Journal of Entomology and Zoology Studies

Available online at www.entomoljournal.com

E-ISSN: 2320-7078
P-ISSN: 2349-6800
www.entomoljournal.com
JEZS 2020; 8(6): 1471-1474

Received: 20-08-2020
Accepted: 11-10-2020

Kammili Jhansi
Principal Scientist, Entomology & Programme Coordinator, Krishi Vigyan Kendra, Ghantasala, Krishna, Andhra Pradesh, India

Kannaji Prasada Rao
Acharya N.G. Ranga Agricultural University Sugarcane Research Station, Voyeur, Andhra Pradesh, India

Kakkumanu Subash Chandra Bose
Acharya N.G. Ranga Agricultural University Sugarcane Research Station, Voyeur, Andhra Pradesh, India

Corresponding Author:
Kammili Jhansi
Principal Scientist, Entomology & Programme Coordinator, Krishi Vigyan Kendra, Ghantasala, Krishna, Andhra Pradesh, India

Studies on the effect of weather parameters and time of planting on the incidence of early shoot borer, *Chilo infuscatellus* Snell in sugarcane

Kammili Jhansi, Kannaji Prasada Rao and Kakkumanu Subash Chandra Bose

Abstract
Studies were conducted at Sugarcane Research Station, Vuyyuru to know the effect of meteorological factors and time of planting on the incidence of early shoot borer, *Chilo infuscatellus* Snell in Sugarcane. Three varieties *viz.*, 99V30, 2000V59 and 2003V46 were planted at fortnight intervals from January to April. The percent incidence of shoot borer was recorded weekly starting from 3rd week after planting to 18th week in the three varieties in all the eight plantings. The corresponding meteorological data were also recorded. Correlation co efficient of the variety and time of planting, the percent shoot borer incidence recorded at weekly intervals showed positive correlation with max temp, min temp and sunshine hours and negative correlation with was worked out. Irrespective forenoon and afternoon relative humidity and rainfall for the current week and preceding two weeks.

Keywords: Sugarcane, *Chilo infuscatellus* (Early shoot borer), weather parameters

Introduction
Sugarcane *(Saccharum officinarum*) is an important commercial crop grown in India, supporting the second largest agro – based industry. Among the various factors attributed to low productivity and recovery levels, ravages of pests is an important one, as this crop was reported to be infested by more than 100 pests, out of which 49 were major pests [9]. Sugarcane early shoot borer, *Chilo infuscatellus* Snell is distributed throughout the sugarcane growing areas and is said to be a key pest in early stages of crop growth causing economic loss [1]. In Andhra Pradesh, it commences its infestation from germination as shoot borer and continues up to the formative phase. In a year of drought and scanty rainfall it also extends damage to the growing cane. The shoot damage is done by the larvae by boring into it initially, followed by feeding on the growing point. As the larvae feed on the basal portion of the youngest leaf, due to which the leaf is being cut off from the plant and forms the "dead heart" after drying, that can be easily pulled out. The dead heart emits an offensive odour and in described as the distinct symptom of infestation of ESB, *C. infuscatellus*. The pest infests rainfed sugarcane crop severely taking toll of over 70 percent shoot [12]. According to Patel and Hapase [4], it was reported that the ESB causes about 22 to 33 percent loss in cane yield, 12 percent in sugar recovery, 2 percent in commercial cane sugar and 27 percent in jaggery. Infestation of ESB, results in both quantitative and qualitative losses subjecting cane growers and sugar industry to a substantial loss. A number of cultural, mechanical, biological and chemical methods have been evolved from time to time for suppression of early shoot borer. Considering the seriousness of the pest, it was felt essential to undertake investigation on the incidence of the pest in different plantings at fortnight intervals and its relationship with meteorological factors.

Materials and Methods
Experiments were conducted to study the factors associated for the incidence of early shoot borer in sugarcane at Sugarcane Research Station, Vuyyuru. The experiment was laid out in strip plot with three varieties having 12 x 8 x 0.8 meter plot size (12 rows of 8 meters length). The plantings were done from January to April at fortnight intervals. The recommended doses of NPK were applied @ 168: 75: 100 per hectare. Irrigations were given once in 6 days during vegetative phase, as and when necessary during rainy season and once in three weeks during maturity phase.

All the agronomical practices like weeding, inter cultivation were followed to maintain a healthy crop. First tier and second tier trash twist propping were also taken up, to prevent lodging due to rains and winds. In all the eight plantings in all the three varieties, the incidence of early shoot borer was recorded starting from 3rd week to 18th week after planting. The corresponding meteorological data were also recorded. The percentage incidence of shoot borer was calculated by counting total number of healthy and affected shoots. Statistical analysis of the data on percent incidence of shoot borer and weather factors were carried out to determine correlation co efficient.

