

Studies on the Control of Termites with Heptachlor

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ABSTRACT

An experiment was conducted at Akandabaria farm of Carew & Co. Darsana with Heptachlor 30EC and Heptachlor 20G which significantly controlled termite when applied in trenches before sett plantation. The liquid formulation sprinkled in the trenches was very effective in controlling termite followed by granular formulation broadcasted in the trenches before plantation. Considering the dose and yield, Heptachlor 30EC @ 1.5 kg a. i./ha and Heptachlor 20G @ 2.0 kg a. i./ha may be recommended for termite control.

INTRODUCTION

Termite is one of the major soil pests of sugarcane. Fifty three species of termites have been recorded as feeding on sugarcane (Harris, 1969). Five species viz. *Odontotermes parvidens* Holm and Holm, *Odontotermes* probably *lokanerdi*, *Microtermes* sp., *Odontotermes* sp. and *Microtermes obesi* Holm have been identified as sugarcane pests in Bangladesh (Anonymous, 1979). Termites damage sugarcane setts after planting, eye buds of planted setts, young shoots on germination and lower internodes of growing canes (Khanna, *et. al.* 1956; Rajani, 1964). This lowers plant population, produce canes gaps in the field which consequently reduce yield (Karim, *et. al.* 1979).

Alam and Abbas (1969) and Karim, *et. al.* (1979) conducted trials on termites control with different chlorinated hydrocarbons like Heptachlor 40WP, Agritox 50EC, Chlordane 40WP and Basudin 10G. Both the authors found Heptachlor, 40WP the most effective in controlling termite.

The objective of the study was to find out the appropriate formulation, dose and method of application to control termites with Heptachlor 30EC and Heptachlor 20G.

MATERIALS AND METHODS

The experiment was conducted during 1981-82 at the Akandabaria Farm of Carew & Co., Darsana, Kushtia where termite is a major pest. The whole study comprised of two separate experiments : (a) Post-plantation application of Heptachlor or in brief "Post-plantation" and the other (b) Pre-plantation application of Heptachlor or in brief "Pre-plantation."

THE POST PLANTATION APPLICATION :

The "Post-plantation" part was selected from a commercial plot of the variety Isd. 2/54 planted during October, 1981. This part consisted of nine treatments (including control) replicated four times under the completely randomized block design. The individual plot size was 10m x 6m. Row to row distance was one meter and that in between plots and blocks were one meter and two meters respectively. The treatments were as follows :

- A. Heptachlor 30EC @ 0.5 kg a.i./ha.
- B. Heptachlor 30EC @ 1.0 kg a.i./ha.
- C. Heptachlor 30EC @ 1.0 kg a.i./ha.
- D. Heptachlor 30EC @ 2.0 kg a.i./ha.
- E. Heptachlor 20G @ 0.5 kg a.i./ha.
- F. Heptachlor 20G @ 1.0 kg a.i./ha.
- G. Heptachlor 20G @ 1.5 kg a.i./ha.
- H. Heptachlor 20G @ 2.0 kg a.i./ha.
- I. Control (Untreated).

Procedure of application :

Insecticides were applied during tillering stage of the crop on 4th December, 1981. For Heptachlor 30EC (liquid), furrows were made on both sides of all rows of a plot by bullock drawn indigenous plough. Required quantity of insecticide mixed with water was sprinkled in the furrows with the help of a watering can. Two ploughings were done just through the middle of two adjacent rows to cover insecticides with a light layer of soil.

THE PRE-PLANTATION APPLICATION :

The "Pre-plantation" part was set-up on 4th December, 1981 and plots or setts were treated on the same day just before plantation. Variety was Co-1158. There were thirteen treatments (including control) replicated four times under randomized block design. Plot size, row to row and block to block distance were similar to that of the "Post-plantation." In addition, there was one buffer row in between two plots.

The followings were the treatments :—

- A. Heptachlor 30EC @ 0.5 kg a.i./ha.
- B. Heptachlor 30EC @ 1.0 kg a.i./ha.
- C. Heptachlor 30EC @ 1.5 kg a.i./ha.
- D. Heptachlor 30EC @ 2.0 kg a.i./ha.
- E. Heptachlor 20G @ 0.5 kg a.i./ha.
- F. Heptachlor 20G @ 1.0 kg a.i./ha.
- G. Heptachlor 20G @ 1.5 kg a.i./ha.
- H. Heptachlor 20G @ 2.0 kg a.i./ha.
- I. 0.063% Mixture of Heptachlor 30EC in water.
- J. 0.125% Mixture of Heptachlor 30EC in water.
- K. 0.25% Mixture of Heptachlor 30EC in water.
- L. 0.5% Mixture of Heptachlor 30EC in water.
- M. Control (Untreated).

