. It was observed when the maximum and minimum temperature showed decreasing trend and morning & evening relative humidity also showed decreasing trend.

Keywords- Chick pea, Parasitoid, Gram Pod Borer.

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Introduction

Chickpea (*C. arietinum* Linn., Leguminaceae) is one of the most important *rabi* pulse crop of India, cultivated in 9.01 million hectare of an annual production 7.58 million tonnes with productivity of 841 kg/ha [1]. In Madhya Pradesh chickpea is cultivated in 3.04 million hectare with an annual production of 3.29 million tonnes and productivity of 1082 kg/ha [1]. It has an important place in the diet of Indian people because it gives comparatively more protein, vitamins and minerals than any other food grains. It has 21.1% protein, 6.15% carbohydrate and 4.5% fat. [2]. Production of chickpea in our country is low, one of the major reason is the losses caused by several pests and diseases, both in field and in storage. It is attacked by number of insect pest among them; the gram pod borer (*H. armigera*) is the most serious insect pest in the most of the chickpea growing areas of the country [3].

Materials and Methods

An experiment was conducted in the laboratory to observe the "Study of larval parasitoid *C. chloridae* Uchida parasitize to gram pod borer (*H. armigera* hub.) on chickpea (*C. arietinum* Linn.) crop". During *rabi* season of 2012-13 at plant breeding experimental field, college of agriculture JNKVV Jabalpur (M.P.) The observation of natural enemies (*C. chloridae*) were also recorded by collecting the larvae from one meter row length and reared in the laboratory. The number of healthy and parasitized larvae was recorded and calculates the per cent parasitization of *H. armigera* larvae under field condition. Second instar larvae of *H. armigera* were collected from the untreated chickpea plot and put separately into the Petridis. Fresh leaves were provided daily and counted the parasitized larvae. No. of *H. armigera* larvae were changed weekly and parasitization (%) per

week were calculated.

Statistical analysis of Correlation and regression of the weather (abiotic) factors on major insects were worked out by using the formula as suggested by [7].

$$\text{Correlation 'r'} = \frac{\sum xy - \frac{\sum x \cdot \sum y}{n}}{\sqrt{\left\{\sum x^2 - \frac{(\sum x)^2}{n}\right\} \left\{\sum y^2 - \frac{(\sum y)^2}{n}\right\}}}$$

Test of significance 't'

$$t = \frac{r}{\sqrt{1-r^2}} \sqrt{n-2}$$

Result

Parasitization (%) due to larval parasitoid *C. chloridae* on *H. armigera*

Only one species of parasitoid *C. chloridae*, Uchida (Hymenoptera: Ichneumonidae) was observed parasitizing early instar larvae of *H. armigera* on chickpea under field conditions. The per cent parasitization of *H. armigera* by *C. chloridae* was observed ranging from 10% to 35% during the period of investigation. In the 1st SW, (first week of January 2013) 20% parasitization was observed, when the maximum and minimum temperature was (25.3°C & 7.1°C) respectively, and morning & evening relative humidity was (88% & 29%) respectively.

The peak per cent parasitization was observed in the 52nd SW, fifth week of December when the maximum and minimum temperature was (23.8°C & 5.0°C) respectively, and morning & evening relative humidity was (90% & 30%)

respectively and there was no rainfall. Then after the per cent parasitization was decreased in the 1st and 2nd SW, (20% & 13.33%) respectively was observed when the maximum and minimum temperature showed decreasing trend and morning & evening relative humidity also showed decreasing trend.

The per cent parasitization was increased in the 3rd SW, (third week of January 2013) 22% was observed when the maximum and minimum temperature was (26.7°C & 10.1°C) respectively, and morning & evening relative humidity was 84% & 36% respectively and there was no rainfall. In the 8th SW, (fourth week of February 2013) the per cent parasitization was observed decrease 13.33% when the maximum and minimum temperature was (25°C & 11°C) respectively, and morning & evening relative humidity was (93% & 49%) respectively and there was 55.4 mm rainfall.

The per cent parasitization was constant in the 9th and 10th SW, (last week of February 2013 & first week of March 2013) 16% was observed when the maximum and minimum temperature was showed increasing trend and morning & evening relative humidity was showed decreasing trend and there was 4.8 mm rainfall in the 9th SW. The minimum per cent parasitization was observed in the (6th and 13th SW), 10% when the maximum temperature was (25.9°C & 33.8°C) and minimum temperature was (11.3°C & 16.2°C) respectively, and morning & evening relative humidity was (88% & 76%) and (49% & 30%) respectively, and there was (1 mm & 7.8 mm) rainfall [Table-1].