Results and Discussion

There was no much variation in the per cent incidence of shoot borer between the three varieties *viz.*, 99V30, 2000V59 and 2003V46 in different plantings *ie.*, from January to April at fortnight intervals (all the eight plantings) as depicted in Fig1. There was gradual increase in the percent incidence of shoot borer from 3rd week after planting up to 10-13th weeks after planting and there after a gradual decline (Fig2).

Irrespective of the variety, the stage of the crop is playing an important role in shoot borer incidence (Fig 1, 3, 4 and 5). Once the internodes are formed there was decline in the borer incidence. Tillering phase is more vulnerable for borer incidence [12, 16].

The shoot borer incidence was observed to be comparatively high in March and April plantings compared to January and February plantings (Fig 2) in all the three varieties (Fig 3, 4 and 5). High incidence of early shoot borer in March and April planted crop was due to synchrony and peak activity of *C. infuscatellus* with vulnerable stage of the pest as observed by Mali [10], Duhra *et al*. [2] and Jena and Patnaik [6]. Similar results of less incidence of early shoot borer was observed by Sithanantha *et al.* [14] and high incidence in late plantings by Thirumurugan *et al.* [16].

The present study made to observe the correlation between early shoot borer, *Chilo infuscatellus* and weather parameters showed a significant positive correlation with ESB incidence and significant negative correlation with forenoon and afternoon relative humidity (Tab1). Some earlier workers had also found that high day temperatures coupled with moderate relative humidity was conducive for multiplication of ESB [7], [8], [15]. The current week rainfall had a significant negative correlation and preceding two week rainfall a non-significant negative correlation with shoot borer incidence (Table 1), which is in conformity with the findings given by Prasada Rao *et al*. [12] and Samui [13]. The sunshine hours had a weak positive correlation with pest incidence as reported by Hasabe and Khaire [5].

Studies on relationship of meteorological parameters with ESB indicated maximum temperature and minimum temperature showed significant positive correlation. The morning and evening relative humidity showed significant negative correlation. The rainfall and sunshine hours showed non-significant negative and positive correlations respectively. The results are in conformity with the earlier findings by Hapase *et al.* [4], Gajjar *et al*. [3] and Umashankar and Patel [17].

