Effect of Weather Parameters on the Seasonal Incidence of *Helicoverpa armigera* (Hubner) Infesting Chickpea in Saurashtra Conditions, Gujarat, India

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A B S T R A C T

Keywords Seasonal incidence, *Helicoverpa armigera*, Chickpea **Article Info** *Accepted:* 07 November 2018 *Available Online:* 10 December 2018	Seasonal incidence studies of *Helicoverpa armigera* (Hubner) infesting chickpea were undertaken during 2016-17 at Instructional farm, Department of Agronomy, College of Agriculture, J.A.U, Junagadh. A dominant invertebrate animal, insect, have capacity to change their behavior and habitat with the changing of the environment and so, it is necessary to see the impact of changing pattern in abiotic factors on *H. armigera* on chickpea so seasonal incidence with provide information regarding this utility. The result showed that population of *H. armigera* showed highly significant negative correlation with maximum temperature (r = -0.739) and highly significant negative correlation with minimum temperature (r = -0.725). Pest showed highly significant positive correlation with morning relative humidity (r = 0.695) and also highly significant positive correlation with evening relative humidity (r = 0.743). Result showed that larval population of *H. armigera* has non-significant negative correlation with mean bright sunshine hours (r = -0.442) and also has non-significant positive correlation with wind velocity (r = 0.189).

Introduction

Chickpea is the most important crop with high acceptability and wider use. In India, the area under chickpea is 8.35 million hectares with a production of 7.17 million tonnes with productivity of 859 kg/ha during *rabi*, 2015-

16 (Anonymous, 2017). In Gujarat, area under chickpea was 0.12 million hectares with total production of 0.15 million tonnes and productivity of 1330 kg/ha during *rabi,* 2015-16 (Anonymous, 2017).The production of cereals has increased manifold in the recent past but that of pulses has remained more or

less static. *H. armigera* is widely distributed throughout the world by menacing due to its polyphagous feeding (a typical of Noctuidae), increased adult mobility, obscured larval stages, resistant to pesticides and strong diapauses. The young larvae feed on the buds, flowers and pods of pigeon pea, Chickpea, tomato, sunflower etc. In the situation of global climate change, living organisms are changing their living habitat as well as style which directly affect their span of life. A dominant invertebrate animal, insect, have capacity to change their behavior and habitat with the changing of the environment and so, it is necessary to see the impact of changing pattern in abiotic factors on *H. armigera* on chickpea so seasonal incidence with provide information regarding this utility.

The experimental details

1.	Objective	:	Seasonal incidence of *Helicoverpa armigera* (Hubner) on chickpea
2.	Location	:	Instructional farm, Department of Agronomy, College of Agriculture, JAU, Junagadh.
3.	Season and year	:	*Rabi*, 2016-17
4.	Crop & Variety	:	Chickpea, Gujarat Junagadh Gram - 3
5.	Plot Size	:	20 m x 20 m

Materials and Methods

The experimental plot was divided in to twenty equal quadrate (1 m x 1 m) and the chickpea seeds of variety GJG - 3 were sowing with row spacing 45 cm and plant to plant distance was 10 cm. All the agronomic practices carried out except chemical control.

Observations recorded

The chickpea plants were examined at regular weekly intervals commencing from 15 day after germination to harvest. The data on the first appearance of the pod borer in the field was recorded. The Pod borer population per plant was recorded from the randomly tagged 2 plants in each quadrate.

The weekly meteorological observations on maximum temperature (MaxT) and minimum temperature (MinT), morning relative humidity (RH_1) and evening relative humidity (RH_2), wind velocity (WV), bright sunshine hours (BSS), etc. were obtained from the meteorological observatory of Instructional farm, Dept. of Agronomy, COA, JAU, Junagadh during the course of investigation. Simple correlation between periodical mean values of gram pod borer with various abiotic parameters and biotic factor like adult trap in pheromone trap were calculated.

