

Crop Pests

CONTROL OF ARMY CATERPILLAR, CORN EARWORM, AND CEREAL APHID IN MAIZE WITH CHLORPYRIFOS

B. N. MacDIARMID, C. D. FORGIE and A. A. HAYDON

Ivon Watkins-Dow Ltd, New Plymouth and Hastings.

Summary

Chlorpyrifos at 0.25 kg/ha as an aerial spray gave 86-100% control of army caterpillar (*Pseudaletia separata*) (four trials) and corn earworm (*Heliothis armigera conferta*) (three trials) in maize (*Zea mays*). Speed of kill and final level of control was similar to that achieved with 1-1.2 kg/ha trichlorfon. Chlorpyrifos at 0.125 kg/ha controlled cereal aphid (*Rhopalosiphum padi*) on exposed leaves but failed to provide long term control of those protected in the cob sheath.

INTRODUCTION

Chlorpyrifos has already been shown to control a wide range of pests in orchards (Woon and Haydon 1973) as well as porina (*Wiseana* spp) and stem weevil (*Hyperodes bonariensis*) in pasture (Upritchard 1970; Forgie 1974). The need for such a broad spectrum insecticide in maize (*Zea mays*) prompted the investigations presented below, in which chlorpyrifos was evaluated for the control of army caterpillar (*Pseudaletia separata*), corn earworm (*Heliothis armigera conferta*) and cereal aphid (*Rhopalosiphum padi*) occurring in maize crops in the North Island.

METHOD

Five trials were laid during February and March 1975 in stands of early to mid-dent maize in Gisborne, Hastings, and Taranaki. The treatments in each trial were applied by helicopter across the paddock to single blocks 0.5-2 ha in size using 90-220 litres/ha and D6 or D8-45 disc and core nozzles operating at 275 kPa pressure. Liquid formulations of all the insecticides were used.

RESULTS AND DISCUSSION

Army Caterpillar and Corn Earworm

Three of the East Coast trials were infested with both army caterpillar (AC) and corn earworm (CEW). Pre-treatment assessment of the infestation density was made from 50 randomly-selected cobs per block. This number was increased to 100 for post-treatment counts. Although each trial did not include all the treatments, the results have been summarised in Table 1.

The results show that even at 0.125 kg/ha, chlorpyrifos gave satisfactory control of both AC and CEW. However, more reliable results, comparable to the standard trichlorfon, were achieved with 0.25 kg/ha. There did not appear to be much difference between speed of kill from the two insecticides.

Proc. 29th N.Z. Weed and Pest Control Conf.

TABLE 1: MEAN % MAIZE COBS INFESTED WITH ARMY CATERPILLAR AND CORN EARWORM IN THREE TRIALS — EAST COAST, NORTH ISLAND

Treatment	kg/ha	Pre	Army Caterpillar % Cobs infested			Corn Earworm % Cobs infested			
			1	3-5	14*	Pre	1	3	14*
chlorpyrifos ²	0.125	33	24	15	6	23	—	6	7
chlorpyrifos ³	0.25	37	19	8	4	29	20	8	4
chlorpyrifos ¹	0.50	46	12	5	1	44	21	14	3
trichlorfon ³	1-1.2	37	15	4	3	29	13	6	8

Pre = pre-treatment count

1 — In one trial

2 — In two trials

* Days after treatment

3 — In all three trials

The absence of an untreated block in the above trials was overcome to a large extent in the Taranaki trial, which contained a heavy, uniform infestation of AC (95% plants infested, 4.7 ± 1.3 /plant). Before spraying, the number of AC on five groups of four plants per block were counted and their occurrence on leaf or cob noted. The number on the ground in 1m of row was also recorded. Each group of four plants was then completely covered with a large plastic bag. Two days after spraying, the bags were removed and the caterpillars counted again. In addition, caterpillars on treated plants and on the ground were counted and rated according to whether they were alive (curled on touch), dying or dead (see Kain *et al* 1968 for details).

The results of the Taranaki trial in Table 2 indicate there was no difference between the two rates of chlorpyrifos and trichlorfon in either speed of kill or final activity. Twenty four hours after applying either insecticide, 52% of the ACs were dead and a further 38% were dying.

TABLE 2: ARMY CATERPILLAR CONTROL, THEIR RATE OF DEATH AND SURVIVAL ON THE PLANT FOLLOWING TREATMENT IN TARANAKI TRIAL

Treatment	kg/ha	Bagged Plants	Days after Treatment		
			1	2	5
chlorpyrifos	0.25	31*	90	93	98
chlorpyrifos	0.50	46	95	—	99
trichlorfon	1.0	30	86	92	99
			Rate of death		
% alive (mean 3 treatments)			10	8	4
% dying			38	32	0
% dead			52	60	96
			Survival on plant		
% cob feeding			55	20	5
% leaf feeding			85	24	0

* No. AC on 4 plants uncovered 2 days after spraying

The survival of AC on the plant after two days indicate that those feeding in the cob (21%) remained alive longer than those on the leaf (4%) presumably because they were more protected from the direct spray and were also less mobile.

Cereal aphid

In one Hastings trial, heavy infestations of cereal aphid occurred in pockets throughout a maize crop. After spraying, to measure the effect of the treatments, 50-100 leaves and cobs were selected from these pockets

Crop Pests

and rated on a scale of 0-5 which correspond to predetermined aphid densities from 0 to over 100 per leaf or in the cob sheath. For simplicity in presentation, the ratings were then transposed back into densities and these are shown in Table 3.

TABLE 3: MEAN No. APHIDS/LEAF AND IN COB SHEATH

Treatment	kg/ha	Occurrence	Days after treatment		
			2	8	19
chlorpyrifos	0.125	Exposed leaf	1	0	0
		Cob sheath	44	6	49
demeton-S-methyl	0.21	Exposed leaf	0.5	0	0
		Cob sheath	39	0.5	1.5
untreated		Exposed leaf	54	38	—
		Cob sheath	36	25	40

— Not recorded

The results show that chlorpyrifos and demeton-S-methyl both gave a rapid and complete kill of aphids on the exposed leaf surface. However, it appears the systemic activity of demeton-S-methyl was also sufficient to control aphids in the protected cob sheath, an activity which was not shown to the same extent by chlorpyrifos.

The results of these trials confirm those of Kennedy *et al* (1975) and indicate that advantage can be made of the broad spectrum activity of chlorpyrifos for controlling infestations of army caterpillar, corn earworm, and cereal aphid when they occur alone or in combination in maize crops.

REFERENCES

- Forgie, C.D., 1974. Control of adult stem weevil in ryegrass seed crops with chlorpyrifos. *Proc. 27th N.Z. Weed and Pest Control Conf.*: 182
- Kain, W.M., Wallis, M.J. and Payne, E.O., 1968. Control of army caterpillar. *Proc. 21st NZ Weed and Pest Control Conf.*: 202.
- Kennedy, G.G., Nakakihara, H.N. and Oatman, E.R., 1975. Control of corn earworm on sweet corn in Southern California. *California Agriculture* August: 4.
- Upritchard, E.A., 1970. Possible new insecticides for porina control. *Proc. 23rd N.Z. Weed and Pest Control Conf.*: 191
- Woon, G. W. and Haydon, A.A., 1973. Broad spectrum control of insect pests in pip fruit with chlorpyrifos. *Proc. 26th N.Z. Weed and Pest Control Conf.*: 178.