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Seasonal Incidence of Fruit Borer (*Helicoverpa armigera* Hubner) Infesting Chilli (*Capsicum annum* L.)

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ABSTRACT

Seasonal Incidence of fruit borer (Helicoverpa armigera Hubner) of chilli (Capsicum annum L.) was studied during June to December 2014, at Horticulture farm, Rajsthan College of Agriculture, Udaipur. The study revealed that the incidence of fruit borer, H. armigera (1.00 larvae plant^{-1}) was commenced in the fourth week of August (34 SMW) and touched its peak in the first week (40 SMW) of October (2.80 larvae plant^{-1}). The mean atmospheric temperature and relative humidity during the peak incidence were 26.95 °C and 59.55 %, respectively. In 47th SMW, the fruit borer population was 0.40 larvae plant^{-1} was recorded. The Fruit borer exhibited a negative and significant correlation with relative humidity and total rainfall, while with temperature positively non-significant.

Key words: *Chilli, Correlation, Fruit Borer, Incidence, Peak, Seasonal, Significant.*

INTRODUCTION

Chilli is an important vegetable and condiment crop in India. The two cultivated species (*Capsicum annum* L. and *Capsicum frutescens* L.; family Solanaceae) are raised in the tropics and subtropics with a temperature range of 20-25 °C considered as ideal[8]. India is the largest consumer and exporter of chilli in the world with a production of 1492 MT from an area of 775 thousand ha and productivity 1.9 MT ha^{-1} during 2014 [5]. The major chilli growing states are Andhra Pradesh, Maharashtra, Karnataka, Tamilnadu and Rajasthan[13]. A number of factors are responsible for low yield that include adverse climate, poor quality seeds, diseases, insect and mites significantly affects both the quality and production of chilli. The yield losses range from 50-90 % due to insect pests of chilli[3,6]. Thrips (*Scirthothrips dorsalis* Hood), whiteflies (*Bemisia tabaci* Genn), aphids (*Aphis gossypii* Glover) and mites (*Polyphagotarsonemus latus* Banks) are the important sucking pests contributing to decrease in the crop yield[2]. Major insect pests of chilli in southern Rajasthan include sap sucking pests, *viz.*, thrips (*S. dorsalis*), whiteflies (*B. tabaci*) and the fruit borer (*Helicoverpa armigera* Hub.).

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The incidence of fruit borer was noticed from last week of September to till end of the cropping season on chilli. However, peak incidence was noticed during 4th week of October to 2nd week of November (3.27 to 3.32 larvae plant^{-1}); the incidence was very low during early stage of the crop (0.02 to 1.30 larvae plant^{-1})[7]. The peak incidence of *H. armigera* Hubner was noticed during the second week of April and third week of May [1].

Due to variation in the agro climatic conditions of different regions insects show varying trends in their incidence also in nature and extent of damage to the crop. Besides, some known and unknown factors also play a key role in determining the incidence and dominance of a particular pest or pest complex. Hence a region oriented study on seasonal incidence of fruit borer would give an idea about peak period of their activity and may be helpful in developing pest management strategies.

MATERIALS AND METHODS

The experiment was conducted during *Kharif*, 2014 at Horticulture farm, Rajsthan College of Agriculture to investigate the "Seasonal Incidence of fruit borer, *H. armigera* infesting chilli (*Capsicum annum* L.)". Chilli variety Pusa Jwala was transplanted under natural conditions without spraying the insecticides in plot size 5 m x 4.2 m with 45 cm row to row and 30 cm plant to plant spacing. The larval population of *H. armigera* was recorded on five randomly selected and tagged plants in each plot and expressed as a per plant basis. The data were subjected to statistical analysis and correlation coefficient was worked out. Simple correlation was worked out between the population of insect pests and abiotic factors by the Karl Pearson's coefficient of correlation formula[12]:

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

Where,

r_{xy} = Simple correlation coefficient

X = Variable *i.e.* abiotic component. (Average temperature, relative humidity and total rainfall)

Y = Variable *i.e.* mean number of insect pests per plant

n = Number of observations.

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

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

The calculated t-value obtained was compared with tabulated t-value at 5 % level of significance.

RESULT AND DISCUSSION

The mean population of fruit borer (*H. Armigera*) and correlation with weather parameters is presented in Table 1 and Fig. 1.

