Research Paper :

Population dynamics of pod borer, *Helicoverpa armigera* (Hubner) infesting chickpea

V.P. CHATAR, K.L. RAGHVANI, M.D. JOSHI, S.M. GHADGE, S.G. DESHMUKH AND S.K. DALAVE

International Journal of Plant Protection (April, 2010), Vol. 3 No. 1 : 65-67

See end of the article for authors' affiliations

Correspondence to :
M.D. JOSHI
Department of Entomology, College of Agriculture, Junagadh Agricultural University, JUNAGADH (GUJARAT) INDIA

SUMMARY

The results of the investigation on population dynamics of chickpea pod borer, *Helicoverpa armigera* (Hubner) on chickpea revealed that the pest appeared from 2nd week of December and attained a peak of 3.12 larvae per plant during 2nd week of January. The pest was active during the last week of December to 3rd week of January. Later on, the pest population declined gradually towards the maturity of the crop. Correlation of *H. armigera* with different weather parameters indicated that maximum temperature exhibited highly significant negative correlation (r= -0.7514) with larval population of *H. armigera*, whereas, minimum temperature (r= -0.5771) and mean temperature (r= -0.6836) exhibited significant negative correlation. However, the pest population showed highly significant positive correlation with morning relative humidity (r= 0.7098), evening relative humidity (r= 0.7293) and mean relative humidity (r= 0.8063).

Key words : Pod borer, *Helicoverpa armigera*, Chickpea, Population dynamic

Accepted :* *January, 2010

Among various pulses, chickpea is one of the important leguminous crops. In Gujarat, area under chickpea was 1.97 lakh hectares with total production of 1.872 lakh tonnes and productivity of 950 kg/ha (Anonymous, 2008). Among the various factors responsible for low yield of chickpea in India, *H. armigera* is most important which cause very heavy losses in yield. In India, losses caused by *H. armigera* on chickpea and pigeon pea field exceeds Rs. 12,000/- million per year (Anonymous, 1996). It has been reported 3.6-72.8% pod damage in chickpea (Patnaik *et al.*, 1991). Excessive use of the chemicals not only causes the economical restrain on farmers but also produces the harmful side effects on the environment as well as human being. The best way to overcome this situation is to destroy the pest at its initial stage of the life cycle. This is possible if timely prediction of the occurrence of the pest can be made. Hence, an attempt has been made to investigate the sensitivity of the incidence of pod borer, *H. armigera* infesting chickpea to the different meteorological parameters.

MATERIALS AND METHODS

The experiment on the population dynamics of *H. armigera* on chickpea was carried out on variety GG-1 during *Rabi*- 2008-09 at Instructional Farm, College of Agriculture, Junagadh Agriculture University, Junagadh. The crop was kept unsprayed through out the season. The crop area of 180 sq.m. was divided into 10 quadrates (5.0 m x 3.6 m) and the larval population was recorded on five randomly selected plants from each quadrate at weekly interval on standard weather week basis. With a view to study the impact of different weather parameters on pest incidence, a simple correlation between population of the pest and weather parameters was worked out. Weekly meteorological data were obtained from Meteorological Observatory, Junagadh Agriculture University, Junagadh recorded during present experimental period.

RESULTS AND DISCUSSION

The data summarized in Table1 revealed that the pest population of *H. armigera* ranged from 0.68 to 3.12 larvae per plant during the season. The pest commenced in 2nd week of December with 0.68 larvae per plant, which gradually increased and attained a peak (3.12 larvae per plant) during 2nd week of January (9th week after sowing). Further, the pest population gradually declined (0.08 larvae per plant) towards the maturity of the crop at 14th week after sowing (3rd week of February). It indicated that the pest was active during

Table 1 : Population dynamics of pod borer, *Helicoverpa armigera* (Hubner) on chickpea variety GG-1 during *Rabi* 2008-09

