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Prediction of okra shoot and fruit borer (*Earias vittella* Fab.) incidence using weather variables at Pusa, Bihar

S.K. Mandal*, Abdus Sattar[1], S.B. Sah[2] and S.C. Gupta[2]
Department of Entomology and Agril. Zoology, Rajendra Agricultural University, PUSA SAMASTIPUR (BIHAR) INDIA

ABSTRACT
Weather based forewarning of the incidence of insect pest and generating the information about critical weather sensitive phases in the life cycle of insect can guide operational and tactical strategy in insect pest management. Keeping this in view, a field experiment was conducted at Rajendra Agricultural University, Pusa, Bihar to study the impact of weather variables on population dynamics of shoot and fruit borer, *Earias vittella* Fab. in okra *(Abelmoschus esculentus* L. Moench) crop during summer seasons of year 2000 and 2001. With delay in sowing the borer pest attack increased manifold. In late sown crop (7th April), nearly 31 per cent reduction in the yield of okra was observed. The prediction function using step-wise regression analysis explained 93.1 per cent variability due to weather variables in the percentage damage of fruits and 94.9 per cent variability for the larval population per hundred fruits.

Key words : Shoot and fruit borer, Prediction and Weather.

INTRODUCTION

Vegetable is an important constituent of human diet. Among different vegetables, okra is an important dietary vegetable crop in the country. In India, okra is mostly grown in different regions and are adopted to various agro-climatic conditions. There are about 13 major insect and non-insect pests species, which attack this crop at various stages of growth (Dhamdhere *et al.*, 1984). Unfortunately, okra is the worst sufferer of shoot and fruit borer (*Earias vittella* Fab.), which is main bottleneck for cultivation of this crop. Under different agro-climatic conditions, the losses may vary from 10.1 to 50.0 per cent (Kashyap and Verma, 1983). Sometimes the late sown crop may fail completely if the crop is not protected from the shoot and fruit borer attack. The incidence and spread of okra shoot and fruit borer is largely controlled by various meteorological parameters *viz.*, temperature, relative humidity and rainfall. Information on interaction of weather parameters and insect development can provide vital support in insect management strategies for achieving optimum use of insecticides and also reducing chemical load on environment. Very little information is available for prediction of shoot and fruit borer incidence using the sowing dates and weather conditions. Keeping this in view, the present study was undertaken to study the effect of date of sowing on the pest attack and to develop simple shoot and fruit borer prediction models using various weather parameters.

MATERIALS AND METHODS

The field experiments were conducted at the University Apiary of Rajendra Agricultural University, Bihar, Pusa (Samastipur) during the summer seasons of 2000 and 2001. It is situated at 23°39¢ N latitudes and 85° 4¢ E longitudes at a mean sea level height of 52 m. This area is characterised by sub-humid, sub-tropical climate with very hot summer from April to June and cold winters from December to January. The okra cv. "Pusa Sawani" was sown on six dates at 10 days intervals on 16 February, 26 February, 8 March, 18 March, 28 March and 7 April in Randomised Blocks replicated four times. Each plot size consisted of 3m x 2m with 30cm x 30cm plant spacing. The crop was raised as per the package and practices of Rajendra Agricultural University, Bihar, Pusa (Samastipur).

Meteorological Observations

The weekly meteorological data during the period of experiment were collected from the Agrometeorological Observatory, Pusa (Samastipur). Weekly mean maximum temperature, minimum temperature, relative humidity for 700 hrs. & 1400 hrs. and total weekly rainfall were used to work out the association of weather parameters on infestation of the pest on okra.

Correlation coefficients between the pest incidence and individual weather parameters for the corresponding sowing dates have been worked out. The most predominant sowing dates *viz.*, D_2 (26th February), D_4 (18th March) and D_6 (7th April) were chosen for correlation coefficients studies and development of multiple regressions. The correlation and step-wise regression analysis was done using computer software.

Insect Parameters

Per cent shoot infestation

Ten plants from each plot were randomly selected and tagged. The shoot damage was worked out by counting the withered terminal shoots out of all the shoots of total tagged plants in each replications at weekly observations on each sowing dates of crops. The per cent shoot damage was calculated as :

$$\text{Percent shoot damage} = \frac{\text{Number of damaged shoots}}{\text{Total number of (healthy + damaged) shoots}} \times 100$$

Per cent fruit infestation

Fruit infestation was observed in the first batch of harvested fruits and continued throughout the fruiting stage of crops on each sowing dates of crops. The fruit damage on weight basis was worked out by sorting out the infested and healthy fruits and weight of infested as well as total harvested fruits were recorded. Per cent fruit damage was calculated as :

$$\text{Percent fruit damage} = \frac{\text{Weight of damaged fruits}}{\text{Total weight of (healthy + damaged) fruits}} \times 100$$

Larval population

The larval population per hundred fruits was taken at each pickings from first batch of harvested fruits and continued throughout the crop seasons on each sowing dates of crops. Larva were either crawling on the infested fruits or were present inside the infested okra fruits. The larva in infested fruits were counted by cutting them longitudinally.

RESULTS AND DISCUSSION

Occurrence of the Pests

The activity of shoot and fruit borer (*E. vittella*) on summer okra

[1] Agrometeorology Section,
[2] Department of Agronomy
***Author for correspondence**