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Seasonal variation of *H. armigera* population and their correlation with weather parameters under agro-climatic condition of Tikamgarh district, Madhya Pradesh

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ABSTRACT

Field experiment were carried out during Rabi, 2017-18 indicated the beginning of Helicoverpa armigera infestation was recorded in the 48th SMW (26 Nov to 02 Dec) and reached a peak level 4.80 larvae/mrl. in the 9th standard meteorological week (26 Feb to 04 March). Correlation studies revealed that maximum temperature, Minimum temperature and evaporation exhibited significantly positive correlation (r= +0.54, +0.61 and +0.61 respectively), with H. armigera larval population. A negative but very weak correlation between Helicoverpa larval population and morning and evening relative humidity (r = -0.22, and -0.29 respectively), was observed to non-significantly level. Whereas positive correlation between Helicoverpa larval population rainfall (r = +0.14), was also found to be non-significant.

Keywords:- *Helicoverpa armigera, Cicer arietinum L., population, weather parameters.*

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INTRODUCTION

Chickpea (*Cicer arietinum L.)* in commonly known as Bengal gram and locally as chana, Gram is an important food legume crop. The chickpea is rich in protein (20 to 25%) and several essential amino acids. Chickpea was considered as the “King of Pulses” cultivated in 33 countries in 1979, 44 in 1994 [10] and 52 countries in 2011 [3] of the world indicating increase in its global popularity. In India, chickpea is grown in 83.90 lakh hectare area and recorded a production of 70.60 lakh tones with average productivity is 840 kg/ha. In Madhya Pradesh, ranked first in chickpea growing states of the country covering an area of about 3017 hectares with an annual production of 3364 metric tons during 2015-16 and productivity 1115 kg/ha. [1]. Among the biological constraints, incidence of insect pests specially the pod borer, *Helicoverpa armigera* (Hübner) causes severe damage to the chickpea crop in almost all the chickpea growing areas. It asserts a major share in crop losses (25-40%) every year, worldwide [8]. Increase in intensive crop production technologies and concomitant insecticide resistance of broad spectrum insecticides, as well as continuous accessibility of preferred food plants have favored *H. armigera* to become a major pest [3]. Recent climatic changes have also influenced the population of this pest in different crops. Due to its polyphagous nature, the gram pod borer is also known as American cotton boll worm, corn ear worm, tomato fruit borer, tobacco bud worm, carnation worm, etc. It has been recorded feeding on 181 cultivated and uncultivated plants

species belonging to 45 families. It is an established serious pest of gram in all the state of Indian union. The attack of this pest starts from vegetative stage and continue up to crop maturity [7, 9, 10]. The damage caused by insect pests is one of the main constraints which limit the production of chickpea, pod borer *Helicoverpa armigera* (Hubner) Hardwick is predominant species causing economic damage to chickpea crop. The yield loss in chickpea due to pod borer was reported as 10 to 60% in normal weather condition [11].

MATERIAL AND METHODS

A field experiment was carried out at Entomology Instructional Farm, JNKVV, College of Agriculture Tikamgarh (M.P.), during *Rabi* 2017-18. Popular variety JG-315, was sown in 72 sq. meter area following the standard package and practices of the crop. Observations on population dynamics of gram pod borer were recorded at weekly interval on one meter row length at randomly selected 10 places from the first appearance of the pest and continued till maturity of the crop. Data were correlated with meteorological parameters (maximum and minimum temperature, maximum and minimum relative humidity, rainfall and evaporation etc.)

RESULTS AND DISCUSSION

The data presented in table 1 and figure 1 & 2 showed that the first appearance of gram pod borer *Helicoverpa armigera* (Hubner) was recorded in the 48th Standard Meteorological Week (26 Nov to 02 Dec) and it was continued up to 12th Standard Meteorological Week (19th march to 25th April). Chatar *et al.* [2] reported that the *H. armigera* was appeared from 4th week of November. This is in conformity with the present findings. The peak activity (4.80 larvae/Meter row length) of the pest was observed during 9th SMW (26 Feb to 04 Mar). During this period maximum and minimum temperatures were 33.29^{0}C and 13.00^{0}C, respectively with morning and evening relative humidity of 80% and 25%, respectively. Ramteke *et al.* [6] observed that the larval population of *H. armigera* (Hub.) increased gradually and reached its peak level of 4.71 larvae / plant during March 1st week. Thereafter, declined trend was observed from March 2nd week with an average population of 4.30 larvae / plant.