Weeks after sowing	Standard week	Date of observation	Mean larval population / plant
2	47	24/11/08	0.00
3	48	01/12/08	0.00
4	49	08/12/08	0.68
5	50	15/12/08	0.80
6	51	22/12/08	1.35
7	52	29/12/08	2.58
8	1	05/01/09	2.70
9	2	12/01/09	3.12
10	3	19/01/09	2.62
11	4	26/01/09	2.48
12	5	02/02/09	1.12
13	6	09/02/09	0.64
14	7	16/02/09	0.08
15	8	23/02/09	0.00

Table 2 : Correlation co-efficient between weather parameter and larval population of *H. armigera* infesting chickpea

Population	Temperature (^{0}C)			Relative humidity (%)			Mean bright sunshine hours	Wind velocity (Km/hr)
	Max.	Min.	Mean	Morning	Evening	Mean		
H. armigera	-0.7514**	-0.5771*	-0.6836**	0.7098**	0.7293**	0.8063**	-0.2365	-0.1485

* and ** indicate of significance of values at P = 0.05 (r = ± 0.514) and 0.01(r = ± 0.641), respectively,

January. This period coincided with the flowering and pod formation stage of the crop.

Patnaik and Senapati (1996) observed that the larval activity peaked between the 50th and 2nd standard weeks (*i.e.* 2nd week of December to 2nd week of January). Almost same observation was noticed by Jadhav and Suryawanshi (1998) and Tripathy *et al.* (1999). Thus, the present observations on incidence of *H. armigera* on chickpea crop are more or less in accordance with the earlier reports.

The data (Table 2) indicated that the larval population of *H. armigera* exhibited a highly significant negative correlation with maximum temperature (r = - 0.7514), whereas, minimum temperature and mean temperature showed significantly negative correlation with larval population of *H. armigera i.e.* r= -0.5771 and r= -0.6836, respectively. While, the pest population showed highly significant positive correlation with morning relative humidity (r= 0.7098), evening relative humidity (r= 0.7293) and mean relative humidity (r= 0.8063). Mean bright sunshine hours (r= -0.2365) and wind speed (r= - 0.1485) exhibited negative correlation with larval population of *H. armiger*. However, it was statistically non-significant. The results obtained by Patnaik and Senapati (1996) and Dahiya *et al.* (1997) support the present findings.

Authors' affiliations:
V.P. CHATAR, K.L. RAGHVANI, S.M. GHADGE, S.G. DESHMUKH AND S.K. DESHMUKH, Department of Entomology, College of Agriculture, Junagadh Agricultural University, JUNAGADH (GUJARAT) INDIA

REFERENCES

Anonymous (1996). Annual Report, ICRISAT, Patancheru, Andhra Pradesh.

Anonymous (2008). Directorate of Agriculture, Gujarat State.

Dahiya, K.K., Chaunal, R., Ombir and Malik, V.S. (1997). Effect of abiotic factors on the incidence of pod borer, *Helicoverpa armigera* (Hubner) on early maturing varieties of red gram. *Crop Res.*, **14**(1): 151-154.

Jadhav, R.S. and Suryawanshi, D.S. (1998). Population dynamics of *Helicoverpa armigera* (Hubner) on chickpea. *J. MAU*, **23**(1): 82-83.

Patnaik, H.P. and Senapati, B. (1996). Trends in *Helicoverpa* egg, larval and adult population changes in the chickpea environment of Orissa. *Indian J. Pl. Protec.*, **24**(1/2): 18-23.

Patnaik, H.P., Rath, L.K., Senapati, B. and Behera, P.K. (1991). Incidence of *Helicoverpa armigera* (Hubner) on chickpea and its population phenology in north central plateau zone of Orissa. *Orissa J. Agric. Res.*, **4**(3-4): 137-142.

Tripathy, M.K., Kumar, R. and Singh, H.N. (1999). Host range and population dynamics of *Helicoverpa armigera* (Hubner) in Eastern Uttar Pradesh. *J. Appl. Zoological Res.*, **10**(1): 22-24.

****