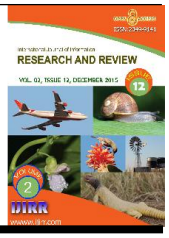
IJIRR

International Journal of Information Research and Review
Vol. 02, Issue, 12, pp. 1538-1541 December, 2015



## Research Article

# SEASONAL INCIDENCE AND BIOEFFICACY OF GRANULAR INSECTICIDES AGAINST SUGARCANE EARLY SHOOT BORER, *CHILO INFUSCATELLUS* (SNELLEN) IN WESTERN OF MAHARASHTRA

**Nilesh Bhawar, *Pandurang Mohite and Sarjerao Patil**

Department of Entomology, College of Agriculture, Kolhapur, 416 004, (M.S)

**ARTICLE INFO**

***Article History:***

Received 09th, September 2015
Received in revised form
27th, October 2015
Accepted 24th, November 2015
Published online 30th, December 2015

***Keywords:***

*Chilo infuscatellus* ,
Bioefficacy, Sugarcane,
Early shoot borer,
Lasenta.

**ABSTRACT**

The infestation of *C. infuscatellus* was first observed at 10th MW.The peak dead hearts was observed during 13th to 14th MW.The studies on seasonal incidence indicated significantly correlation between incidence of early shoot borer and temperature. Whereas negatively correlated with minimum temperature, humidity and rainfall. An investigation was undertaken with an objective to Study the relative bioefficacy of granular insecticides *viz*., Cartap hydrochloride 4 G, indoxacarb 1, Fipronil 0.3G, Ferterra 0,4 G, Carbofuron 3G, Lasenta 80.WG, Phorate10 Chlorpyriphos 10 G against early shoot borer, *Chilo infuscatellus* (Snellen) on sugarcane during Suru season on farmers field. . All the new insecticide molecules treatments were observed to be effective in reducing the heavily infestation of shoot borer on sugarcane. The granular insecticides lasenta 80 WG @ 250 g a.i./ha proved to be most effective against *C. infuscatellus* where 5.12 and 3.17 per cent dead hearts were recorded at first application and second application respectively. The next best treatment in order of their effectiveness were ferterra 0.4 G @ 30 g a.i./ha, fipronil 0.3G @ 7.5 g a.i./ha, cartap hydrochloride 4 G @ 750 g a.i./ha, chlorpyriphos 10 G @ 1 kg a.i./ha, carbofuran 10 G @ 750 g a.i./ha and phorate 10 G 750 g a.i./ha.

*Copyright © 2015 Nilesh Bhawar et al. This is an open access article distributed under the Creative Commons Attribution License, which permits unrestricted use, distribution, and reproduction in any medium, provided the original work is properly cited.*

## INTRODUCTION

The production and productivity of the sugarcane is affected by many factors *viz,* soil type, selections of variety, fertilizer management, irrigation management and damage caused by pests. Sugarcane is attacked by insects, however, 15 pests are reported to cause considerable loss in yield. The early shoot borer, top shoot borer, internode borer, white grub, sugarcane pyrilla, white Woolly aphid, Scale insect and Termites are major pest of sugarcane but the early shoot borer is worst pest which is responsible for severe damage in early growth stage and yield loss. The shoot Borer, *Chilo infuscatellus* (Snellan) (Pyralidae; Lepidoptera) cause economic losses (Avasthy and Tiwari, 1986)from 22-23 per cent in yield, 12 per cent in sugar recovery and27 per cent in Jaggary (Patil and Hapse,1981). The pest is mainly injuries to young cane up to 8 weeks after planting. The caterpillars after hatch out from eggs get scattered and enters into the young shoots by making the holes just above ground levels and tunnels downwards. The central shoot dries up causing 'dead hearts'. It is a characteristic sign of the presence of the pest within the plants. The dead heart can be easily pulled out of the central shoot, roots inside the stem and emits an offensive smell on being pulled out.

***Correspoding author: Pandurang Mohite,***
*Department of Entomology, College of Agriculture, Kolhapur, 416 004, (M.S)*

From time to time several insecticides were tried and recommended for the management of early shoot borer. In spite of that the problem of early shoot borer still persists. Therefore, the efforts are made to find out the effective new molecules for management of early shoot borer in sugarcane.

## MATERIALS AND METHODS

The experiments was laid out in randomized block design with eight treatments including untreated control and replicated thrice in 6 × 2 $M^2$ plot size, Suru Season at farmers field .The sugarcane variety CO-86032 (Nira) was planted as per recommended package of practices except plant protection measures. The granular formulations were applied to the three plots of treatment in three replications were treated at a time. To avoid intermixing of treatment, about 20 to 30 cm thick false bund boundaries were prepared all around the plots having the treatments of granular insecticides. Drenching was undertaken in case of Fipronil + Imidacloprid combination.