Table-1 Parasitization (%) due to *C. chloridae* on larvae of *H. armigera*. (2012-2013)

SW	Date	No. of Larvae	No. of Parasitized Larvae	Parasitization (%)
52	26/12/12-01/01/13	20	7	35
1	02/01/13-08/01/13	20	4	20
2	09/01/13-15/01/13	30	4	13.33
3	16/01/13-22/01/13	40	9	22.5
4	23/01/13-29/01/13	30	4	13.33
5	30/01/13-05/02/13	30	5	16.33
6	06/02/13-12/02/13	30	3	10
7	13/02/13-19/02/13	30	6	20
8	20/02/13-26/02/13	30	4	13.33
9	27/02/13-05/03/13	25	4	16
10	06/03/13-12/03/13	25	4	16
11	13/03/13-19/03/13	30	5	16.66
12	20/03/13-26/03/13	30	6	20
13	27/03/13-02/04/13	30	3	10

Correlation co-efficient between abiotic factors and per cent parasitization due to *C. chloridae* on *H. armigera* in chickpea crop.

The correlation coefficient results of per cent parasitization of *H. armigera* larvae and abiotic factors during *rabi* season [Table -2] showed that the maximum and minimum temperature had negative correlation with per cent parasitization of *H. armigera* is ($r = -0.18$) and ($r = -0.32$). It was found positive correlation was established in morning relative humidity and per cent parasitization of *H. armigera* was ($r = 0.16$) and negative correlation was found with evening relative humidity and per cent parasitization of *H. armigera* was ($r = -0.24$). The rainfall as well as vapour pressure (morning and evening) had negatively correlated with per cent parasitization of *H. armigera* and it was found non significant such as ($r = -0.01$) and ($r = -0.35$ & -0.36).

Table-2 Correlation co-efficient between abiotic factors and per cent parasitization due to *C. chloridae* on *H. armigera* in chickpea crop.

Abiotic Parameters	r value	t-calculated
Temp. Max.	-0.18 NS	0.63
Temp. Min	-0.32 NS	1.20
R.H. morning	0.16 NS	0.58
R.H. evening	-0.24 NS	0.89
Rainfall	-0.01 NS	0.05
Sunshine	0.26 NS	0.94
Wind speed	0.23 NS	0.82
Vap. Pre. (mor.)	-0.35 NS	1.30
Vap. Pre. (eve.)	-0.36 NS	1.36

(NS- Non significant)

Discussion

Parasitization (%) of larval parasitoid *C. chloridae*.

In natural, per cent parasitization studies only one species of parasitoid i.e., *C. chloridae* was found to parasitize on *H. armigera* on chickpea. The peak per cent parasitization (35%) was recorded in the month December, 2012 (5th SW) at vegetative stage of crop. [4] His have mentioned the larval population was fairly low during December and the rate of parasitism by the ichneumonid *C. chloridae* was high. [4,5] studied on natural mortality of *H. armigera* (Hubner) (Lepidoptera: Noctuidae) due to different natural enemies on chickpea. (*Cicer arietinum* L.) [5]. It can be concluded that among different natural enemies, parasitoids *C. chloridae* are the most promising naturally occurring bio-control agents of *H. armigera* [6] His have mentioned *C. chloridae* has to be a potent parasitoid in chickpea ecosystem and has a great significance in biological control of *H. armigera* on chickpea [6].

Conflict of Interest: None declared

References

- [1] Anonymous FAOSTAT (2012) Area and production of chickpea.
- [2] Ahlawat I.P.S. and Omparkash (1995) *Principles of Agronomy and Crops*, p. 43.
- [3] Begum N., Hussain M and Choudhary S.I. (1992) *Int. Chickpea Newslet.*, 27,19-21.
- [4] Prasad D., Chand P., Deka N.K., Prasad R. (1989) *Giornale Italiano di Entomologia*, 4(22), 223 -228.
- [5] Sujata Jana, Joshi N., Virk J.S. and Haque M. (2010) *Annals of Biology*, 26(1), 71-78.
- [6] Pandey Kirti and Kumar Prabhat (2006) *Indian J. of Entomology*, 68(4), 410-411.
- [7] Snedecor G.W. and Cochran W.G. (1967) *Statistical Methods*. Oxford and IBH Publishing Company. New Delhi. 1-292.