

Effects of Heptachlor and Dieldrin on White grubs of Sugarcane (Coleoptera : Scarabaeidae)

M. A. H. Miah, M. M. Biswas and A. Mannan,
Sugarcane Research & Training Institute,
Ishurdi, Pabna, Bangladesh.

ABSTRACT

Experiment was conducted to find out the suitable chemicals and their doses for the control of white grubs in sugarcane. The insecticides used in this experiment were Heptachlor 40WP, Dieldrin 40WP and 20EC. Both the pesticides were applied during plantation in the trenches in November. The chemicals were applied in the field at various concentrations, such as, 2.0 kg ; 3.0 kg ; 3.5 kg and 4.0 kg a.i./ha.

Grub populations were recorded in May and at harvest in December. Data Shows that the chemicals did not significantly reduce the grub populations even at higher doses like 4.0 kg a.i. / ha. Yield of cane due to several treatments was recorded with some increase over the control. The yield response by the different treatments however, appeared to be erratic.

INTRODUCTION

Cultivation of sugarcane in the western and north-western zones of Bangladesh is vulnerable to the attack of more than twelve species of white grubs (Anon, 1981). They are spreading over new areas of cane plantations year after year. Chlorinated hydrocarbon insecticides like BHC, Dieldrin, Heptachlor, Aldrin etc. were reported to be effective against white grubs (Avasthy, 1965; Martorell and Gaud, 1967 ; Bull and Cullen, 1981 ; Agarwall, 1981). BHC (10%) at the highest rates of 50 kg/ha and 100 kg/ha were found effective against grubs (Avasthy, 1965 ; Agarwall, 1981). Avasthy (1965) in his findings stated that BHC controlled grubs in Bihar but not in Uttarpradesh and Madras state even at the highest rates of 100 kg/ha. In Bangladesh white grubs have become a challenge to the growers. Regarding control of white grubs with chlorinated pesticides in general, but BHC in particular, some doubt exists in some corner of the sugar mills management that chlorinated pesticides may be effective against grubs. Commercial application of Heptachlor and Dieldrin in WP formulation is in practice in Bangladesh by the growers since long to control these pests without any result (Personal observation). The chemicals used to be applied at the bottom of the trenches as powder mixed with fertilizer before the sett placement. With crop failure and yield loss question arose about the effectiveness of the chemicals as well as their methods of application. Later on, changes were brought about in the application procedure but there was no success. Therefore, to confirm the effectiveness of chlorinated pesticides on white grubs, the experiment was conducted in the grub prone area (Setabganj Sugar Mills, Dinajpur) with chlorinated hydrocarbon pesticides at enhanced rates.

MATERIALS AND METHODS

The experiment was set up in the cropping season 1983-84 in Sultanpur Section of Protap farm under Setabganj Sugar Mills, Dinajpur. The experiment was laid out in a Randomized Complete Block Design (RCB). The different treatments used in this experiment are shown in the Table 1. The chemicals in WP and EC formulations were sprayed in trenches with a spray

machine in the bottom and on both the sides of the trench to be sufficiently covered with the pesticides. The amount of water sprayed per plot (10mX10m) was 6 litre. The application of chemicals were done when all the formalities like spreading of fertilizers, placement of setts were completed. The setts were then covered with contaminated soil with the help of spades. The variety used was Isd-2 / 54 and the treatments were replicated thrice.

Grub population was recorded in 4th week of June, 1984 and again in 2nd week of December, 1984. Five clumps were randomly selected from every alternate row in each plot except the first or tenth row. Clumps were uprooted by digging with spade (0.61mX0.46mX0.46m) and all white grubs, both larvae, and adults were counted. Weight of millable canes of 5 stools/plot was taken at the time of harvest in December separately and was added to the final yield. Total cane yield of each plot was recorded during harvest in December, 1984.

RESULTS AND DISCUSSION

Data on grub population collected in May and at harvest in December showed no significant effect on their reduction (Table 1). Table 1 shows that Heptachlor at the lowest rate of 2.0 kg a.i./

Table 1. Effect of Heptachlor and Dieldrin on larval population of white grub recorded in May and December 1984 at STSM Ltd.