### Observations

The seasonal incidence of early shoot borer was judged on the basis of the per cent dead hearts from germination up to vegetative stage The weekly observations on dead hearts on ten hills selected randomly for each plot were recorded and correlate with meteorological data.

The efficacy of various insecticides against early shoot borer was judged on the basis of the per cent dead hearts at vegetative stage. The granular application was done in endemic area on ETL basis. The observations on the dead hearts on ten hills selected randomly for each plot and tagged. in case of granular application dead hearts were recorded 15 and 30 days after treatment ,The data were subjected to analysis of variance by Panse and Sukhatme (1985).

presented in Table 1. The infestation started increasing 10.49 per cent (dead hearts) in 12$^{th}$M.W When the temperature and relative humidity was 38.2 and 79 per cent, respectively. The peak incidence of early shoot borer on the base of dead hearts observed was found to be 17.07 per cent when temp and humidity was 36.5 and 78 per cent respectively then the incidence was started declining from 15$^{th}$MW. Onwards corresponds to 2$^{nd}$week of April.

**Table 1. Correlation between Sugarcane early shoot borer *C. infuscatellus* infestation with weather parameters**

| Sr. No. | Damage/symptoms | Meteorological parameters | | | | |
|---|---|---|---|---|---|---|
| | | Max. Temp. | Min. Temp. | Humidity | Rainfall | ESB infestation |
| | | Correlation coefficient values | | | | |
| 1 | Dead hearts (%) | 0.543* | -0.022** | -0.554* | -0.125** | 1.000* |

* =Significant at 5 per cent level ** =Significant at 1 per cent level

**Table 2. Bioefficacy of granular insecticides against Early shoot borer (First application)**

| Sr. No. | Insecticides | Dose/ha | Per cent dead hearts. | | Mean |
|---|---|---|---|---|---|
| | | | 15 DAS | 30 DAS | |
| 1. | Cartap hydrochloride 4 G | 750 g a.i. | 6.74 (15.00) | 6.39 (14.69) | 6.20 (14.42) |
| 2. | Fipronil 0.3G | 7.5 ga.i. | 6.65 (14.89) | 6.23 (14.46) | 6.44 (14.67) |
| 3. | Ferterra 0.4 G | 30 g a.i. | 6.41 (14.61) | 5.74 (13.81 | 6.07 (14.21) |
| 4. | Carbofuran 3 G | 750 g a.i. | 7.69 (16.13) | 7.09 (15.48) | 7.39 (15.80) |
| 5. | Lasenta 80 WG | 250 g a.i. | 5.34 (13.26) | 4.91 (12.79) | 5.12 (13.02) |
| 6. | Phorate 10 G | 750 g a.i. | 8.13 (16,55) | 7.55 (15.85) | 7.86 (16.32) |
| 7. | Chlorpyriphos 10 G | 1kg a.i. | 7.33 (15.71) | 6.72 (14.96) | 7.02 (15.33) |
| 8. | Untreated control | -- | 8.91 (17.34) | 9.22 (17.69) | 9.06 (17.51) |
| | S.E. | | 0.13 | 0.15 | 0.14 |
| | C.D. @ 5% | | 0.40 | 0.48 | 0.44 |

**Figures in parenthesis are arsine transformed values.
*Mean of three replication

**Table 3. Bioefficacy of granular insecticides against Early shoot borer (Second application )**

| Sr. No. | Insecticides | Dose/ha | Per cent dead hearts. | | Mean |
|---|---|---|---|---|---|
| | | | 15 DAS | 30 DAS | |
| 1. | Cartap hydrochloride 4 G | 750 g a.i. | 5.93 (14.10) | 5.44 (13.48) | 5.68 (13.79) |
| 2. | Fipronil 0.3G | 7.5 g a.i. | 5.64 (13.73) | 5.25 (13.22) | 5.44 (13.47) |
| 3. | Ferterra 0.4 G | 30 g a.i. | 4.32 (12.O1) | 3.64 (10.99) | 3.98 (11.50) |
| 4. | Carbofuran 3 G | 750 g a.i. | 6.29 (14.56) | 5.89 (14.00) | 6.09 (14.28) |
| 5. | Lasenta 80 WG | 250 g a.i. | 3.34 (10.41) | 3.01 (9.92) | 3.17 (10.16) |
| 6. | Phorate 10 G | 750 g a.i. | 6.73 (15.00) | 6.29 (14.92) | 6.51 (14.77) |
| 7. | Chlorpyriphos 10 G | 1kg a.i. | 6.O2 (14.12) | 5.45 (13.50) | 5.73 (13.81) |
| 8. | Untreated control | -- | 8.91 (16.83) | 8.74 (17.19) | 8.56 (17.01) |
| | S.E. | | 0.14 | 0.17 | 0.15 |
| | C.D. @ 5% | | 0.43 | 0.51 | 0.47 |