Procedure of application :

For Heptachlor 30EC, the different doses of insecticide mixed with 1 gallon of water (i. e. 750 lit/ha) was sprinkled in the trenches with watering can just before sett placement. For Heptachlor 20G, the different doses mixed with small quantity of soil was broadcasted in the trenches by hand just before sett placement. For different mixtures of Heptachlor 30EC in water, the required concentration of mixtures were prepared in drums. Setts were kept immersed in respective concentration for five minutes before plantation. The application in the trenches was made so as to cover both sides of trenches.

METHODS OF DATA COLLECTION :

“Post-plantation” Treatment :

Two criteria namely, termite population and cane yield were considered to compare the treatments. Termite population was counted twice, one during August from five randomly selected stools per plot and the final one during harvest (November) from ten randomly selected stools per plot. First, selected clumps were harvested and then the whole underground part was uprooted by digging a pit (0.5m x 0.5m x 0.5m). The underground part of the stool and soil dug were thoroughly checked for termites keeping on a polythene sheet or cloth piece. Population was recorded on stool basis and plot basis. For data on yield, total canes of each plot were harvested separately and per plot weight of millable cane was recorded.

"Pre-plantation" Treatment :

Same criteria like termite population and cane yield used in the "Post-plantation" treatments were considered. In this case termite population was taken three times; first during March from five ungerminated setts per plot, second during August from five stools and the final one during harvest (November). In case of setts, randomly selected five ungerminated setts were dug out by spade, taken on a polythene or cloth piece, and counted all the termites from the sett. Individual and per plot records were taken. For stool basis count, similar method was used as in case of "Post-plantation treatment"

RESULTS AND DISCUSSION

In this part of experiment, termite population was low. Data on termite population from ungerminated setts during March was discarded because they were indecisive. Termite population in stools during August was insignificant. Population per ten stools per plot (40 stools per treatment) were low and no significant difference was observed among the treatments in the data taken during harvest (November). Though significant difference was observed in case of yield but the data were not consistent.

Table 1. Termite population in five setts per plot during March
(Pre-plantation application) at Carew and Company, 1982.

Treatments	Termite Population (no.)	
	Total	Mean
A. Heptachlor 30EC @ 0.5 kg a.i./ha.	453	113.25
B. Heptachlor 30EC @ 1.0 kg a.i./ha.	207	51.75
C. Heptachlor 30EC @ 1.5 kg a.i./ha.	1015	253.75
D. Heptachlor 30EC @ 2.0 kg a.i./ha.	105	26.25
E. Heptachlor 20G @ 0.5 kg a.i./ha.	76	19.00
F. Heptachlor 20G @ 1.0 kg a.i./ha.	109	27.25
G. Heptachlor 20G @ 1.5 kg a.i./ha.	356	83.00
H. Heptachlor 20G @ 2.0 kg a.i./ha.	460	115.00
I. 0.063% Mixture of Heptachlor 30EC	185	46.25
J. 0.125% Mixture of Heptachlor 30EC	30	7.50
K. 0.25% Mixture of Heptachlor 30EC	0	0.00
L. 0.5% Mixture of Heptachlor 30EC	152	38.00
M. Control (Untreated)	157	39.25

As post-plantation application gave no concrete result in respect of both termite population and yield, no interpretation could be drawn on it. This probably, happened due to very low population of termite in this experiment. Therefore, post-plantation application needs repetition.

Pre-plantation application :

Some erratic effect of treatments was observed on termite population counted from five ungerminated setts per plot during March (Table 1). This happened probably due to uneven distribution of termites in the plots. Significant difference was, however, observed among the treatments in respect of termite population taken from five stools per plot during August (Table 2). Only the treatments 1.5 kg a.i./ha and 2.0 kg a.i./ha of Heptachlor 30EC significantly controlled termite. But the general trend was that the "higher the dose (in case of all methods) the lower the population" except a few cases.

Final data taken during harvest (November) had similar trend as in August in respect of termite population (Table 3). The treatments 0.5 kg a.i./ha, 1.0 kg a.i./ha, 2.0 kg a.i./ha of Heptachlor 30EC and 1.0 kg a.i./ha, 1.5 kg a.i./ha and 2.0 kg a.i./ha of Heptachlor 20G significantly controlled termite. But the sett dipping treatments showed no difference with control.

Table 2. Termite population per five stools during August
(Pre-plantation application) at Carew and Company, 1982.

Treatments	Termite population (no.)	
	Observed	Transformed ($x+0.5$)
A. Heptachlor 30EC @ 0.5 kg a.i./ha.	297	13.67abc*
B. Heptachlor 30EC @ 1.0 kg a.i./ha.	61	5.46ab
C. Heptachlor 30EC @ 1.5 kg a.i./ha.	24	3.28a
D. Heptachlor 30EC @ 2.0 kg u.i./ha.	17	2.92a
E. Heptachlor 20G @ 0.5 kg a.i./ha.	842	26.36c
F. Heptachlor 20G @ 1.0 kg a.i./ha.	177	9.21ab
G. Heptachlor 20G @ 1.5 kg a.i./ha.	331	15.37abc
H. Heptachlor 20G @ 2.0 kg a.i./ha.	58	6.56ab
I. 0.063% Mixture of Heptachlor 30EC	555	20.73bc
J. 0.125% Mixture of Heptachlor 30EC	327	16.72abc
K. 0.25% Mixture of Heptachlor 30EC	490	18.53abc
L. 0.5% Mixture of Heptachlor 30EC	115	8.48ab
M. Control (Untreated)	501	21.19bc

* Figures followed by different letters are significantly different at 0.05 level as per DNMR test.

