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EFFECT OF ABIOTIC FACTORS ON SEASONAL INCIDENCE OF GRAM POD BORER, *HELICOVERPA ARMIGERA* (HUBNER) IN GRAM

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ABSTRACT

The present investigation was conducted at the Instructional Farm, Rajasthan College of Agriculture, Udaipur during *rabi*, 2017-18. Gram variety, GNG-1581 was sown to study the seasonal incidence of gram pod borer. The maximum pod borer population (4.32 larvae per meter row) was recorded during 3rd and 4th week of December (50th and 51st SMW); whereas, minimum pod borer (0.28 larvae per meter row) was recorded during 5th week of November (48th SMW). As there was no significant variation in the mean atmospheric temperature therefore, it had no significant effect on larval population in any treatment. Pod borer population had significant positive correlation (r= 0.59) with mean relative humidity during the crop season; whereas, sunshine exhibited a significant negative correlation (r= -0.62) with the larval population.

Key words: gram, pod borer, seasonal incidence

INTRODUCTION

Chickpea (*Cicer arietinum* L.) is among the most widely consumed legumes in the world, particularly in tropical and subtropical areas. Gram or chana is an important *rabi* pulse crop of India and has been considered as 'King of Pulses' (Bhatt and Patel, 2001); consumed as a major nutrient supplement for protein. It is also called as Ceci bean, Bengal gram, Garbanzo bean, Chana and Sanagalu bean. The gram pod borer, *Helicoverpa armigera* (Hubner) begins infestation at the seedling stage and later feeds on the flower and developing seeds in pods until crop maturity (Mandal and Roy, 2012). A single larva is capable of destroying 30-40 pods during its larval period (Chaudhary and Chaudhary, 1975). Recent research has determined the consumption rate of larvae from hatching to pupation to be 2.0 g of grain/larva.

MATERIALS AND METHODS

The present investigation was conducted at the Instructional Farm, Rajasthan College of Agriculture, Udaipur during *rabi*, 2017-18. Gram variety, GNG-1581 was sown to study the seasonal incidence of gram pod borer. Observations were recorded at weekly interval after 15th days of germination during early hours of the day (7 to 9 am) for *H. armigera* larvae infesting the crop along the 3-metre-row, selecting 3 rows from each plot/ replicate.

The record of gram pod borer was maintained with a view to find out the following:-

- First appearance of gram pod borer and weekly population trend.
- Peak incidence of gram pod borer.

The meteorological data were used for computing simple correlations between gram pod borer and the weather parameters (atmospheric temperatures, relative humidity and sunshine). The following formula was used for calculating coefficient of correlation (r):

$$r_{xy} = \frac{\sum XY - \frac{(\sum X)(\sum Y)}{n}}{\sqrt{\left[\sum X^2 - \frac{(\sum X)^2}{n}\right]\left[\sum Y^2 - \frac{(\sum Y)^2}{n}\right]}}$$

Where,

r_{xy} = Simple correlation coefficient

X = Variable i.e. abiotic component.

(Average temperature and relative humidity)

Y = Variable i.e. mean number of insect pests

n = Number of paired observations

The coefficient of correlation (r) values were subjected to the test of significance using t-test:

$$t = \frac{r}{\sqrt{1 - r^2}} \times \sqrt{n - 2} \sim t_{n-2} \text{ d.f.}$$

RESULTS AND DISCUSSION

Observations were recorded weekly on the incidence of gram pod borer, *H. armigera* and were expressed in terms of mean larval population per meter row during *rabi* 2017-18 and is presented in Table (1). The observations were taken two weeks after sowing.

From Table (1) and Fig 1, it can be observed that the maximum average pod borer population was recorded during 3rd and 4th week of December (50th and 51st SMW); whereas, minimum pod borer was recorded during 5th week of November (48th SMW). It was observed that the minimum larval population was 0.28 larvae per meter row and maximum mean larval

Table 1. Seasonal incidence of *H. armigera* on gram during *rabi*, 2017-18

SMW	Mean Abiotic Factors of Environment			Mean Pod borer (No/m row)
	Atmospheric Temperature (°C)	Relative Humidity (%)	Sunshine (hrs.)	
43	24.04	60.50	8.96	0.28
44	22.95	68.57	8.43	0.67
45	21.51	73.64	7.73	1.14
46	20.31	72.64	6.59	1.28
47	17.75	69.79	5.71	1.30
48	18.69	69.07	8.23	2.15
49	17.61	86.93	2.40	2.93
50	17.26	78.79	6.00	4.32
51	16.59	69.29	5.50	4.31
52	16.26	71.94	8.55	1.78
1	14.73	67.21	8.07	0.75
Seasonal Mean	18.46	71.16	7.05	0.33
Coefficient of correlation (r) for mean Atm. Temp. & pod borer population				-0.286
Coefficient of correlation (r) for mean R. H. & pod borer population				0.591*
Coefficient of correlation (r) for mean sunshine & pod borer population				-0.627*