Fruit Borer, *Helicoverpa armigera* Hubner

The fruit borer, *H. armigera* Hubner was observed throughout the crop growth period from fourth week of August to last week of November. The population gradually increased and touched its peak of 2.8 larvae plant^{-1} during 40th SMW and thereafter started declining gradually. The mean atmospheric temperature and relative humidity during the peak incidence were 26.95 °C and 59.55 %, respectively. The fruit borer population was non-significant and positively correlated with mean temperature (r = 0.012). The correlation between mean relative humidity (r = -0.614) and rainfall (r = -0.550) with fruit borer was negative and significant. The infestation of fruit borer on tomato commenced in the first week of October continued till 3rd week of November[10]. The maximum infestation (34.10%) was observed during 4th week of October when infestation level was 34.84 %. In summer season the infestation commenced in the fourth week of March[10]. The peak incidence of *H. armigera* eggs in chilli was recorded during the second fortnight of

September, while the peak incidence of larvae occurred during the first fortnight of November. Maximum temperature and rainfall had positive significant correlation with *H. armigera* eggs, whereas, maximum temperature had positive significant correlation with larvae[4]. The population of first appearance of *H. armigera* on tomato in 50th (2nd week of December) and 52nd (4th week of December) standard week, initial population gradually increased and remained confined to vegetative growth but it rapidly increased during fruiting stage and attained its peak in 15th standard week (2nd week of April). Rainfall and relative humidity were negatively correlated and temperature, were positive correlated with the pest activity[11].

The fruit borer population on tomato exhibited significant positive correlation with the temperature but positive and non-significant with sunshine hours. Relative humidity and rainfall had non- significant negative effect on borer population[9]. The incidence of fruit borer was noticed from last week of September to till end of the cropping season on chilli. However, peak incidence was noticed during 4th week of October to 2nd week of November (3.27 to 3.32 larvae/ plant); the incidence was very low during early stage of the crop (0.02 to 1.30 larvae/ plant)[7]. The peak incidence of *H. armigera* Hubner was noticed during the second week of April and third week of May [1].

Table 1: Effect of abiotic factors on the incidence of fruit borer, *H. armigera* infesting chilli (*C. annum*) during *kharif*, 2014

SMW No.	Mean Temperature (°C)	Mean Humidity (%)	Rainfall (mm)	Fruit borer plant^{-1}
31	27.00	83.60	109.00	0.00
32	25.85	81.30	47.20	0.00
33	26.55	72.70	0.20	0.00
34	28.15	76.35	40.80	1.00
35	27.40	77.35	31.60	0.80
36	25.95	82.70	165.20	0.20
37	25.05	87.65	94.80	1.00
38	26.15	68.05	0.00	1.40
39	25.60	64.25	0.00	1.80
40	26.95	59.55	0.00	2.80
41	26.25	56.50	0.00	1.60
42	25.05	54.00	0.00	1.80
43	24.90	46.00	0.00	2.00
44	24.90	51.60	0.00	1.40
45	23.50	54.00	0.00	1.60
46	22.50	55.60	11.00	1.00
47	20.90	51.60	0.00	0.40
Coefficient of correlation (r) for population and mean temperature				0.012
Coefficient of correlation (r) for population and mean relative humidity				-0.614*
Coefficient of correlation (r) for population and rainfall				-0.550*