**Figures in parenthesis are arsine transformed values.
*Mean of three replication

## RESULTS AND DISCUSSION

### Seasonal incidence of Sugarcane early shoots Borer *C. infuscatellus*

The data on per cent dead hearts by *C. infuscatellus* under field conditions along with weather parameters viz; temperature (Maximum and Minimum), relative humidity, rainfall are

In general the temperature was positively correlated (r = 0.543) the incidence of early shoot borer. These results are arranged in agreements with Sunilkumar *et al*. (2004) who reported that temp (maximum and minimum) has positive impact on the incidence of early shoot borer. Similar results of seasonal incidence in rice stem borer were also reported by David (1995) and Harishkumar (1995).

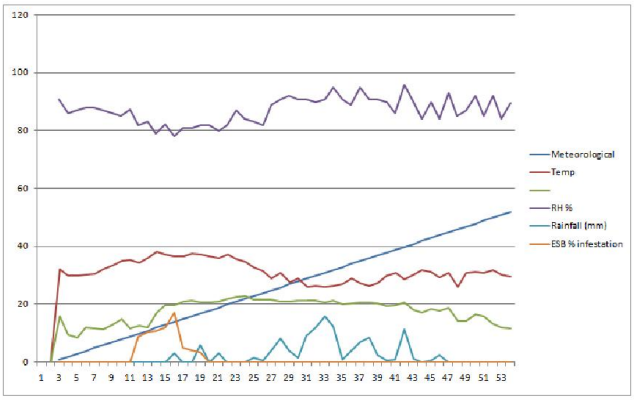
**Bioefficacy of Granular Insecticide against Sugarcane Early shoot borer, *Chilo infuscatellus* (Snellan). (Granular application/ drenching)**

The efficacy of different granular insecticides against sugarcane early shoot borer was judged on the basis of observation recorded on per cent dead hearts recorded on 15th day after treatment and 30th days after treatment.

**First application**

The data presenting on shoot infestation by *C. infuscatellus* under field conditions are given in Table 3 The results revealed that all the insecticide treatments recorded significantly lower per cent of dead hearts as compared to untreated control up to 30 DAS. It could be seen from Table 2 that the dead hearts observed in different granular insecticide treatment varied from 5.34 to 8.13 per cent as against 8.91 per cent in untreated control. Among the insecticides tested, the drenching with lasenta 80 WG @ 250 g a.i./ha proved to be most effective and significantly superior over all other treatments and recorded lower dead hearts 5.34 per cent. The treatment with ferterra 0.4 G @ 30 g a.i./ha found next in order of efficacy where 6.41 per cent dead hearts, were recorded however it was on par with Fipronil 0.3 G @7.5 g a.i/ha and cartap hydrochloride 4G @ 750 g a.i./ha where 6.65 and 6.74 per cent dead hearts were recorded, respectively. The treatment with chlorpyriphos 10 G, carbofuran 3 G and phorate 10 G were next in order of efficacy.

**Fig, No.1 Seasonal incidence of *C. infuscatellus* on Sugarcane**




The dead hearts percentage was significantly low in all the treatments as compared to untreated control when observations were recorded on 30 DAS. Among the insecticides tested the treatment with lasenta 80 WG @ 250 g a.i./ha proved to be most effective and superior overall the rest of the treatment recorded lower dead hearts 4.91 per cent. The treatment with ferterra 0.4 G @ 30 g a.i./ha stood second in order of efficacy where 5.74 per cent dead hearts were recorded. Treatment with Fipronil 0.3 G @ 7.5 g a.i./ha recorded (6.23 per cent) and found at par with cartap hydrochloride 4 G @ 750 g a.i./ha where 6.23 and 6.39 per cent dead hearts were recorded, respectively. This was followed by the treatment with chlorpyriphos 10 G, carbofuran 3 G and phorate 10 G in which 6.72, 7.09 and 7.55 per cent dead hearts noticed.

**Second application**

The dead heart observed in different granular insecticides the per cent dead hearts ranged from 3.34 to 6.73 per cent as against 8.39 per cent in untreated control.

