

Use of Granular Pesticides in Controlling Whitegrub and Top Shoot Borer of Sugarcane

A. Mannan, M.M. Biswas and R. Kundu

Sugarcane Research & Training Institute,
Ishurdi, Pabna, Bangladesh.

ABSTRACT

An experiment was conducted to study the effectiveness of Mocap 5G (Ethoprophos) and Furadan 3G (Carbofuran) at various doses in different times in controlling whitegrubs (WG) and Top shoot borer (TSB) of sugarcane during the cropping season 1986-87 at Pratap Farm under Setabganj Sugar Mills Ltd, Dinajpur. Data collected in June showed that Furadan 3G at single application in March at three different doses (2, 3, 4 kg a.i./ha) showed 81.62-88.02% reduction of TSB infestation over control followed by Furadan 3G applied at 2.0 kg a.i./ha in March and April (72.87%). Whitegrub population was reduced in all the treatments which were statistically significant over control. Mocap 5G @ 2.5 kg a.i./ha gave highly significant reduction of grub population followed by Mocap 5G @ 2.0 kg a.i./ha. Furadan 3G @ 2.0 kg a.i./ha (standard dose) and Mocap 5 G @ 2.5 kg a/ha had almost similar response in controlling whitegrubs. The cost benefit ratio of Furadan use at various doses either single or split application during the study comes to 1 : 2.31 to 3.41.

INTRODUCTION

Of late, Whitegrub has been considered as major pest in sugarcane. Its activity starts in late February and lasts upto the end of May, showing visible symptoms of yellowing and stunting in cane growth. Simultaneously the attack of Top shoot borer *Scirpophaga excerptalis* Walker starts. The whitegrub (WG) infestation is severe in sandy/ sandy loam soils of the different sugar mill zones. Especially in STSM, TSM, RSM, Carew & Co. and parts of RJSM Ltd. Miah *et al.* (1983) conducted experiments with different pesticides for the control of whitegrubs and suggested to apply Furadan 3G @ 2.0 kg a.i./ha in the middle of March and then one month after first application followed by irrigation each time. Furadan 3G also indicated positive response against TSB. The above recommendation was followed by all the affected sugar mills. In applying the chemical as per said recommendation the farm management of the sugar mills experienced some difficulties. They observed that in executing the March application maintaining all formalities, the time of April (second) application would become overdue and the second application could not even be started. The problem was critically analysed and some changes were needed in the timing of chemical application with higher rates. It was thought that Furadan at the higher rates of 4.0 kg a.i./ha applied only in March might be sufficient enough to control the grub population. The March application might have positive effect on TSB. It was also felt that such change in methodology would save one irrigation cost as well as the costs of labourer. Hence the present study was carried out with Mocap 5G and Furadan 3G at different time combination to find out the probable solution of the problem.

MATERIALS AND METHODS

An experiment was conducted in the cropping season 1986-87 in Pratap farm under Setabganj Sugar Mills, Dinajpur and laid out in Randomized Complete Block

Design (RCB). There were three replications having eight treatments including one control. The individual plot size within the replication was 8x12 m. Within the block the gap between the plots was 1 m but along the cane rows the distance was maintained by 2 buffer rows of canes. The distance between blocks was 2m. The variety used was L. Jaba-C.

The treatments used were as follows :

- A, Mocap 5G @ 1.5 kg a.i./ha applied in March and April
- B, " @ 2.0 kg a.i./ha applied in March and April
- C, " @ 2.5 kg a.i./ha applied in March and April
- D, Furadan 3 G @ 2.0 kg a.i./ha applied in March and April (standard)
- E, " @ 2.0 kg in March only.
- F, " @ 3.0 kg in March only.
- G, " @ 4.0 kg in March only.
- H, Control (check).

The chemicals were applied as per schedule of the treatments in March and April. On both sides of cane rows furrows were made by bullock driven plough. Then the chemicals were spread in furrows as well as in the space between furrows, then covered with soils, followed by irrigation. Before irrigation the individual plot was surrounded by a soil ridge so as to protect the on rush of irrigation water from one plot to the other. Intercultural operations were made as and when necessary except mechanical control of insect pests.

Data collection on TSB infestation was recorded before and after application of chemicals. Record on white grub population was made on 4.6.87 after 2-months of chemical application. Five clumps per plot were uprooted and all the whitegrubs (adult and larvae) were counted. The weight of the canes (uprooted) during data collection was adjusted at the time of final weight at harvest. The experiment was harvested on 29.12.87 and yield of millable canes per plot (TCH) was recorded.