*Significant at 5% level of significance

SMW: Standard Meteorological Week

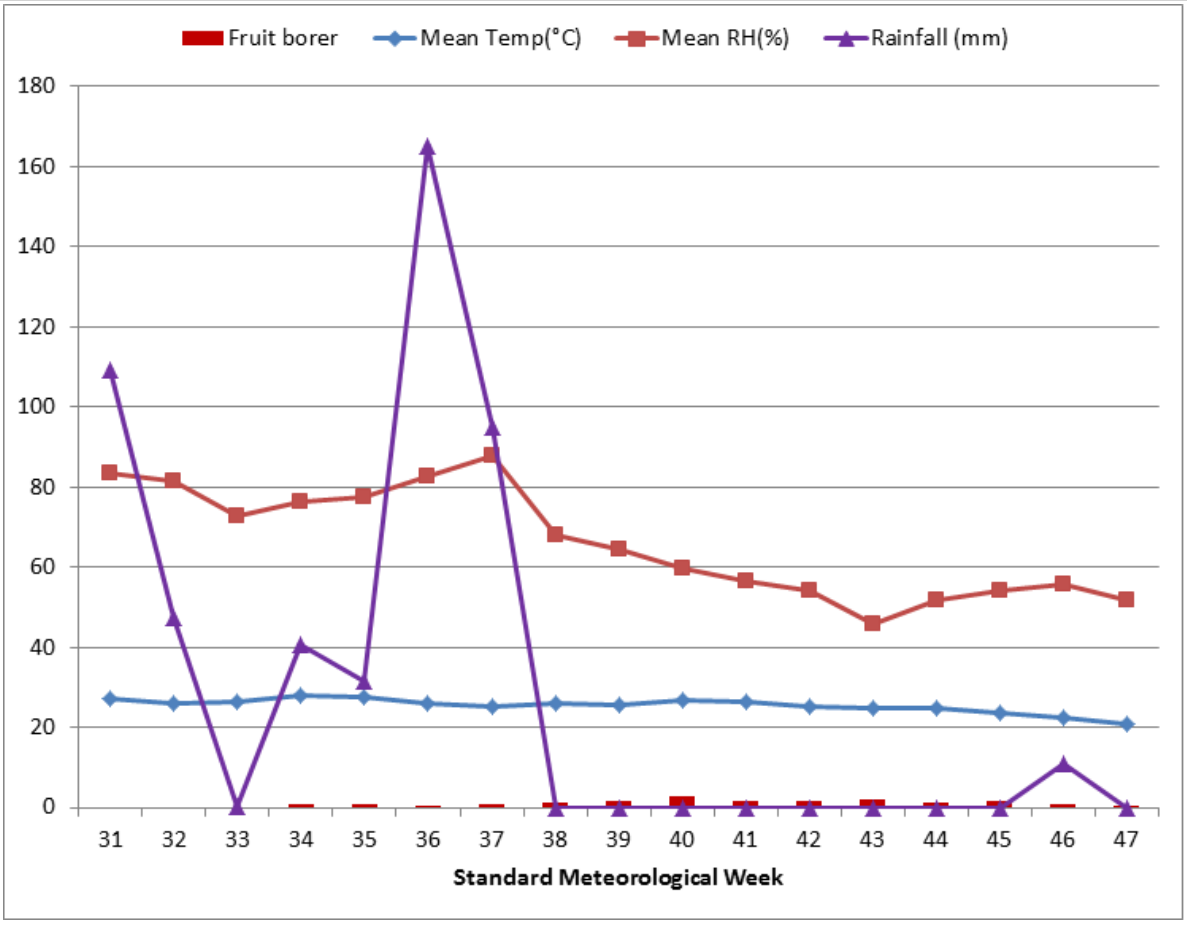

Fig. 1: Effect of abiotic factors on the incidence of fruit borer, *H. armigera* infesting chilli (*C. annum*) during *Kharif*, 2014

CONCLUSION

The incidence of fruit borer, *H. armigera* was commenced in the 4th week of August and touched its peak in the 1st week of October (2.80 larvae plant^{-1}). The Fruit borer exhibited a negative and significant correlation with relative humidity and total rainfall, while with temperature positively non significant. This will help us in scheduling fruit borer, *H. armigera* management strategies in chilli crop.

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REFERENCES

1. Asma, A. and Hanumantharya, L., Population dynamics of major insect and mite pests of chilli. *Journal of experimental Zoology, India*, **18:** 173-176 (2015).
2. Hosmani, M. M., Chilli: Published by Mrs. Sarasikshi M. Hosmani, *Dharwad Publication*, p. 246 (1993).
3. Kumar, N. K. K., Yield loss in chilli and sweet pepper due to *Scirtothrips dorsalis* Hood. (Thysanoptera: Thripidae). *Pest Management in Horticultural Ecosystems*,**1:** 61-69 (1995).
4. Nadaf, A. M. and Kulkarni, K. A., Seasonal incidence of the fruit borers *Helicovrpa armigera* H. and *Spodoptera litura* F. on chilli in Dharwad. *Karnataka Journal of Agricultural Sciences*, **19:** 549-552 (2006).
5. National Horticulture Board, Indian Horticulture Database 2014, pp 6 (2014).
6. Nelson, S. J. and Natarajan, S., Economic threshold level of thrips in semi - dry chilli. *South Indian Horticulture*, **42:** 336-338 (1994).

7. Roopa, M. and Kumar, A. C. T., Seasonal incidence of pests of capsicum in Bangalore conditions of Karnataka, India. *Global Journal of Biology, Agriculture and Health Sciences*, **3:** 203-207 (2014).
8. Seasonal outlook of chilli. KARVV Comtrade limited. pp. 1-12 (2008).
9. Sharma, D., Maqbool, A., Ahmad, H. and Jamwal, V. V. S., Meteorological factors influencing insect pests of tomato. *Annals of Plant Protection Sciences*, **21:** 68-71 (2013).
10. Sharma, K. C. and Bhardwaj, S. C., Seasonal incidence of *Helicoverpa armigera* infesting tomato. *Indian Journal of Applied Entomology*, **18:** 125-129 (2004).
11. Singh, K., Raju, S. V. S. and Singh, D. K., Population succession of tomato fruit borer (*Helicoverpa armigera*) on tomato (*Lycopersicon esculentum* Mill.) agro-ecosystem in eastern region of U. P. *Vegetable Science*, **38:** 152-155 (2011).
12. Steel, R. G. D. and Torry, J. H., Principles and procedures of statistics. Publ. McgrawHill Book Company, New York (1980).
13. Subbiah A. and Jaykumar S., Production and marketing of chilli. Market survey. 1-3 (2009).