

Effectiveness of Different Cartap Insecticides in Controlling Stem Borer and Their Effect on the Yield of Sugarcane

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ABSTRACT

Different cartap insecticides namely Seda 50SP, Padan 50SP, Cidan 4G, Razex 4G, Forwatap 4G, Sundan 4G and Padan 4G were used to evaluate their effectiveness against stem borer of sugarcane. The experiment was carried out at 3 locations viz. i) BSRI farm, Ishurdi, Pabna ii) Patuadangi farm and iii) Jamalpur farm under Thakurgaon Sugar Mills Ltd., Thakurgaon during the cropping season 2001-2002. More pest control was achieved when number of application was more. It was found that Cidan 4G, Razex 4G, Forwatap 4G, and Sundan 4G @ 3.0 kg ai ha⁻¹ applied in June, July and August (three times) effectively controlled stem borer of sugarcane. An increase of 28.86 to 50.61% in yield was recorded in insecticide treated plots as compared to non treated.

Key words : Sugarcane, stem borer, cartap insecticides, effective control.

INTRODUCTION

Sugarcane stem borer, *Chilo tumidicostalis* Hampson is one of the most destructive pests of sugarcane growing areas of Bangladesh. Incidence of stem borer starts from the end of April and continues upto November. However, it is most abundant in June to September. Infestation in the field may be as high as 80%. Total crop losses by stem borer infestation was recorded in Setabgonj sugar mills during 1973-1974 cropping season (Karim and Islam, 1977). Different authors reported on the losses due to stem borer. Heavy infestation due to the stem borer may cause yield loss ranging from 8.2 to 12.6% (Khanna *et al.*, 1957). Gupta and Avasthy (1960) also reported 25-70% and 12-60% losses in cane yield due to primary and secondary infestation in different varieties respectively along with 0.5-3.5 unit loss of sugar recovery in West Bengal. Due to stem borer infestation, heavy losses in yield incurred every year. When attack reaches as high as 100% loss in yield and loss in recovery range from 8.2-70.0% and 3.0-48.6% respectively. Stem borers are the internal feeders. They feed internal tissues voraciously making the plants ultimately die. Upon hatching the larvae immediately enter into the plants, feed the tissue and damage the cane. The newly hatched larvae move slowly towards the base of the leaf lamina and enter into 2-4 top most internodes by boring many entry holes in those internodes. Due to the primary infestation, top leaves completely dry up and infested plant is visible from a distance. Copious red colour frasses ooze out from the bored holes. Aerial roots come out profusely from the nodes adjacent to the damage internodes. After the primary infestation stage, the grown up larvae come out and migrate to the neighbouring canes to cause secondary infestation. The secondary infested canes

show the entry holes with oozing out excreta with sawdust like damaged tissue. The present study was undertaken to evaluate the efficacy of different cartap insecticides against stem borer.

MATERIALS AND METHODS

The experiment was set up at three locations one at Patuadangi farm and one at Jamalpur farm under Thakurgaon Sugar Mills Ltd., Thakurgaon and other one at BSRI farm, Pabna during the cropping season 2001-2002. The experiment was comprised of eight treatments including one control viz. T₀ : Control (untreated), T₁ : Seda 50SP, T₂ : Padan 50SP, T₃ : Cidan 4G, T₄ : Razex 4G, T₅ : Forwatap 4G, T₆ : Sundan 4G and T₇ : Padan 4G. The experiment was laid out in Randomized Complete Block Design (RCBD) with three replications. The plot size was 7m x 7m. Block to block distance was 2m and plot to plot distance was 1m. The variety Isd 28 was used to conduct the experiment in November, 2001. Two test insecticides were soluble in water and rest were granular in formulation and used @ 3.0 kg ai ha⁻¹. The application of insecticides was done once (Ishurdi), twice (Patuadangi) and thrice (Jamalpur), respectively in the months of August only, July + August and June + July + August at the same dose. Fertilizers were applied as per recommended dose, method and time. Intercultural operations were done as and when required.

Four test insecticides were granular in formulation and were applied at furrows, which were made on both sides of cane rows and incorporated with soils with the help of spade. Other two wettable powder insecticides were sprayed on plants with sprayer. Before irrigation, soil ridges surrounding individual plots were made to protect on rush of water from one plot to another. Data were taken in July, August, September and final in October. The yield of canes per plot was recorded at harvest.

