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Chemical Control of Sugarcane Stem Borer, *Chilo infuscatellus* Snellen (Crambidae: Lepidoptera) at Tando Jam

Muzaffar A. Talpur, Imtiaz A. Nizamani and Khalid H. Qureshi
Department of Plant Protection, Sindh Agriculture University
Tandojam -70060, Sindh, Pakistan

Abstract: An experiment was conducted to assess the chemical control of sugarcane stem borer, *Chilo infuscatellus* (Sn.) in the experimental area of Sugarcane Section, Agriculture Research Institute, Tandojam during 1999-2000 season. Four insecticides namely Furadan 3G (carbofuran) at 12 kg/ac, Padan 4G (cartap) at 9 kg/ac, Basudin 10G (diazinon) at 9 kg/ac and Thimet 5G (phorate) at 10 kg/ac and compared with an un-treated (check plots) using a "Complete Randomized Block Design" with three replicates. It was found that all insecticides minimum infestation percentage of stem borer significantly at 10, 15 and 30 days of post-treatment and increased cane yield over check plot. Among the best products Furadan proved superior in checking stem borer infestation over rest of the product tested.

Keywords: Control, Stem Borer, *Chilo Infuscatellus*, Sugarcane

Introduction

Sugarcane, *Saccharum officinarum* L. is an industrial cash crop of canal irrigated areas of Pakistan and ranks fourth after wheat, rice and cotton. (Marwat and Khalil, 1985). In Pakistan cane is cultivated on an area of about 1009.8 thousand hectares with an annual production of 46332.6 thousand tones (Anonymous, 2001). The per hectare sugarcane yield in Sindh is comparatively higher indicating the suitability of agroclimatic condition for better sugarcane production in the region. However, the yield in Pakistan is very low as compared with other cane growing countries of the world (Ansari, 1974., Fasihi and Siddique, 1985). One of the most important factors for low production of sugarcane is the ravage of insect pest. Sugarcane is attacked by about one hundred insect species in the sub-continent and forty-nine species have been classified as major pests (Rehman and Singh, 1942 and Lakshmikanthan, 1983). In Pakistan twelve species of insect pests have been reported to be associated with sugarcane crop (Choudhary and Ansari, 1988) including Sindh (Naqvi, 1975). Sugarcane stem borer is a serious pest of cane in Sindh (Jafri, 1998). Its heavy infestation retards the growth of the crop and quality of the cane is also affected. Keeping in view the economic importance of the pest and crop, field studies were carried out to determine the chemical control of sugarcane stem borer at Tandojam.

Materials and Methods

In order to assess the chemical control of sugarcane stem borer on sugarcane crop, an experiment was conducted in the experimental area of Sugarcane Section, Agriculture Research Institute Tandojam, during the crop season of 1999-2000. Homogenous sets of a standard commercial sugarcane variety BL-4 were planted during 1st week of March 1999 in rows keeping one meter distance between row to row and one feet distance between set to set. Using a three replicated "Randomized Complete Block Design" was laid out. A 7x5 m^2 net plot was maintained. As such there were five rows, each of meter long for each treatment plot.

Insecticides and Their Application: Four insecticides were tried and compared with an un-treated plot control viz; Furadan at 3G (carbofuran) at 12 kg/ac, Basudin 10G (diazinon) at kg/ac, Padan 4G (cartap) at 9 kg/ac and Thimet 5G (phorate) at 10 kg/ac. All insecticides were dressed at 2 to 3 percentage damage of stem borer during the month of April. Three dressings were made at one month of intervals.

Observation on Stem Borer Infestation Percentage: For recording observation on damage percentage 10 shoots were selected randomly from each treatment of respective replication. Damaged cane were separated, holes were counted and tabulated for damage percentage according to the given formula.

$$\% \text{ Infestation} = 1 \frac{\text{No. of damaged cane}}{\text{No. of healthy cane}} \times 100$$

Pre-treatment observation was recorded one day before each application of insecticides, while post-treatment observation was recorded after 10, 15 and 30 days of each dressing of insecticide. At maturity the sugarcane crop was harvested and yield/plot was recorded separately for each treatment and compared with un-treated control. All the collected data were subjected to analysis of variance to test the superiority of treatment mean LSD test was applied following Gomez and Gomez (1984).