Table 3. Termite population per ten stools during Harvest
(Pre-plantation application) at Carew and Company, 1982.

Treatments	Termite population (No.)	
	Observed	Transformed (mean of $\log_e (n+1)$)
A. Heptachlor 30EC @ 0.5 kg a.i./ha.	117.00	2.17 abc*
B. Heptachlor 30EC @ 1.0 kg a.i./ha.	17.25	2.35 abc
C. Heptachlor 30EC @ 1.5 kg a.i./ha.	165.00	2.79 abcd
D. Heptachlor 30EC @ 2.0 kg a.i./ha.	5.50	0.78 a
E. Heptachlor 20G @ 0.5 kg a.i./ha.	183.50	4.62 bcd
F. Heptachlor 20G @ 1.0 kg a.i./ha.	30.25	2.53 abc
G. Heptachlor 20G @ 1.5 kg a.i./ha.	50.25	1.33 ab
H. Heptachlor 20G @ 2.0 kg a.i./ha.	198.50	1.67 abc
I. 0.063% Mixture of Heptachlor 30EC	87.75	4.30 bcd
J. 0.125% Mixture of Heptachlor 30EC	174.25	5.12 cd
K. 0.25% Mixture of Heptachlor 30EC	89.50	3.48 bcd
L. 0.5% Mixture of Heptachlor 30EC	259.75	3.71 abcd
M. Control (Untreated)	518.25	6.02 d

* Figures followed by different letters are significantly different at 0.05 level as per DNMR test.

Results on population (in August and November) also showed that among the three methods of application liquid formulation sprinkled in trenches was most effective in controlling termite followed by granular formulation broadcasted in trenches and setts dipped in mixtures of Heptachlor 30EC in water.

In respect of yield no statistically significant difference of the treatments with the control was observed (Table 4). The effect of liquid formulation sprinkled in trenches gave the best result in respect of termite population. Yield of granular formulation broadcasted in trenches and dipped in mixture were similar unlike the result of termite population (Table 3). This happened because granular insecticide worked well only after the rainy season (July-September) to lower the termite population, but yield was affected (reduced) due to attack of termite before on set of rainy season.

From the above result it is evident that Heptachlor 30EC @ 2.0 kg a.i./ha gave the best result in controlling termite population. Karim *et. al.* (1979) also obtained best result with Heptachlor 40WP @ 2.0 kg a.i./ha when applied with water in the trenches before covering the setts with soil.

Table 4. Weight of millable cane during Harvest
(Pre-plantation application) at Carew and Company, 1982.

Treatments	Weight of millable cane (Ton/ha).
A. Heptachlor 30EC @ 0.5 kg a.i./ha.	10.15 ab*
B. Heptachlor 30EC @ 1.0 kg a.i./ha.	15.69 b
C. Heptachlor 30EC @ 1.5 kg a.i./ha.	14.36 b
D. Heptachlor 30EC @ 2.0 kg a.i./ha.	12.56 ab
E. Heptachlor 20G @ 0.5 kg a.i./ha.	7.77 ab
F. Heptachlor 20G @ 1.0 kg a.i./ha.	8.77 ab
G. Heptachlor 20G @ 1.5 kg a.i./ha.	11.50 ab
H. Heptachlor 20G @ 2.0 kg a.i./ha.	5.90 a
I. 0.063% Mixture of Heptachlor 30EC	7.40 ab
J. 0.125% Mixture of Heptachlor 30EC	9.50 ab
K. 0.15% Mixture of Heptachlor 30EC	9.69 ab
L. 0.5% Mixture of Heptachlor 30EC	9.83 ab
M. Control (Untreated)	9.42 ab

* Figures followed by different letters are significantly different at 0.05 level as per DNMR test.

Heptachlor 30EC @ 1.0 kg a.i./ha, @ 1.5 kg a.i./ha and @ 2.0 kg a.i./ha gave higher yield, but there was no significant difference between 1.5 kg a.i./ha and 2.0 kg a.i./ha of Heptachlor 30EC. It may be assumed that liquid formulation sprinkled in the trenches before plantation gave better result over granular formulations or mixtures of different concentrations. Therefore, Heptachlor 30EC @ 1.5 kg a.i./ha and Heptachlor 20G @ 2.0 kg a.i./ha may be recommended for termite control in the sugarcane field.

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