Correlation studies revealed that maximum temperature, Minimum temperature and evaporation exhibited significantly positive correlation (r= +0.54, +0.61 and +0.61 respectively), with *Helicoverpa armigera* larval population. A negative but very weak correlation between *Helicoverpa* larval population and morning and evening relative humidity (r = -0.22, and -0.29 respectively), was observed to non-significantly level. Whereas positive correlation between *Helicoverpa* larval population rainfall (r = +0.14), was also found to be non-significant. Pandey *et al.* [5] have also reported that the population of gram pod borer has significantly positive correlation with minimum, maximum temperature and evaporation the correlation coefficient was 0.62, 0.64 and0.60 respectively. The correlation coefficient of morning and evening relative humidity was negative (-0.76 and -0.73). The rainfall and larval population showed positive correlation coefficient (-0.09) but it was non- significant which is in conformity with the present finding.

Table 1: Correlation coefficient of larval population of *Helicoverpa armigera* (Hub.) with meteorological parameters

S.N.	SMW	Period		Larvae/ meter row length	Temperature		Relative Humidity		Rainfall (m.m.)	Evapo-ration
		From	To		Max.	Min.	Mor.	Eve.		
1	48	26 Nov	02 Dec	0.40	28.06	7.40	82	31	0.0	15.4
2	49	03 Dec	09 Dec	0.70	25.41	10.03	79	31	0.0	15.4
3	50	10 Dec	16 Dec	0.80	25.97	9.46	85	39	0.0	14.4
4	51	17 Dec	23 Dec	0.90	23.93	6.59	89	49	0.0	14.9
5	52	24 Dec	31 Dec	0.50	25.26	4.79	86	48	0.0	10.5
6	01	01 Jan	07 Jan	0.40	22.64	4.03	90	41	0.0	14.8
7	02	08Jan	14Jan	0.30	23.02	5.59	86	42	0.0	10.2
8	03	15Jan	21 Jan	0.70	27.40	5.90	84	37	0.0	14.0

9	04	22 Jan	28 Jan	2.90	25.51	5.21	84	40	0.0	16.1
10	05	29 Jan.	04 Feb	3.50	26.57	8.20	83	37	0.0	14.4
11	06	05 Feb	11 Feb	3.20	24.71	9.00	82	39	0.0	20.7
12	07	12 Feb.	18 Feb	2.90	25.13	10.74	86	48	12.2	23.2
13	08	19 Feb	25 Feb	2.90	32.33	11.54	76	47	0.0	20.2
14	09	26 Feb	04 Mar	4.80	33.29	13.00	80	25	0.0	24.3
15	10	05 Mar	11 Mar	4.60	32.71	13.37	79	27	0.0	29.1
16	11	12 Mar	18 Mar	3.00	35.53	14.86	65	23	0.2	29.7
17	12	19 Mar	25 Mar	2.00	34.64	15.83	53	20	0.0	34.2
Correlation coefficient					0.545*	0.615*	-0.226	-0.297	0.128	0.617*
t-value					2.518	3.018	-0.897	-1.205	0.498	3.037

t – tabulated = **2.13**, * significant at **5% level**
SMW = Standard Meteorological Week

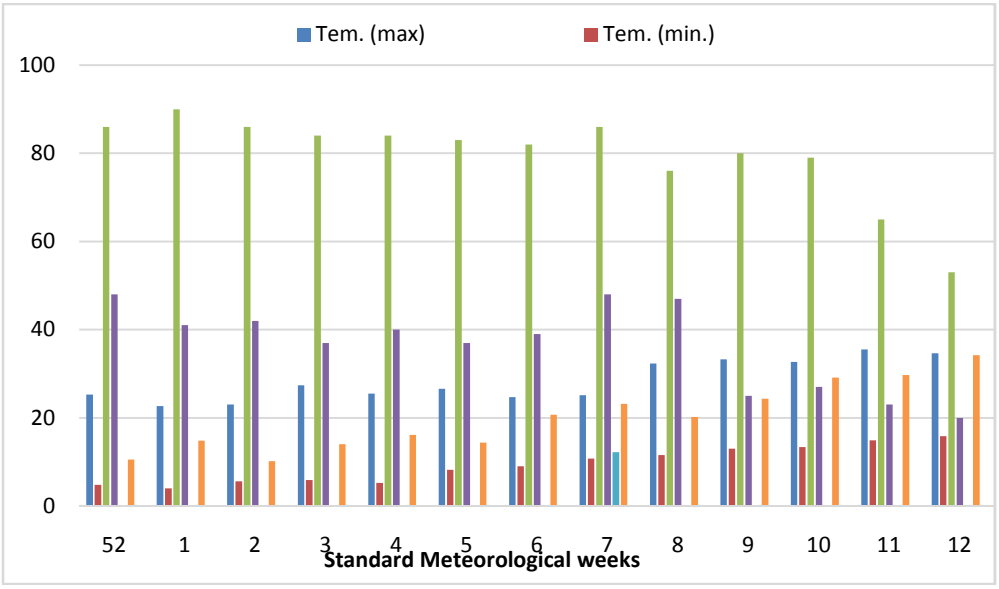

Fig. 1Weekly Meteorological data during crop season *(Rabi* 2017-18) at Tikamgarh (M.P.)