Results and Discussion

A study was carried to know about the occurrence and abundance of larval population of *H. armigera* on chickpea (Gujarat Junagadh Gram-3) during *rabi*, 2016-17. Two plants were selected randomly from each quadrate for observation. Absolute population of larvae was recorded at weekly interval in the morning hours. The pest activity was determined in relation to the various environmental factors. The findings were described as under:

The data (Table 1 and Fig. 1) indicated that the *H. armigera* infestation on chickpea was started in the fourth week after germination i.e. in the month of the December (50th standard week) with 0.65 larvae per plant, which was increase. The pest population reached to the first peak in the third week of the January (3rd standard week) 3.10 larvae per plant.

Table.1 Weekly population of *H. armigera* per chickpea plant during *rabi,* 2016-17

Weeks after germination	Date of Observation	Standard Week	Average larval population per plant	Temp.(°C) Maximum	Temp.(°C) Minimum	RH (%) Morning	RH (%) Evening	Mean bright sunshine hours (hrs/day)	Wind velocity (km/h)
3	03/12/2016	49	0.00	32.5	13.1	70	26	8.5	2.2
4	10/12/2016	50	0.65	31.2	15.0	72	28	8.7	2.9
5	17/12/2016	51	0.80	30.7	12.6	81	29	8.0	2.2
6	24/12/2016	52	1.35	31.9	11.7	74	23	8.7	2.4
7	01/01/2017	1	2.55	30.8	12.4	85	34	7.6	2.1
8	08/01/2017	2	2.70	25.3	10.2	71	26	7.6	4.4
9	**15/01/2017**	**3**	**3.10**	28.9	12.0	88	36	7.3	4.4
10	22/01/2017	4	2.60	31.5	13.6	74	31	8.2	3.8
11	29/01/2017	5	2.45	32.0	12.0	80	32	9.0	2.7
12	**05/02/2017**	**6**	**3.00**	29.4	12.0	86	32	9.2	5.1
13	12/02/2017	7	0.60	34.9	16.1	62	24	7.2	3.5
14	19/02/2017	8	0.10	36.6	17.3	67	23	10.0	4.4
15	26/02/2017	9	0.00	36.5	18.7	40	13	10.1	4.9
Mean			**1.68**						