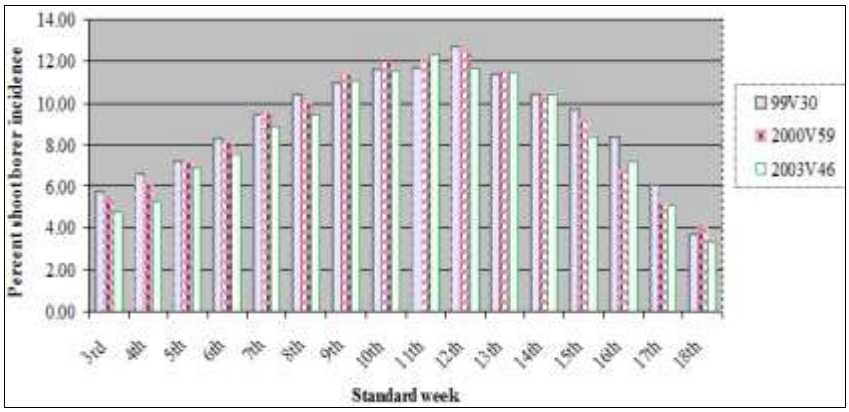

Fig 1: shoot borer incidence in different varieties

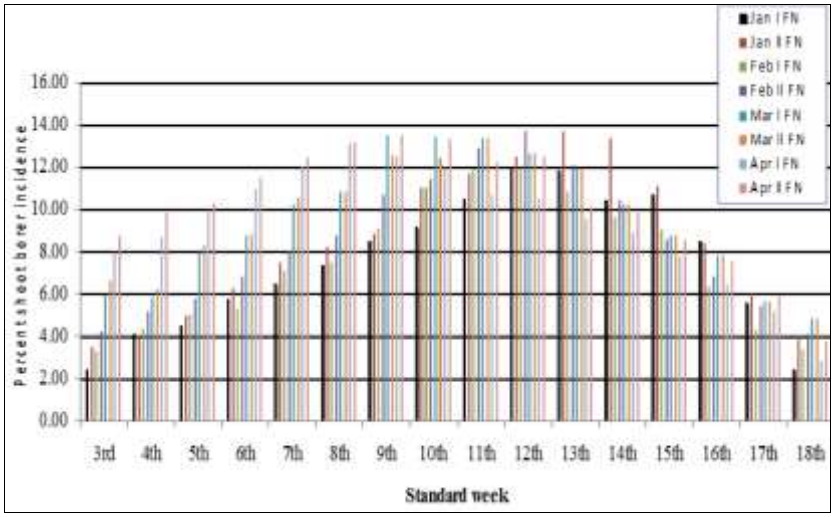

Fig 2: Shoot borer incidence at different times of plannings

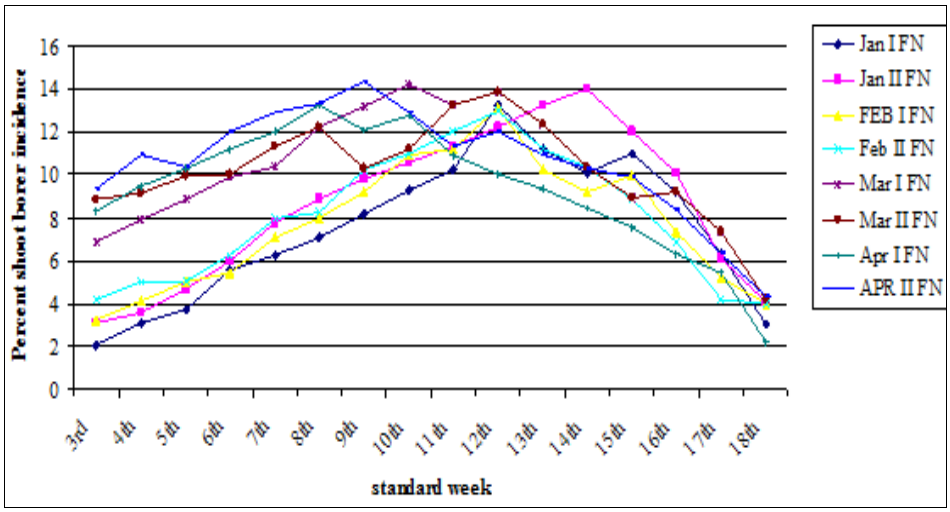

Fig 3: Shoot borer incidence in 99v30 at fortnight intervals planting

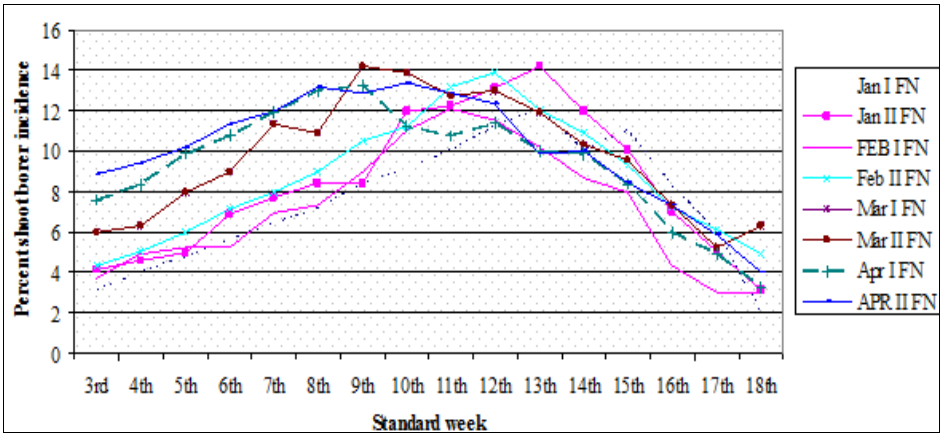

Fig 4: Percent shoot incidence in 2000 V 59 at fortnight intervals planting

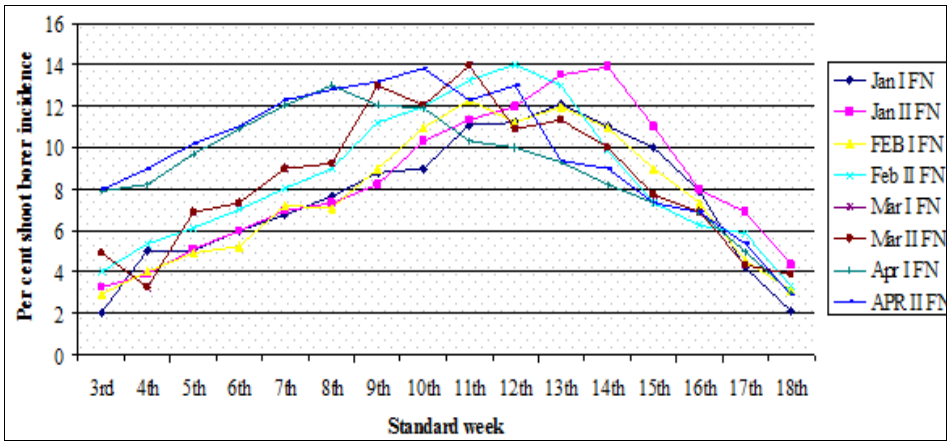

Fig 5: Shoot borer incidence in 2003 V 46 at fortnight intervals planting

Table 1: Influence of weather parameters on incidence of ESB

Weather parameter	Correlation co- efficient	
	corresponding week	Preceding two weeks
Maximum Temperature ° C	0.41 **	0.40 **
Minimum Temperature ° C	0.38 **	0.40 **
Relative humidity % – F.N	- 0.39 **	- 0.28 **
Relative humidity %– A.N	- 0.28 **	- 0.26 **
Rainfall (mm)	- 0.18 *	- 0.10
Sunshine Hours	0.11	0.21