Results and Discussion

First Application: The results on the infestation percentages of stem borer, *Chilo infuscatellus* on sugarcane after different time intervals of first application are presented in Table 1. A perusal of the data showed that various insecticides affected the survival of the insect pest significantly after different time intervals. All the insecticides had higher initial killing effect as highest infestation percentage was recorded after 10 days of dressing. However, lowest infestation percentage was recorded in plots treated with Furadan followed by Basudin, Padan and Thimet, while un-treated control plot showed the maximum infestation. After 15 days of dressing all treated plot reduces the stem borer infestation, but slightly more as compared to 10 days of application. The differences among the treatments were highly significant. Furadan remained on top as displayed minimum infestation of pest followed by Basudin, Padan and Thimet respectively. Similarly, after 30 days of application, all the tested products reduced the pest infestation significantly over control. Although pest infestation comparatively increased over 10 and 15 days after dressing. Furadan treated plots showed lowest infestation of stem borer, followed by Basudin, Padan

and Thimet. On over all the performance of Furadan found to be superior in reducing the pest infestation than other treatments tested.

Second Application: The results on the infestation percentages of sugarcane stem borer during second application of insecticides are summarized in Table 2. It is evident from the data that the differences in pest infestation between the treatments after 10, 15 and 30 days of dressing were significant at 1% level. It was observed that after 10 days of dressing the pest infestation reduced progressively in all treated plots over control. Furadan displayed effective control of stem borer on the treated plots recorded minimum infestation followed by Basudin, Padan and Thimet respectively, while greater infestation of pest was recorded in case of un-treated plot. After 15 days of treatment the trend was similar as observed after 10 days of dressing insecticides. Furadan treated plot recorded minimum infestation, followed by Padan, Thimet and Basudin, while un-treated (check plots) displayed maximum infestation of pest. It was further found that after 30 days of insecticide application in all products reduces greater infestation as compared to 15 days. Furadan treated plots recorded lowest infestation of pest followed by Padan, Basudin and Thimet, while un-treated plots recorded greater infestation of pest. On over all the Furadan treated plots recorded infestation of pest when compared with other products tested.

Third Application: The data on infestation percentages of stem borer recorded after different time intervals of insecticide application are shown in Table 3. It revealed that all insecticides treated plots reduced the pest infestation significantly after 10, 15 and 30 days of dressing. After 10 days of application Furadan proved effective in reducing pest infestation significantly and recorded minimum infestation followed by Thimet, Padan and Basudin respectively. However, after 15 days of application all the products displayed similar trend of effectiveness as shown during 10 days of dressing Furadan treated plots recorded significantly lower infestation of pest followed by Basudin, Padan and Thimet. After 30 days of treatment the infestation of stem borer increased over 10 and 15 days of treatments. The differences in infestation percentage between insecticides were highly significant. Plots interval with Furadan resulted less infestation followed by Basudin, Padan and Thimet over control. On over all the Furadan treated plots recorded lower infestation of stem borer over rest of the other insecticides tried. The present results are also supported by the findings of Wajih, *et al.*, (1969) who recommended five applications from April to November to control borer complex in sugarcane with any of Furadan, Diazinon and Malathion. Moreover, the studies of many research workers (Halimie, *et al.*, 1988, Halimie, *et al.*, 1989, Halimie, *et al.*, 1990, Sardana and David, 1992 and Patel, *et al.*, 1993) are in conformity with present studies, that carbofuran was the most effective insecticide in controlling the *Chilo infuscatellus* on sugarcane.