For efficiency study, percent infestation was computed by counting total and infested canes for individual plot and the per cent infestation was computed by using the formula:

$$\% \text{ SB Infestation} = \frac{\text{Number of infested canes}}{\text{Total number of canes}} \times 100$$

RESULTS AND DISCUSSION

From table 1 it was found that when the chemicals were applied only once in the month of August, range of stem borer control was only 59.54% in Padan 50SP to 79.12% in Sundan 4G shown as in first data (September, 2002). After two months of insecticides application range of stem borer control was only 46.75% in Razex 4G to 60.25% in Forwatap 4G As shown in final data (October, 2002). From table 2 it was found that one month after insecticide application in July, the highest control of stem borer was in Sundan 4G (84.00%) followed by Padan 4G (82.96%), Razex 4G (71.91%) and Seda 50SP (68.52%) shown in first data recorded in August, 2002. After second insecticides applications in August, it was observed that all the insecticides were equally effective in reducing the stem borer infestation (Table 2, October, 2002 data) ranging from 70.08-74.58% showing significant response over control. But the data could not show 80% level of efficacy. The treatment Razex 4G showed maximum yield of 44.88 MTH followed by

Forwatap 43.78 MTH (Table 2). From the table 3 (Jamalpur farm, TSM) it was observed that when cartaps were applied in June and data taken in July showed promising control of stem borer, when applied in June and July and data taken in August also showed promising results. In case of 3 times application (June, July, August) and data taken in October the result was also very satisfactory (over 80%) except in Seda 50SP and Padan 50SP. For cane yield, the treatment Razex 4G showed maximum yield of 50.61 MTH followed by Forwatap 49.80 MTH. Therefore effective control of sugarcane stem borer could be achieved by applying Cidan 4G, Razex 4G, Forwatap 4G, and Sundan 4G @ 3.0 kg ai ha⁻¹. Significant difference in mean infestation was observed among the treated with untreated (control). During the period for 1973-78 field trials were conducted to control stem borer with insecticides like Padan 4G, Orthene 5G, Monitor 500, Furadan 3G, Sevidol 8G, Basudin 10G, Fundal 5G, Cytrolane 10G, Disyston 10G, Sevin 5G, Terracur 5G, Dursban 20EC, Supracide 40EC, Azodrin 10EC and Nuvacron 40WSC at BSRI and sugarmills farms but none could show promising control of the pest (Shahjahan *et al.*, 1983). In 1979-80 experiments were conducted with insecticides like Fyfanon 57EC, NOGOS 100EC, Dursban 20EC, Carbicron 10WSC and Nuvacron 40 WSC but none showed significant control of the pest. Experiments were conducted in 1979-80 and in 1982 with Padan 10G against stem borer also. The insecticide gave promising results in controlling the pest which is also a chemical under cartap group (Shahjahan *et al.*, 1983). Results of the present study and some previous studies reveal that only cartap group of insecticides have so far been shown effective control of the pest. And from the present finding Cidan 4G, Razex 4G, Forwatap 4G and Sundun 4G may be safely recommended against sugarcane stem borer with two to three frequencies of applications during the pest abundance period (June to August).

Table 1. Efficacy of some Cartap chemicals in controlling sugarcane stem borer, BSRI, Ishurdi, 2001-2002.

Treatments	% SB infestation (Mean of 3 replications)				Yield (t ha ⁻¹) (December 2002)	
	First data (September 2002)		Second data (October 2002)		Mean	% increase over control
	Mean	% efficacy	Mean	% efficacy		
Seda 50SP @ 3.0 kg ai ha ⁻¹ (August)	6.13 bc	68.40	20.49 bc	51.38	70.09	31.87
Padan 50SP @ 3.0 kg ai ha ⁻¹ (August)	7.85 b	59.54	20.81 bc	50.62	79.72	49.99
Cidan 4G @ 3.0 kg ai ha ⁻¹ (August)	6.19 bc	68.09	19.99 bc	52.56	75.56	42.16
Razex 4G @ 3.0 kg ai ha ⁻¹ (August)	6.23 bc	67.89	22.44 bc	46.75	71.39	34.32
Forwatap 4G @ 3.0 kg ai ha ⁻¹ (August)	5.18 bc	73.30	16.75 c	60.25	77.41	45.64
Sundan 4G @ 3.0 kg ai ha ⁻¹ (August)	4.05 c	79.12	18.98 bc	54.96	71.39	34.32
Padan 4G @ 3.0 kg ai ha ⁻¹ (August)	6.77 bc	65.10	18.47 bc	56.17	72.68	36.75
Control (untreated)	19.40 a	-	42.14 a	-	53.15	-
LSD (5%)	3.613	-	7.840	-	-	-

* Figures accompanied by the same letters are not significantly different.

Table 2. Efficacy of some Cartap chemicals in controlling sugarcane stem borer, Patuadangi farm, Thakurgaon, 2001-2002.