RESULTS AND DISCUSSION

To observe the incidence of Top shoot borer infestation, collection of data was made on 23rd March 1987 before chemical application. It was found that the Top shoot borer (TSB) infestation was more or less evenly distributed over the entire experimental plot. The TSB infestation over the whole experimental plot before chemical use was assumed to be alike which was statistically analysed. Observation on TSB infestation after one month of chemical application (24th April, 1987) showed that the applied chemicals (pesticides) irrespective of doses did not bring any significant reduction of Top shoot borer attack over control (data not shown in table). Final count of TSB infestation was recorded after a month of 2nd application of chemicals and it was found that the infestation by TSB was very low in the plots where Furadan was used once only in March. Furadan 3G (March application only) at various doses ranging from 2.0-4.0 kg a.i./ha reduced Top shoot borer infestation to a very significant level which were statistically similar and proved superior over control. Furadan 3G @ 2.0 kg a.i./ha (standard) and Mocap 5G @ 2.5 kg a.i./ha showed statistically similar response in reducing the TSB infestation. The reduction through Furadan was also significant over control (Table 1).

Observation on whitegrubs (several species) population from the same experimental plot was made on 4th June, 1987 as per Table 2 which indicated that Mocap 5G at different rates had its effects on reducing grub population. Highest reduction was found in the treatments, Mocap 5G @ 2.5 kg a.i./ha followed by Mocap 5G @ 2.0 kg and 1.5 kg a.i./ha. In an unpublished paper, Bull (1983) mentioned that Mocap 10 G @ 3.0 kg a.i./ha reduced grub population to a desired level. Furadan 3G at various doses applied in the month of March only showed significant reduction of whitegrubs showing the effectiveness of the chemical ranging from 60.00 to 75.83% over control. But remarkable difference was observed when Furadan 3G was applied at the rate of 2.0 kg a.i./ha in March and April (standard), the effectiveness reached upto 82.22% over control. However, all the treated plots showed significant reduction of whitegrub population against control plots.

Miah *et al.* (1986) suggested that Furadan 3G @ 2.0 kg a.i./ha applied twice (March and April) was found to be superior to all the treatments.

Table 1. Effect of different insecticides on Top shoot borer infestation (%), STSM, 1987.

Treatments		Mean TSB infestation (%), 2-months after chemical application	Efficiency (%) over control
Chemicals	Dose (kg a.i./ha)		
Mocap 5G	1.5	11.52 ab*	29.63
"	2.0	12.22 ab	25.35
"	2.5	6.63 bc	59.50
Furadan 3G	2.0 (standard)	4.77 bc	70.86
"	2.0	3.01 c	81.62
"	3.0	2.25 c	86.25
"	4.0	1.96 c	88.02
Control	—	16.37a	—

* Figures in column accompanied by similar letters, do not differ significantly at 0.05 level as per DNMR test.

Table 2. Effect of different insecticides on whitegrub population and cane yield, STSM, 1987.

Treatments		Grub popula- tion (Mean grub/5 clumps)	Efficiency (%) over control	Yield (TCH)	Yield increase over control (%)
Chemicals	Dose (kg a.i./ha)				
Mocap 5G	1.5	20.00 cd*	83.33	49.60 bc*	70.79
Mocap 5G	2.0	15.66 d	86.95	43.44 cd	49.58
Mocap 5G	2.5	7.66 e	93.61	55.26 bc	90.28
Furadan 3G	2.0 (standard)	21.33 cd	82.22	72.86 a	150.89
Furadan 3G	2.0	48.00 b	60.00	58.57 abc	102.03
Furadan 3G	3.0	29.00 bc	75.83	60.31 abc	107.67
Furadan 3G	4.0	30.33 bc	74.72	64.46 ab	121.96
Control	—	120.00 a	—	29.04 d	—

* Figures in column(s) accompanied by similar letter do not differ significantly at 0.05 level as per DNMR test.

From the experiment it is noticed that Furadan 3G at various rates applied only in March was probably best utilized by sugarcane plants in uptaking the chemical which ultimately helped in reducing the TSB population to a satisfactory level. But the same doses did not bring desirable results in controlling whitegrubs which might be due to the degradation of chemicals after application in the soil having a pH 5.0 starts degradation more rapidly after a lag period of 40 days (Siddaramappa *et al.* 1977).

All the treatments however, showed positive response in cane yield compared to the control plots (Table 2). But highly significant yield increase was noticed with the treatments Furadan 3G @ 2.0 kg a.i./ha (standard) in March and April which contributed 150.89% yield response. The treatment, Furadan 3G @ 4.0 kg a.i./ha in March recorded 121.96% higher yield over control. Hence Furadan 3G at the said dose rate might be recommended against the standard dose in controlling Top shoot borer and whitegrubs. The treatment will undoubtedly save simultaneously labour cost without affecting the cane yield. In applying Furadan 3G at the suggested recommendation rate the cost benefit ratio stands at 1:2.8 (price of Furadan 3G/kg Tk. 62.50 and price of cane per ton Tk. 655.37). The other cost remaining constant.

From the present findings it was also revealed that Mocap 5G @ 2.5 kg a.i./ha might be suggested as an alternative to Furadan for controlling the grubs only. The treatment showed 93.61% effectiveness in reducing the WG population. The yield increase due to the treatment was 90%.

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