Yield: The results obtained on cane yield are shown in Table 4 and their analysis of variance in Table 5. It may be seen from the tables that cane yield was affected significantly by the insecticide application. Maximum can yield (kg/plot and mds/ac) was recorded in plots treated with Furadan followed by Padan. Basudin and Thimet respectively, while lowest cane yield was recorded in check (plots) when no insecticide was applied. These results demonstrated that Furadan is found to be more effective in checking stem borer infestation and resulted more cane yield, although other treated plot also gave more yield as compared to un-treated plot control. The results presented are in agreement to various research workers (Yadav, *et al.*, 1992 and Singh, 1994) who reported that Furadan (carbofuran) was found to be more effective in reducing the infestation and resulted in higher yield than rest of the other insecticides which manifest their recommendation for the control of stem borer of sugarcane.

Table 1: Infestation Percentage of *Chilo infuscatellus* (Sn.) On Sugarcane Recorded at Various Intervals During First Application of Insecticides

Insecticides	Pre-treatment	Time interval			Mean
		10-days	15-days	30-days	
Check (plot)	11.82	11.98a	13.90a	25.00a	16.96
Padan	12.57	6.33c	8.67b	14.97c	9.99
Basudin	12.90	5.82cd	7.55c	13.60c	8.99
Thimet	12.73	8.34b	9.29b	19.71b	12.45
Furadan	12.87	4.19d	5.81d	10.83d	6.94
S.E	-	0.706	0.753	1.199	-
CdI	-	1.630	1.740	2.770	-
CdII	-	2.371	2.531	4.029	-

Mean values followed by similar letter do not differ significantly at 5% level.

Table 2: Infestation Percentage of *Chilo infuscatellus* (Sn.) On Sugarcane Recorded at Various Intervals During Second Application of Insecticides

Insecticides	Pre-treatment	Time interval			Mean
		10-days	15-days	30-days	
Check (plot)	20.18	20.24	31.11a	26.91a	26.09
Padan	19.7 7	11.33b	17.92c	19.91b	16.39
Basudin	20.43	10.06c	24.31b	20.40b	18.26
Thimet	20.02	11.69b	23.61b	21.11b	18.80
Furadan	19.52	4.95d	14.16d	15.77c	11.63
S.E	-	0.156	1.195	1.359	-
CdI	-	0.364	2.760	3.140	-
CdII	-	0.520	4.015	4.567	-

Mean values followed by similar letter do not differ significantly at 5% level.

Table 3: Infestation Percentage of *Chilo infuscatellus* (Sn.) on Sugarcane Recorded at Various Intervals During Third Application of Insecticides

Insecticides	Pre-treatment	Time interval			Mean
		10-days	15-days	30-days	
Check (plot)	32.45	32.63a	29.89a	27.63a	30.05
Padan	32.63	13.39c	19.06c	24.01b	18.82
Basudin	32.07	25.08b	14.50d	16.44c	18.67
Thimet	33.05	9.27d	23.90b	25.61ab	19.59
Furadan	32.90	5.75e	10.15e	14.36c	10.09
S.E.	-	1.524	1.450	0.900	-
CdI	-	3.520	3.350	2.080	-
CdII	-	5.121	4.873	3.025	-

Mean values followed by similar letter do not differ significantly at 5% level.

Table 4: Mean Stripped Cane Yield (kg/plot & mds/ac) as Affected by Different Insecticides Against *Chilo infuscatellus* (Sn.) on Sugarcane

Insecticides	Replicate			Total	Average Yield (kg/plot)	Average Yield (mds/ac)
	RI	RII	RIII			
Check (plot)	215	201	195	611	203.67e	588.98
Padan	414	395	385	1194	398.0 0b	1150.95
Basudin	317	303	285	905	301.67c	872.38
Thimet	295	312	274	1485	293.66d	846.33
Furadan	407	463	485	1355	451.67a	1306.16
S.E	-	-	-	-	20.334	-
CdI	-	-	-	-	46.972	-
CdII	-	-	-	-	68.322	-

Mean values followed by similar letter do not differ significantly at 5% level.

Table 5: Analysis of Variance For Stripped Cane Yield/Plot

Source of Variation	D.F	S.S	M.S	F.Ratio	Remarks
Treatments	4	112747.13	28186.78	45.45	**
Replications	2	281.00	140.50	0.226	N.S
Error	8	961.67	620.21	-	-
Total	14	117989.800	-	-	-

**= Significant at P=0.01
N.S.= Non Significant

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