*Significant at 5% level of significance

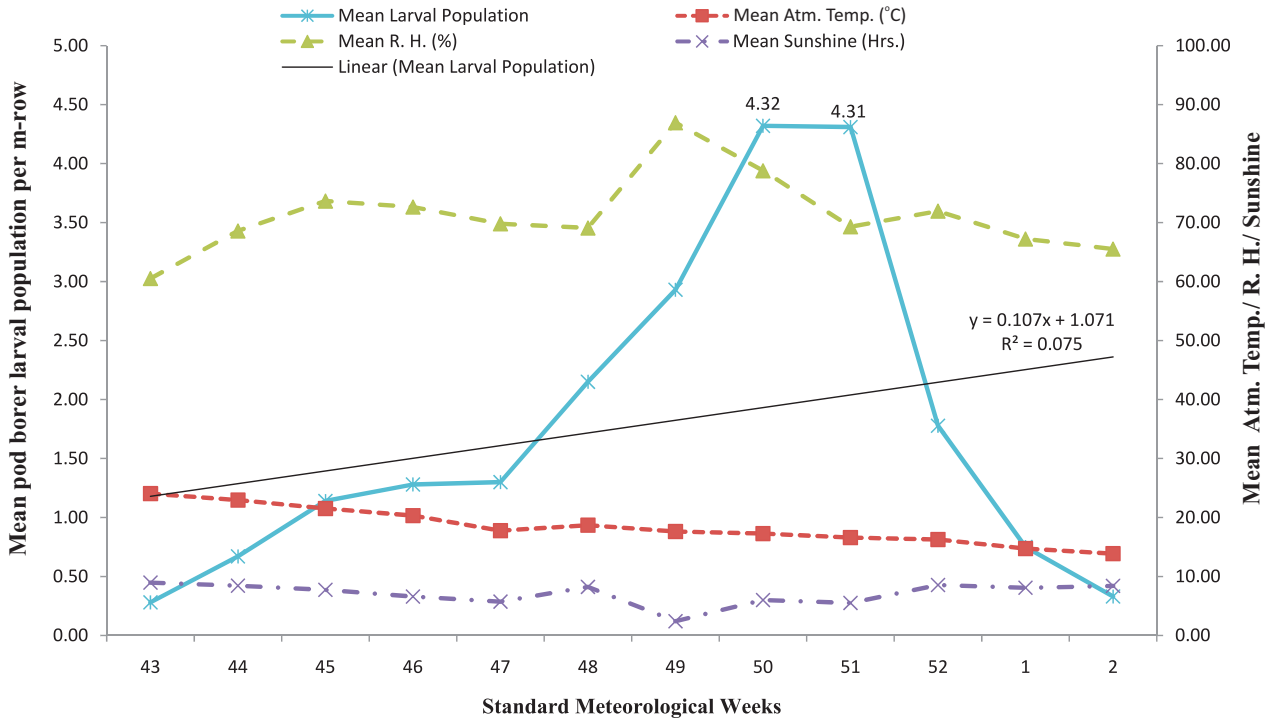

Fig. 1: Seasonal population trend of the gram pod borer during *Rabi* 2017-18

population was 4.32 larvae per meter row. It is evident that larval population showed negative non significant correlation with mean atmospheric temperature (r = -0.286), positive significant correlation with mean relative humidity (r =0.591) while negative significant correlation with sunshine (r = -0.627). Verma (2014) reported that gram pod borer population peaked twice, first from 17th November to 10th December (47th to 50thSMW) and second from 12th March to 5th April (10th to 14th SMW) in the year 2009-10 and during 2010-11 first from 22th November to 13th December (47th to 50th SMW) and second from 13th March to 4th April (10th to 14thSMW). The recorded variations in gram pod borer population could be attributed to the local environmental conditions of UP. Nitharwal (2016) observed that the population of pod borer appeared on chickpea in the 6thSMW (February second week) with an average of 0.25 larvae/plant and showed significant positive correlation with maximum and minimum temperatures; whereas, the relative humidity revealed negative significant correlation with pod borer population. Yadav (2016) observed that *H. armigera* population exhibited positive and significant correlation with mean temperature and negative but non significant correlation with mean relative humidity during *rabi*, 2012-13 and 2013-14.

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