Among the insecticide tested the drenching with lasenta 80 WG @ 250 g a.i./ha proved to be most effective and superior over all the rest of the treatment and recorded lower (3.34 per cent) dead hearts. The treatment with ferterra 0.4 G @ 30 g a.i./ha stood second in order of efficacy and recorded 4.32 per cent dead hearts. The next best treatment in order of their efficacy was Fipronil 0.3 G @ 7.5 g a.i/ha recorded 5.64 per cent dead hearts and found at par with cartap hydrochloride 4 G @ 750 g a.i./ha recording 5.93 per cent dead hearts. Significant difference did not exist among the rest of the treatment. The dead hearts percentage was significantly low in all the treatments as compared to untreated control when observations were recorded 30th days after treatment

Among the insecticide tested the drenching with lasenta 80 WG @ 250 g a.i./ha proved to be significantly superior over all the rest of the treatments and recorded lower (3.01 per cent) dead hearts. The treatment with ferterra 0.4 G @ 30 g a.i./ha stood second in order of effectiveness recording 3.64 per cent dead hearts. Treatment with Fipronil 0.3 G @ 7.5 g a.i./ha recorded 5.25 per cent dead hearts and found at par with cartap hydrochloride 4 G @ 750 g a.i./ha recording 5.44 per cent dead hearts. Significant difference did not exist among the rest of the treatments. Overall performance of various granular insecticidal treatments based on the mean dead hearts indicated that treatment with lasenta 80 WG was the most effective and significantly superior over all other treatments in reducing the dead hearts to minimum level of 3.17 per cent followed by ferterra 0.4 G where 3.98 per cent dead hearts were recorded.

Treatment with Fipronil 0.3 G proved next effective treatment and found on par with cartap hydrochloride where 5.44 and 5.68 per cent of dead hearts were recorded respectively. The treatment chlorpyriphos, carbofuran and phorate were next in order of efficacy. In case of granular insecticides lasenta 80 WG @ 250 g a.i./ha was consistently most effective against sugarcane early shoot borer where lower per centage of dead hearts were recorded. Ferterra 0.4 G @ 30 g a.i./ha, Fipronil 0.3 G @ 7.5 g a.i./ha, cartap hydrochloride 4 G @ 750 g a.i./ha, chlorpyriphos 10 G @ 1 kg a.i./ha, carbofuran 3 G @ 750 a.i./ha, phorate 10 G @ 750 g a.i./ha and also showed better results in reducing dead hearts. The effectiveness of lasenta 80 WG and ferterra 0.4 G in controlling the white grub has already been tested. However they are tested first time against the shoot borer and hence the results could not be compared. Other granular treatments which were next in order of efficacy Fipronil 0.3 G, cartap hydrochloride 4G, Chlorpyriphos 10 G, carbofuran 3 G and phorate 10 G have also been reported in reducing stem borer infestation. The effectiveness of cartap hydrochloride @ 10 kg/ha at 20 days interval against *S. incertulus* (Walker) and *Cnaphalocrocis medinalis* damage significantly has already been reported by Singh and Sharma (1998) and . Rao *et al.* (2008)

## REFERENCES

Anonymous, 2013. National conference on agriculture for Kharif campaign 2013 M.S State Dept. Of Agril. Govt. of Maharashtra.

Avasthy, P.N. and Tiwari, N. K. 1986. The shoot borer,*Chilo infuscatellus* (snellen). In sugarcane entomology in India, ICAR, SBI, Coimbatore Publication pp. 68-82.

Carbofuron application in rice against stem borer and leaf folder. *J. Res. Punjab Agric.Uni.,* 35(1/2):53-58.

David, P.K. 1995. Studies on the seasonal incidence of rice stem borer and leaf folder in Tambirabrani delta.M.Sc. (Agri.) Thesis. Tamilnadu Agric. Univ., Killikulam.

Harish Kumar (1995).Varietal resistance, population dynamicsand timing of insecticidal application with peakoviposition by *Scirpopha ga incertulas* (Walker) (Lepidoptra: Pyralidae) on rice. *Annul. of Appl.Zool.* 127(2):221-228.

Indian Sugar, 51 (8):517-520.

Panse, V. G. and Sukhatme, P. V. 1985. Statistical methods for agricultural worker, 4th Edition, ICAR Publication, New Delhi, pp. 85-105.

Patil, A.S. and D.G. Hapase. 1981. Research on Sugarcane borers in Maharashtra. Proceedings, National Symposium on stalk borer, karnal pp. 165 – 175.

Rao, B.S., S. Mallikarjunappa, G. Bhat and N. Koneripalli. 2008. Bioefficacy of new generation insecticide Takumi 20 WG against rice yellow stem borer *Scirpophaga incertulas.* Pestology, 34(4):33-34.

Singh, D.P. and Sharma, D.R. 1998. Implications of phorate and

Sunil kumar, K., T. Uma Maheshwari and N. Venugopala Rao.2004. Biology and seasonal incidence sugarcaneearly shoot borer *chilo infuscatellus* snellen in 55southern in southern Zone of Andhra Pradesh. *Indian Journal of Entomology*. 66(3) 246-250.

*******