Effect of Some Organocarbamate and Organophosphate Insecticides in Controlling Top Shoot Borer and Yield of Sugarcane

M. Begum, M.N.A Siddiquee, M. M. Biswas, M. Abdullah and M. A. Alam
Bangladesh Sugarcane Research Institute
Ishurdi, Pabna, Bangladesh.

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ABSTRACT

Experiment was conducted with different organocarbamates viz., Sinodan 5G, Nikidan 3G, Unifuran 5G @, Pardan 5G, New-furan 5G, Furan 3G and organophosphate viz., Baizinon 60 EC to evaluate their effectiveness against the top shoot borer of sugarcane. It was found that Sinodan 5G , Nikidan 3G, Unifuran 5G @, Pardan 5G, New-furan 5G, Furan 3G applied in March and May reduced incidence of the top shoot borer significantly. Increased cane yield over control was recorded in treated plots. Highest yield (74.81 t ha-1) was recorded in Unifuran 5G treated plots when applied in March and May with a range of 13.49- 53.33 % increase in different treatments.

Keywords : Sugarcane, top shoot borer, organocarbamate, organophos phate, control, yield.

INTRODUCTION

Top shoot borer, *Scirpophaga excerptalis* Walker (Lepidoptera: Pyralidae) is a serious pest throughout the cane growing areas of Bangladesh. It causes severe losses both in cane weight and sucrose content in infested canes. The period of severe attack by top shoot borer is from March to October. If the attack is after internode formation, the growing point is killed and the formation of 'dead-heart. Its infestation in the field ranges from 10 to 100%. Loss in cane weight due to the pest varied from 6.50 to 50.17% and 21 to 48% as reported by Khalequzzaman & Mannan (1980), and Karim and Islam (1977), respectively. Due to top shoot borer infestation estimated loss varies from 0.8 to 14.0% by weight and sugar loss varies from 1.5 to 29.6% (Miah *et al.*, 1980). Gupta and Singh (1997) reported that top shoot borer decreased brix, pol, sucrose, glucose and CCS by 2.10, 4.28,16.26,19.55 and 4.75 respectively. Sandhu & Dhura (1977) reported that the top shoot borer of sugarcane could be effectively controlled by the use of systemic insecticides like Carbofuran and Phorate. Mostafa *et al.* (1986) reported carbofuran as a broad-spectrum systemic insecticide. The Carbamate insecticides have both properties of killing insects by contact as well as systemic action. The present study was aimed at assessing the effectiveness of certain insecticides in suppressing the top shoot borer.

MATERIALS AND METHODS

The experiment was set up at Bangladesh Sugarcane Research Institute (BSRI), Ishurdi, Pabna during the cropping season 2005-2006. The experiment was laid out in Randomized Complete Block Design (RCBD) with three replications. There were nine treatments including one control. The treatment Furadan 5G was considered as standard. The plot size was 6m x 6m. Block to block distance was 2m and plot to plot distance was 1m. The sugarcane variety Isd 20 used as planting material. Planting was done through conventional sett placement (end to end) in trenches in December 05 at BSRI. The test insecticides included granular and liquid formulations. Furrows were made on both sides of cane rows by spade. Granular insecticides were broadcasted in the furrow and on the space between the furrows and covered with soils with the help of spade followed by irrigation. EC formulation was mixed with water before application for desired doses. Intercultural operation was made when necessary. Each of the organocarbamate insecticides like Sinodan5G, Nikidan3G, Unifuran 5G, Pardan5G, New-furan5G, Furan3G (Carbofuran) was applied twice and Organophosphate insecticide like Baizinon 60 EC (Diazinon) was applied three times. First application of Organocarbamate was made in March and second in May followed by irrigation. Organophosphate insecticide was applied in March, May, and July. Data on top shoot borer infestation were recorded in May, July and September. The yield of cane per plot was recorded at harvest. All the recorded data were analysed statistically using LSD.

RESULTS AND DISCUSSION

Data collected in May indicated statistically significant reduction of the top shoot borer incidence by all the chemicals. The control efficacy ranged from 67.19 - 83.77% in which only Baizinon 60 EC failed to reach the desired level (80%) of efficacy (Table-1). In July all treatments were statistically significant in reducing the top shoot borer infestation over the control and the efficacy ranged from 71.80% to 85.83%. The treatments with Sinodan 5G @ 2.0kg ai ha^{-1}, Nikidan 3G @ 2.0kg ai ha^{-1}, Unifuran 5G @ 2.0kg ai ha^{-1}, Pardan 5G @ 2.0kg ai ha^{-1}, New-furan 5G @ 2.0kg ai ha^{-1}, Furan 3G @ 2.0kg ai ha^{-1} gave satisfactory reduction(over 80% control). The treatment Baizinon 60 EC @1.0Lha^{-1} failed to show the desired level of efficacy (80%).

Final data collection was done in September. Here it was observed that all the test chemicals had significant difference in reducing the top shoot borer infestation over the control.In which organocarbamate insecticides (Sinodan 5G, Nikidan 3G, Unifuran 5G, Pardan 5G, New-furan 5G, Furan 3G) gave desired level of efficacy (over 80%),whereas organophosphate insecticide (Baizinon 60 EC) failed to show the desired level of efficacy (80%). The efficacy of Pooled data indicated that Sinodan 5G, Nikidan 3G, Unifuran 5G, Pardan 5G, New-furan 5G, Furan 3G applied in March and May gave over 80% control (Table 1). The control efficacy (Pooled data) ranged from 71.50-85.27%.

