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Efficacy Of Some Selected Insecticides In Controlling Sugarcane Termites.

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

ABSTRACT

Insecticides Aronil 3GR, Bonanza 3GR, Econil 3GR, Envoy 50 SC, Aronil 50 SC of Fipronil group; Suncloprid 20 SL, Premier 200 SL, Gain 20 SL, Tez 20 SL of Imidacloprid group; Vitacon 15G, Vitaban 48EC, Ranger 20EC from Chloropyrifos group were tested at varying doses against sugarcane termites in the field at Akandabaria farm under Carew & Co. Sugar mills during the cropping season 2006-200. Standard Regent 3GR (fipronil) and untreated control plots were also included in the trial. All the test insecticides showed significant percent efficacy over control in April data ranging from 89.59% in vitacon 15G (@ 2.25 kg ai ha^{1}) treated plots to 100% over control in Aronil 50 SC (@ 50 ml ai ha^{1}) and in Premier 200 SL (@ 200ml ai ha^{1}) treated plots. Similar result were obtained in October where percent efficacy over control ranged from 84.24% in Tez 20 SL (@ 200ml ai ha^{1}) to 99.82% over control in Econil 3GR (@ 50 gm ai ha^{1}). As a result control the test insecticides increased sugarcane yield. Minimum yield increase of 9.23% was found in Envoy 50 SC (@ 50 ml ai ha^{1}) treated plot and maximum of 57.46% in vitacon 15G (@ 2.25 kg ai ha^{1}).

Key words: sugarcane, termite control, fipronil, imidacloprid, chlorpyrifos

INTRODUCTION

Sugarcane is one of the most important cash-cum industrial crops in Bangladesh. It covers about 0.17m ha of land both in mill and non mill zones of Bangladesh producing on an average 0.15-0.20 m ton of white sugar and 0.35-0.40 m ton of brown sugar (Gur) annually. Sugarcane is a annual crop occupying about 12-16 months in the field. So far about 70 species of insect pest including two species of mites have been identified and reported to feed on sugarcane causing serious damage to the crop in Bangladesh. 0-60% (Alam, 1967).The standing cane over a period of year with its luxuriant growth provides favorable environment for building up of different pest population. The environmental conditions of the different cane growing zones of Bangladesh and influence vary greatly the pest out break differently. The Sugarcane damage caused by any pest also differs markedly with soil type and cane varieties. Termite is one of the major soil pests of sugarcane in Bangladesh. Five species of termite viz. *Odentotermes parvidens* Holm and Holm, *Odentotermes lokanardi* Chaterjee et Thakur, *Odentotermes* sp., *Microtermes obesi* Holm and *Microtermes* sp. have been identified in Bangladesh (SRTI Annul Report,1979). *Odentotermes obesus* and *Microtermes* sp. are considered as serious pests of sugarcane in Bangladesh (Dean, 1979). Termite cause damage to eye buds of planted setts, young

shoot on germination and infest lower internodes of growing canes (Khanna *et al.*, 1956; Rajani, 1964).These damages cause death of young plants and produce gap in cane rows with resultant poor yield (Karim *et al.*, 1979). Termite infestation is observed both in (sett buds) and standing canes. Bud damage by termites may reach up to 60% (Singh and Kishan, 1946; Avasthy, 1967).Crop yield and Sugar recovery reduced by 2.5 and 4.5% respectively (Agarwala, 1955). Substantial loss is caused due to their attack in to later stages. In the pass Chlorinated hydrocarbons (Heptachlor, Dieldrin, Chlordane, and BHC etc.) are extensively used against termites all over the world, which is very toxic and hazardous with long residual effects. These chemicals are now banned in Bangladesh and else where. Therefore, there is an urgent need to find out effective, as well as less hazardous insecticides to suppres termites. So, it is a demand to undertake research to find out effective and cheaper substitute(s) of chlorinated hydrocarbons. With this aim in view some selected insecticide of Fipronil, Imidacloprid and Chloropyrifos group were used for trial against termites.The Insecticides were Aronil 3GR, Bonanza 3GR, Econil 3GR, Envoy 50 SC, Aronil 50 SC (of Fipronil group); Suncloprid 20 SL, Premier 200 SL, Gain 20 SL, Tez 20 SL (of Imidacloprid group) and Vitacon 15G, Vitaban 48EC, Ranger 20EC (from Chloropyrifos group) and tested at varying doses against sugarcane termites under field condition. Alam *et al.*, (2001).reported that these chemicalsare less toxic and less hazardous to the environment compared to chlorinated hydrocarbon

MATERIALS AND METHODS

The experiment was set at Akandabaria farm, Carew & Co. Sugar mills, Darsana, Chuadanga, Bangladesh during the cropping season 2006-2007. The name of insecticides, their dosages 14 treatments and time of planting are furnished below:

Aronil 3GR @ 50 g ai ha^{-1} applied at planting, Bonanza 3GR @ 50 g ai ha^{-1} treated at planting, Econil 3GR @ 50 gm ai ha^{-1} applied at planting, Envoy 50 SC @ 50 ml ai ha^{-1} sprayed at planting, Aronil 50 SC @ 50 ml ai ha^{-1} sprayed at planting, Suncloprid 20 SL @ 200 ml ai ha^{-1} applied at planting, Premier 200 SL @ 200 ml ai ha^{-1} sprayed at planting, Gain 20 SL @ 200 ml ai ha^{-1} treated at planting, Tez 20 SL @ 200 ml ai ha^{-1} applied at planting, Vitacon 15G @ 2.25 kg ai. ha^{-1} (at planting + March + May), Vitaban 48EC @ 2.25 kg ai. ha^{-1} (at planting + March + May), Ranger 20EC @ 2.25 kg ai. ha^{-1} (at planting + March + May), Regent 3 GR @ 50 g ai ha^{-1} at planting (standard) and Untreated (Control)

The experiment was designed in a Randomized Complete Block Design (RCBD) with three replications. Individual plot size was 6m X 5m. Block to block distance was 2 m and within block was 1 m. planting was done through conventional sett placement (end to end) in the trenches and in the month of December 2006 with the variety Isd 32 in termite prone farm, Akandabaria under Carew & Co. Sugar mills. Fipronil and Imidacloprid (common name) insecticides were applied in the trenches only once at plantation while the chlorpyrifos insecticides were applied thrice at planting and at days after planting (DAP) i.e., in March and at days after planting (DAP) i.e., in May. Granular insecticides were

applied by broadcasting and SC, EC and SL chemicals were applied in mixing with water by using sprayer. March and May applications were done in furrows on both sides of cane rows and then covered with soil. Prevalence of the pest was common since land was selected only in termite prone farm and endemic throughout the season in sugarcane fields.

To study the efficacy of test insecticides, data on termite population was taken twice. First data was taken in the month of April when maximum setts are attacked and finally in October when lower part of mature canes are attacked. At each time, 5 clumps per plot were uprooted by digging with the help of a spade. The uprooted setts/ stools along with soils and counted the number of termites in infested setts/stools by splitting with a knife and also recorded then in collected soils from the base of the uprooted cane. The yield of canes per plot was recorded at harvest in January, 2008.

RESULTS AND DISCUSSION

All the tested insecticides showed satisfactory performance in suppressing sugarcane termites at Akandabaria farm by the doses (Table-1) applied. Data collected in April (5 months crop) showed that all the treated plots showed reduced termite population giving the efficacy up to 100.00% over control. Efficacy range from 89.59% to 100.00% over control. Most of treatments showed statistically significant difference except Vitacon 15G @ 2.25 kg ha^{-1} and Ranger 20EC @ 2.25 kg ha^{-1} compared to untreated control.Table-1 also shows results on the basis of the data recorded in the month of October (11 months crop). All the insecticide treated plots suppressed termite satisfactorily. The percent efficacy over control ranged from 84.24-99.82%. A minimum 80% efficacy over control is the requirement for getting recommendation of an insecticide against the pest as per pesticide regulatory rules in Bangladesh (PTAC, 1980). Here all the test insecticide (Pooled % data) fulfilled the requirement of pesticide recommendation regulation. Some reports (Anon 1996a, 1996b) indicated that Regent has been tested against several insect pests of corn, rice, cotton, potato and citrus including foliar and soil pests globally with varying doses from 25-300 g a.i ha^{-1}.But for controlling sugarcane stem borer and termite this doses of Regent varied from 50-200 g a.i ha^{-1} which produced satisfactory results that supported the present findings. Alam *et al.* (2001) reported that Regent 3 GR and Regent 50SC @ 100 g a.i ha^{-1} significantly reduced sugarcane termites. Alam *et al* (2004) also recommended some Chlorpyrifos chemicals @ 2.0-2.5 Kg a.i ha^{-1} against sugarcane termites. Madan and Singh (1998) found that, Chlorpyrifos 20EC @ 1.25 Kg a.i.ha^{-1} satisfactorily controlled sugarcane termites among the tested organophosphate insecticides including Sevidol 4G and Quinalphos 5G which is also in agreement with the present findings.

Table 1. Effectiveness of different insecticides of long residual toxicity in suppressing Termites at Akandabaria farm, Carew & Co. Sugar Mills Ltd, Darsana, Bangladesh 2006-2007.