Treatments		Mean Grubs/5 stool	
Name of chemicals	Dose in kg a.i./ha	Observed in December 1984	Observed in May 1984
Heptachlor 40WP	2.0	14.66	8.66
	3.0	13.00	10.33
	3.5	11.00	15.33
	4.0	19.00	12.33
Dieldrin 40WP	2.0	12.00	18.66
	3.0	8.66	14.00
	3.5	12.33	18.66
	4.0	13.66	11.00
Dieldrin 20EC	2.0	13.33	14.66
	3.0	14.66	16.33
	3.5	16.66	15.33
	4.0	11.00	17.00
Control	—	12.50	15.17
LSD (5%)	—	1.03	0.94

ha reduced grub population (in May) to some extent compared to the Heptachlor 40WP @ 4.0 kg a.i./ha and those of Dieldrin 40WP and 20EC. But the difference was not significant. Data collected during harvest in December shows only slight reduction of grub population with Dieldrin 40WP @ 3.0 kg a.i./ha. For the control of white grubs chlorinated pesticides were tried at higher doses by Agarwall (1981) and Avasthy (1965), who found BHC at 50 kg/ha and 100 kg/ha equally effective against grubs. In this experiment some unusual increase of grub population was noticed among the treatments where chlorinated pesticides (Heptachlor 40WP and Dieldrin 40WP and 20EC) were used at higher doses. The grub population was observed to increase with higher rates of Dieldrin 20EC @ 2.5 kg a.i./ha (Miah *et al.*, unpublished). Such ineffectiveness of chlorinated pesticides might be due to development of resistance in white grub to chlorinated hydrocarbon group resulting from continuous use of sublethal dose in the area (Miah *et al.*, 1983). In South Africa severe restrictions have been imposed on the use of Dieldrin as the white grubs were becoming resistant to it (Carnegie, 1974). The chlorinated pesticides in this work at enhanced rate (upto 4.0 kg a.i./ha) did not produce any significant effect on grub population. Similar result was experienced by Bull (Personal Communication) where BHC absolutely failed to control grubs. Chlorinated pesticides have been in use for years together to control white grubs in Bangladesh. Still this pest poses a serious threat. It has been stated that melolonthinae larvae (white grubs) were becoming increasingly severe pests of sugarcane in India, apparently owing to the accidental elimination of their natural enemies by insecticides (Veeresh, 1981). The present study clearly shows that the use of chlorinated insecticides against grubs is wasteful (Table 1). Moreover, some of the treated plots had higher population of grubs than the untreated ones. Although some yield increase was observed following pesticide application, the trend was highly erratic and could not be correlated with doses of pesticides or grub population. Thus it may be suggested that chlorinated pesticides would not be of any use in grub affected areas to control this group of pests.

REFERENCES

- Agarwall, R. A. 1981. Problems and usages of insecticides in the control of insect pests of sugarcane. *Indian Sugar*, 31 (3) : 175-185.
- Anonymous, 1981. Annual Report 1981. Sugarcane Research and Training Institute, Ishurdi, Pabna, Bangladesh, pp. 67-79.
- Avasthy, P. N. 1965. The problem of white grubs of sugarcane in India, pp. 1321-1333. *In* Proceedings of the 12th Congress of International Society of Sugarcane Technologists, Puerto Rico.
- Bull, T. A. and Cullen, G. R. 1981. Chemical products applied to sugarcane fields. *Sugar-Y-Azucar year book*, 1981. pp. 48-68.
- Carnegie, A. J. M. 1974. Sugarcane white grubs (Scarabaeoidea) and their control in South Africa, pp. 498-512. *In* Proceedings of the 15th Congress of International Society of Sugarcane Technologists, Durban, South Africa.
- Martorell, L. F. and Gaud, S. M. 1967. Status of Important insect pests of sugarcane in Puerto Rico and their control. pp. 1278-1286. *In* Proceedings of the 12th Congress of International Society of Sugarcane Technologists, Puerto Rico.

- Miah, M. A.H.; Khuda, A. K. M. Q. E.; Alam, M. A.; Biswas, M. M. and Shahjahan, M. 1983. Chemical control of white grubs. *Bangladesh J. Sugarcane*, 5 : 1-7.
- Veeresh, G K. 1981. Possibilities of biological control of white grubs in Sugarcane. *Review of Applied Entomology*, 69 (3) : 157.