Results presented in Table-2 showed that insecticide-treated plots increased the yield of cane over the untreated plots. The yield of cane was statistically similar. The yield increase over control in different treatments varied from 13.48 to 53.33%. Highest yield (74.81 t ha^{-1}) was recorded in Unifuran 5G treated plots when applied in March and May. In an experiment Miah and Akhter (1985) noted that yield increase in Furadan treatments might be due to profuse root development though increased mitotic index that enhanced nutrient uptake resulting increased cane yield. Biswas *et al.* (1994) suggested application of Furadan and Curaterr (commonly carbofuran) against white grubs @ 2.0 kg ai ha^{-1} and they recommended the same dose rate for the control of the top shoot borer. Several experiments were conducted under BSRI, Ishurdi, Pabna with lower dosage i.e.1.0 kg ai ha-1 & 1.5 kg ai ha^{-1} of Carbofuran insecticides. All dosage of insecticides failed to show the desired level of efficacy (80%) (SRTI, 1981), (SRTI,1988), (SRTI,1989), (SRTI, 1990) . The effectiveness of any insecticides showing mortality of pests or reduction of pest infestation should reach 80% or above as the Pesticide Technical Advisory Committee (PTAC, 1980), a government body required such level of control to approve the use of an insecticide in agriculture. From the study it might be concluded that Sinodan 5G, Nikidan 3G, Unifuran 5G, Pardan 5G, New-furan 5G, Furan 3G @ 2.0kg ai /ha^{-1} applied in March and May might be recommended for the control of the top shoot borer.

Table-1. Effectiveness of different insecticides in controlling Top Shoot borer (TSB) at BSRI farm, Ishurdi, Pabna, 2006.

Treatments (Chemical)	Percent TSB infestation (mean)			Pooled data (Percent TSB infestation)
	30.05.06	30.07.06	30.09.06	
Sinodan 5G @ 2.0 Kg ai ha^{-1}	1.44c	8.96c	9.08c	6.49
(March + May)	(83.77)	(80.93)	(81.17)	(81.30)
Nikidan 3G @ 2.0 Kg ai ha^{-1}	1.76c	8.06cd	8.64cd	6.15
(March + May)	(80.16)	(82.85)	(82.09)	(82.28)
Baizinon 60 EC @ 1.0 L ha^{-1}	2.91b	13.25b	13.51b	9.89
(March + May + July)	(67.19)	(71.80)	(71.99)	(71.50)
Unifuran 5G @ 2.0 Kg ai ha^{-1}	1.74c	8.73c	8.88cd	6.45
(March + May)	(80.38)	(81.42)	(81.59)	(81.41)
Pardan 5G @ 2.0 Kg ai ha^{-1}	1.56c	8.68cd	8.91cd	6.35
(March + May)	(82.41)	(81.53)	(81.73)	(81.70)
New-furan 5G @ 2.0 Kg ai ha^{-1}	1.67c	9.11c	9.36c	6.78
(March + May)	(81.17)	(80.61)	(80.18)	(80.46)
Furan 3G @ 2.0 Kg ai ha^{-1}	1.70c	8.84c	8.56cd	6.37
(March + May)	(80.83)	(81.19)	(82.25)	(81.64)
Furadan 5G @ 2.0 Kg ai ha^{-1}	1.47c	6.66d	7.19d	5.11
(March + May) (Standard)	(83.43)	(85.83)	(85.09)	(85.27)
Control (untreated)	8.87a	46.99a	48.23a	-
LSD (5%)	0.68	0.24	0.21	-

Figures in Parenthesis are % efficacy over control

* Means followed by the same letter in a column are not significantly different at 5% level as per LSD.

Table-2. Effectiveness of different insecticides on the yield of Sugarcane at BSRI farm, Ishurdi, Pabna, 2006.

Treatments (Chemical)	Yield data (tha^{-1})	% Efficacy over control
Sinodan 5G @ 2.0 Kg ai ha^{-1} (March + May)	59.54	22.03
Nikidan 3G @ 2.0 Kg ai ha^{-1} (March + May)	66.39	36.07
Baizinon 60 EC @ 1.0 L ha^{-1} (March + May + July)	57.68	18.22
Unifuran 5G @ 2.0 Kg ai ha^{-1} (March + May)	74.81	53.33
Pardan 5G @ 2.0 Kg ai ha (March + May)	62.96	29.04
New-furan 5G @ 2.0 Kg ai ha^{-1} (March + May)	58.70	20.31
Furan 3G @ 2.0 Kg ai ha^{-1} (March + May)	55.37	13.49
Furadan 5G @ 2.0 Kg ai ha^{-1} (March + May) (Standard)	63.79	30.74
Control (Untreated)	48.79	-
LSD (5%)	NS	-

Figures in Parenthesis are % efficacy over control

* Means followed by the same letter in a column are not significantly different at 5% level as per LSD.

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