Treatments	Termite population (5 clumps plot^{-1})				
	April data	% Efficacy over control	October data	% Efficacy over control	Pooled % efficacy
Aronil 3GR @ 50 g ai ha^{-1} at planting in trenches	0.69cd	99.91	1.29bcd	98.26	99.09
Bonanza 3GR @ 50 g ai ha^{-1} at planting in trenches	1.15cd	99.60	1.16bcd	98.86	99.23
Econil 3GR @ 50 gm ai ha^{-1} at planting in trenches	3.28bc	96.33	0.60d	99.82	98.08
Envoy 50 SC @ 50 ml ai ha^{-1} at planting in trenches	1.15cd	99.60	0.94bcd	99.41	99.51
Aronil 50 SC @ 50 ml ai ha^{-1} at planting in trenches	0.00d	100.00	0.77cd	99.67	99.84
Suncloprid 20 SL@ 200 ml ai ha^{-1} at planting in trenches	2.34bcd	97.80	3.70abc	95.39	96.60
Premier 200 SL @ 200 ml ai ha^{-1} at planting in trenches	0.00d	100.00	1.90bcd	98.04	99.02
Gain 20 SL @ 200 ml ai ha^{-1} at planting in trenches	1.53cd	98.71	3.22bcd	90.81	94.76
Tez 20 SL @ 200 ml ai ha^{-1} at planting in trenches	3.54bc	94.13	3.58bcd	84.24	89.19
Vitacon 15G @ 2.25 kg ai.ha^{-1} (at planting + March + May)	5.45ab	89.59	2.98bcd	94.43	92.01
Vitaban 48EC@ 2.25 kg ai.ha^{-1} (at planting + March + May)	3.68bc	92.61	4.00ab	90.66	91.64
Ranger 20EC @ 2.25 kg ai. ha^{-1} (at planting + March + May)	5.33ab	91.76	3.48bcd	86.12	88.94
Regent 3 GR @50 g ai ha^{-1} at planting (standard)	0.65cd	99.92	2.20bcd	98.04	98.98
Untreated (Control)	7.80a	-	6.80a	-	-
LSD (5%)	3.185		3.100		

*Figures followed by the same letter (s) are not significantly different at 5% level as per LSD test.

It revealed from the (Table 2) that all test insecticides showed statistically in significant cane yield over control. The yield increase over control in different treatments varied. The yield of sugarcane ranged from 47.94 to 69.111 t ha^{-1} among insecticide treated plots

whereas the control plots (untreated) had 43.89 t ha^{-1}. The increased cane yield over control in insecticide treated plots ranged from 27.09 to 57.46 %. Vitacon 15G had the highest yield 69.11 t ha^{-1} showing 57.46% yield increase over control followed by Regent 3 GR and Econil 3 GR which gave 67.11 t ha^{-1} and 66.83 t ha^{-1} showing 52.90% and 52.27% yield increase over control, respectively. Envoy 50SC had the lowest yield among insecticide treated plots which produced only 47.94 t ha^{-1}. The results of the present findings is comparable to those of Miah *et al.* (1986) who reported 190.89% yield increase over control due to effective control of white grubs with Furadan 3G (carbofuran). Yield increase in Furadan treatments might be due to profuse root development through increased mitotic index that enhanced nutrient uptake resulting increased cane yield (Miah and Akhter, 1985). The present findings suggested that all the tested insecticides were found effective in suppressing termite population (pooled data) beyond 80% and might be recommended for further field trial in other termite prone Sugarcane farm of Setabganj Sugar mills (STSM) Bangladesh.

Table 2. Effectiveness of different insecticides of long residual toxicity on the yield of Sugarcane at Akandabaria farm, Carew & Co. Sugar Mills Ltd, Darsana Bangladesh during 2006-2007 cropping season.

Treatments with doses	Yield (t ha^{-1})	Yield increase (+) or decrease (-) over control
Aronil 3GR @ 50 g ai ha^{-1} at planting	63.11	43.79
Bonanza 3GR @ 50 g ai ha^{-1} at planting	65.39	48.99
Econil 3GR @ 50 gm ai ha^{-1} at planting	66.83	52.27
Envoy 50 SC @ 50 ml ai ha^{-1} at planting	47.94	09.23
Aronil 50 SC @ 50 ml ai ha^{-1} at planting	58.95	34.31
Suncloprid 20 SL@ 200 ml ai ha^{-1} at planting	64.56	47.10
Premier 200 SL @ 200 ml ai ha^{-1} at planting	65.50	49.24
Gain 20 SL @ 200 ml ai ha^{-1} at planting	62.06	41.40
Tez 20 SL @ 200 ml ai ha^{-1} at planting	56.89	29.62
Vitacon 15G @ 2.25 kg ai. ha^{-1} (at planting + March + May)	69.11	57.46
Vitaban 48EC @ 2.25 kg ai. ha^{-1} (at planting + March + May)	58.17	32.54
Ranger 20EC @ 2.25 kg ai. ha^{-1} (at planting + March + May)	55.78	27.09
Regent 3 GR @50 g ai ha^{-1} at planting (standard)	67.11	52.90
Untreated (Control)	43.89	(-)
LSD (5%)	NS	

*Figures followed by the same letter (s) are not significantly different at 5% level as per LSD test.

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