Table.2 Correlation co-efficient between larval population of *H. armigera* and different abiotic (weather) parameters in *rabi,* 2016-2017
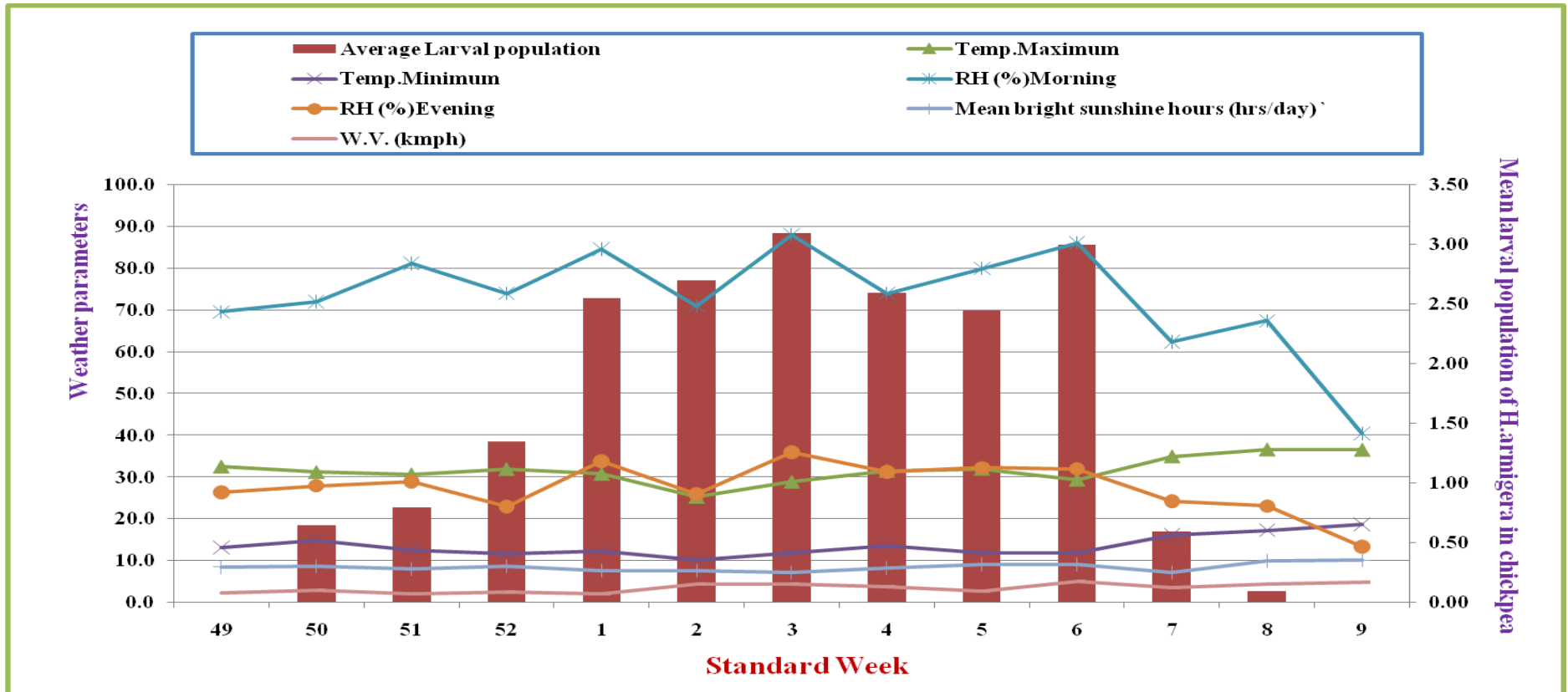
Temperature (°C)		Relative Humidity (%)		Mean bright sunshine hours (hrs/day)	Wind Velocity (km/h)
Maximum	**Minimum**	**Morning**	**Evening**		
r = -0.739**	r = -0.725**	r = 0.695**	r = 0.743**	r = -0.442	r = 0.189

(n = 13)
*Significant at 0.05% r = 0.553
** Significant at 0.01% r = 0.684

Figure.1 Weekly average population of *H. armigera* on chickpea in relation to different abiotic (weather) and biotic parameters during *rabi,* 2016-2017

Thereafter, it was decrease 2.60 larvae per plant in (4th standard week) followed by 2.45 larvae per plant in (5th standard week).

Again the larval population increased and reached on the second peak with 3.00 larvae per plant in the first week of the February (6th standard week). Thereafter population started to decrease at low-level up to the 0.10 larvae per plant in the third week of the February (8th standard week) due to the crop attend the maturity and thereafter disappeared from the chickpea crop in last week of the February (9th standard week).

In order to, understand the role of the different parameters in the fluctuation of larval population of *H. armigera* on chickpea correlation co-efficient was worked out between the pest populations on GJG-3 variety of chickpea and different parameters. The correlation coefficient values presented in the Table 2 indicated that population of *H. armigera* showed highly significant negative correlation with maximum temperature (r = -0.739) and highly significant negative correlation with minimum temperature (r = -0.725). Pest showed highly significant positive correlation with morning relative humidity (r = 0.695) and also highly significant positive correlation with evening relative humidity (r = 0.743). Result showed that larval population of *H. armigera* has non-significant negative correlation with mean bright sunshine hours (r = -0.442) and also has non-significant positive correlation with wind velocity (r = 0.189).

Khurana (1997) studied the seasonal activity of *H. armigera* in chickpea and found that larval population peaked during November-December and January-February. Chavan *et al.,* (2003) reported that larval incidence of *H. armigera* was observed throughout the crop growth period and peak incidence was noticed during second fortnight of December and January in chickpea. Chatar *et al.,* (2010) reported that 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).

However, the pest population showed highly significant positive correlation with morning relative humidity (r= 0.7098), evening relative humidity (r= 0.7293) and had non-significant negative correlation with mean bright sunshine hours (r = -0.236).

Thus, present finding were agreement with the work carried out by earlier workers.

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