Conclusions

The shoot borer incidence is influenced by neither the variety nor the time of planting. The tillering stage of the crop is most vulnerable for the pest attack. Maximum temperature, minimum temperature and sunshine hours had a positive correlation and forenoon and after noon relative humidity and rainfall had a negative correlation with shoot borer incidence. From foregoing results it may be concluded that it is difficult to find out the direct cause and effect relationship between any single climatic factor and pest activity. The impacts of weather on pest incidence are usually compound.

Acknowledgement

The authors are thankful to Acharya N.G. Ranga Agricultural University, for providing facilities required during the course of investigation.

References

1. Avasthy PN, Tiwari NK. The shoot borer, *Chilo infuscatellus* Snellen. Sugarcane Entomology in India (eds: Savid H, S Easwaramurthy and R Jayanthi). Sugarcane Breeding Institute, Coimbatore 1986,69-92.
2. Duhra MS, Bains BS, Sharma KK. Effect of planting time of sugarcane varieties on the incidence of shoot borer and cane yield. Indian Journal of Ecology 1993;20(1):91-93.
3. Gajjar S, Makwana KV, Mali SC. Sugarcane borer's (Top borer and internode borer) population dynamics in relation to abiotic stress evaluated through pheromone trap. Proc. Int. Sugar Cane Technology 2015,116-123.
4. Hapase DG, Patil AS, Moholkar PR. Effect of some climatic factors on the incidence of sugarcane borer, Indian Journal of Sugarcane Technology 1979;2:1-8.
5. Hasabe BM, Khaire VM. Path analysis: Infestation of early shoot borer in relation to meteorological parameters. Bharatiya Sugar 2005;21:41-45.
6. Jena BC, Patnaik NC. Effect of planting dates on early shoot borer incidence in sugarcane. Co-operative Sugar 1996;27(12):925-927.
7. Kalra AN, Sharma NC. Occurrence of the shoot borer, *Chilotraea infuscatellus* Snell, as cane borer in Sriganganagar area of Rajasthan, Indian Journal of Sugarcane Research Development 1963;7:193-194.
8. Krishnamurthy Rao BH. The activity of *Chilotraea infuscatellus* Snell in relation to meteorological conditions. Proc. Ann. Conv. Sug. Technol. Assoc. India 1966;34:127-129.
9. Lakshmikantham M. Technology in sugarcane growing. IBH Publ, New Delhi 1983,259.
10. Mali BB. Effects of time of planting and varieties on the incidence of early shoot borer *Chilo infuscatellus* Snellen Sugarcane. Journal of Insect science 1990;5:77-79.
11. Patil AS, Hapase DG. Research on Sugarcane borers in Maharastra State. Proceedings of National Symposium on Stalk Borer 1981,165-175.
12. Prasada Rao VLV, Sambasiva Rao S, Venugopala Rao N. Factors influencing infestation of early shoot borer *Chilo infuscatellus* Snellen in Sugarcane. Cooperative Sugar 1991;22:515-521.
13. Samui RP. Forewarning of stem borer attack on sugarcane pest and pest weather calendar for operational crop protection at Gorakhpur, East Uttarpradesh. Indian Sugar 1993;13:627-639.
14. Sithanantham S, Durai D, Muthuswamy S. Incidence of sugarcane shoot borer in relation to planting time. Indian Sugar 1975;24:867-870.
15. Tanwar RK, Bajpai PK. Relative abundance of borer species in relation to environmental factors at shoot borer stage of sugarcane. Indian sugar 1993;43:243-248.
16. Thirumurugan A, Enayathullah Shah S, Venkatachalam SR. Effect of time of planting on incidence of shoot borer, *Chilo infuscatellus* Snellen, yield and quality. Cooperative Sugar 2001;32:549-551.
17. Uma Shankar HG, Patel VN. Abundance of Sugarcane Internode borer, *Chilo sacchariphagus indicus* (Kapur) (Crambidae: Lepidoptera) and Role of Abiotic factors on its incidence. Indian journal of natural sciences 2018;9(51):1-5.