Treatments	% SB infestation (Mean of 3 replications)				Yield (t ha ⁻¹) (December 2002)	
	First data (August 2002)		Second data (October 2002)		Mean	% increase over control
	Mean	% efficacy	Mean	% efficacy		
Seda 50SP @ 3.0 kg ai. ha ⁻¹ (July + August)	3.62 cde*	68.52	22.13 b	71.89	32.78	28.86
Padan 50SP @ 3.0 kg ai. ha ⁻¹ (July + August)	5.71 b	50.35	23.56 b	70.08	34.17	31.75
Cidan 4G @ 3.0 kg ai. ha ⁻¹ (July + August)	4.20 bcd	63.48	21.24 b	73.03	40.09	41.83
Razex 4G @ 3.0 kg ai. ha ⁻¹ (July + August)	3.23 de	71.91	20.34 b	74.17	42.31	44.88
Forwatap4G @ 3.0 kg ai. ha ⁻¹ (August)	5.30 bc	53.91	21.79 b	72.33	41.48	43.78
Sundan 4G @ 3.0 kg ai. ha ⁻¹ (July + August)	1.84 e	84.00	20.01 b	74.58	41.39	43.66
Padan 4G @ 3.0 kg ai. ha ⁻¹ (July + August)	1.96 e	82.96	22.25 b	71.74	37.87	38.42
Control (untreated)	11.50 a	-	78.74 a	-	23.32	-
LSD (5%)	1.923	-	11.73	-	-	-

* Figures accompanied by the same letters are not significantly different.

Table 3. Efficacy of some Cartap chemicals in controlling sugarcane stem borer, Jamalpur farm, Thakurgaon, 2001-2002.

Treatments	% SB infestation (Mean of 3 replications)						Yield (t ha ⁻¹) (December 2002)	
	First data (July 2002)		Second data (August 2002)		Final data (October 2002)		Mean	% increase over control
	Mean Ln (x+1)	% efficacy	Mean Ln (x+1)	% efficacy	Mean Ln (x+1)	% efficacy		
Seda 50SP @ 3.0 kg ai. ha ⁻¹ (June + July + August)	1.027b* (2.41)	78.24	1.194b (2.64)	85.08	3.132bc (23.06)	74.81	33.60	33.87
Padan 50SP @ 3.0 kg ai. ha ⁻¹ (June + July + August)	1.168b (2.31)	79.15	1.268b (2.27)	84.63	3.276b (27.74)	69.70	36.68	39.42
Cidan 4G @ 3.0 kg ai. ha ⁻¹ (June + July + August)	0.430bc (0.56)	94.95	0.822b (1.48)	91.63	2.745cd (16.33)	82.16	43.15	48.50
Razex 4G @ 3.0 kg ai. ha ⁻¹ (June + July + August)	0.080c (0.09)	99.19	0.684b (1.02)	94.23	2.372de (11.10)	87.88	44.99	50.61
Forwatap4G @ 3.0 kg ai. ha ⁻¹ (June + July + August)	0.658bc (1.30)	88.27	0.677b (1.19)	93.28	2.118e (8.30)	90.93	44.26	49.80
Sundan 4G @ 3.0 kg ai. ha ⁻¹ (June + July + August)	.651bc (0.92)	91.70	(0.765b (0.42)	91.98	2.665d (14.40)	84.27	44.08	49.59
Padan 4G @ 3.0 kg ai. ha ⁻¹ (June + July + August)	0.344bc (0.45)	95.93	(0.841b (1.57)	98.13	2.563d (13.08)	85.71	38.52	42.32
Control (untreated)	2.364a (11.08)	-	2.842a (17.70)	-	4.516a (91.55)	-	22.22	-
LSD (5%)	0.8471	-	0.9617	-	0.4181	-	-	-

* Figures accompanied by the same letters are not significantly different.

Figures in parenthesis are observed mean.

REFERENCES

- Gupta, B.D. and Avasthy, P.N. 1960. Biology and control of the stem borer, *Chilo tumidicostalis* Hampson. Proc. Int. Soc. Sug. cane Technologist. 10 : 886-901.
- Karim, M.A. and Islam, M.N. 1977. Sugarcane insect pests and their natural enemies recorded in Bangladesh. Proc. 3rd Ann. conf. Bang. Soc. Sug. Technologist, 1974-1976. pp 32-68.
- Khanna, K.L.; Nigam, L.N. and Puri, V.D. 1957. Stem borer, *Chilo tumidico stalis* Hampson, a serious pest of sugarcane in Bihar. Proc. Indian.Acad.Sci., (B) 46: 75-95.
- Miah, M.A.H.; Khuda, A.K.M.Q.E., Khan, A.Z. and Shahjahan, M. 1980. Assessment of loss caused by top shoot borer, *Scipophaga excerptalis* Walk and stem borer, *Chilo tumidicostalis* Hampson and *Chilo auricilues* Dudgeon, Bangladesh J. Sugarcane. 2 : 13-17.
- Shahjahan, M. Karim, M.A.; Miah, M.A.H.; Sarkar, M.A.A.; Hossain, A.H.M.D.; Malek, M.A. and Chowdhury, S.A. (eds) 1983. Ten years of sugarcane research (1973-83). Annual report (Publication No.31), SRTI, Ishurdi, Pabna.113p.