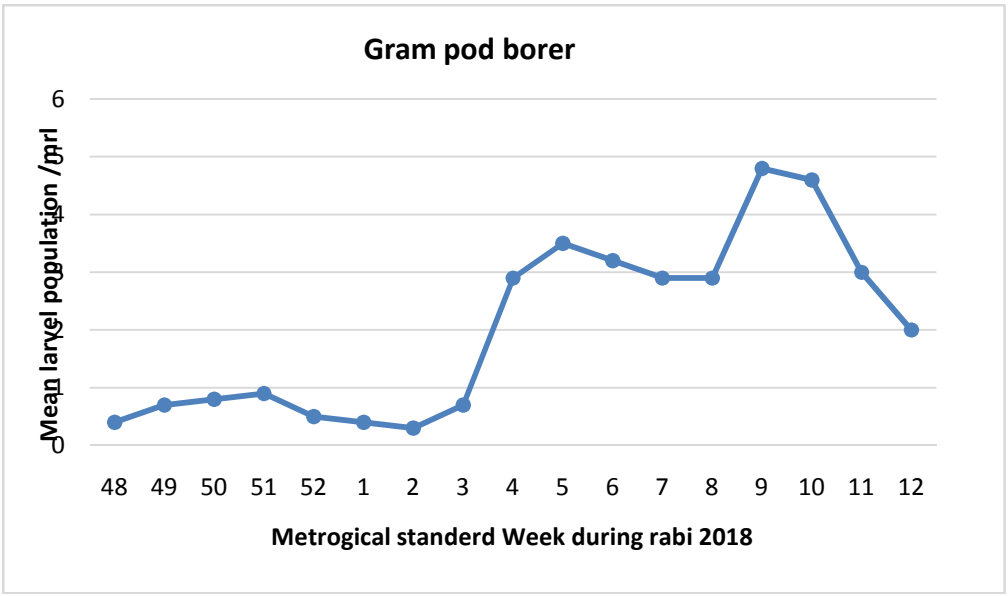

Fig. 2 Seasonal incidence of gram pod borer of chickpea at Tikamgarh during *rabi* season (2017-18)

REFERENCES

1. Anonymous. (2016). Project coordinators report, 2016 all India coordinated research project on chickpea. Indian institute of pulses research, Kanpur.
2. Chatar VP, Raghvani KL, Joshi MD, Ghadge SM, Deshmukh SG and Dalave SK. (2010). Population dynamics of pod borer, *Helicoverpa armigera* (Hubner) infesting chickpea. International Journal of Plant Protection;3: 1, 65-67.
3. Fathipour,Y.and Naseri, B. (2011). Soybean Cultivars AffectingPerformance of *Helicoverpa armigera* (Lepidoptera: Noctuidae). In: NG TB, editor. Soybean: Biochemistry, *Chemistry Physiological in Technology* pp. 599-630.
4. Gaur PM. (2013). Global chickpea success stories. In: Souvenir, 18th Annual Group Meet of AICRP on Chickpea, JNKVV, Jabalpur (M.P.) pp.14-18.
5. Pandey B.M, Tripathi MK and Lakshmi V. (2012). Seasonal incidence of gram pod borer *Helicoverpa armigera* (Hub.) on chickpea in Varanasi area. Journal of Experimental Zoology, India; 2012. 15: 2, 667-669.
6. Ramteke PW, Simon S and David D.(2013). Population dynamics of *Helicoverpa armigera* infesting Chickpea. *Ann. Protect. Sci.* 22(1): 203-204.
7. Sarwar M Ahmad N and Toufiq M. (2011). Indentification of susceptible and tolerant gram *(Cicer arietinum* L.) genotypes against gram pod borer, *Helicoverpa armigera* (Hubner). Pak. J. Bot., 43 (2) : 1265-1270.
8. Sharma HC, Gowda CLL, Stevenson PC, Risdill TJ, Clement,SL, Rangarao GV, Romies J, Milis M and Bhouhssini MEL. (2006). Host plant resistance and insect pest management in chickpea.In: S.Yadav (ed.). Chickpea Breeding and Management .CAB International .pp.527-544.
9. Singh SS and Yadav, SK. (2006). Efficacy and economics of some modern insecticides, bioinsecticides and neem based formulations against pod borer, *Helicoverpa armigera*, in pigeon pea. Indian Journal of Entomology; 2006. 68: 2, 139-143.
10. Singh KB and Saxena MC. (1999). Chickpea Macmillan Education Ltd., London and Basingstoke p.1.
11. Vaishampayan SM and Veda OP. (1980). Population dynamics of gram pod borer, *H. armigera* (Hub.) and its outbreak situation on gram at Jabalpur. *Indian J. Ent.*,42 (3) : 453-459.