A STUDY IN THE USE OF GRANULAR INSECTICIDES FOR SOLDIER FLY LARVAE CONTROL IN ESTABLISHING MAIZE

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Summary

Trials are reported where a number of insecticides were tested for activity against soldier fly larvae (*Inopus rubriceps*) using maize as the indicator of larval damage. Carbofuran significantly reduced larval numbers in the vicinity of the plant and was superior to parathion and fensulfothion. Whilst no significant yield increases were obtained in a 1971 trial all the insecticides in the 1972 trial with the exception of fensulfothion significantly increased grain yield.

INTRODUCTION

THE larvae of soldier fly (*Inopus rubriceps*) has caused extensive damage to maize crops grown in the Waikato, South Auckland and Bay of Plenty districts. In this region some of the soil populations have been estimated at 40 million larvae per hectare. Where maize has been sown into soils containing a high population of the pest, complete or partial crop failure is probable. Timlin and Hewitt (1969) reported that chemical control of the larvae has proved difficult because of resistance of the pest to available and permissible insecticides. Hewitt (1969) reported an increase in plant population and cob weight when the insecticide ethyl parathion was applied at a rate of 1.9 kg a.i./ha at planting. Fellowes (1971) claimed maize grain yield responses of up to 3450 kg/ha when granules of parathion were band applied with the seed at planting.

Although previous research workers have recorded plant population and yield responses in maize crops treated at planting with parathion there has not been any published work on the effect of insecticides on populations of the soldier fly larvae.

Trials were laid down in 1971 and 1972 to study the effect of a number of insecticides applied with maize at planting on both the plant and the larvae of soldier fly.

EXPERIMENTAL METHODS

Both trials were sited near Hamilton in a Matangi loam on land that had previously been in pasture. The layout for each trial was a randomised block. The 1971 trial included 4 treatments (refer Table 3) with 5 replications and the 1972 trial included 6 treatments (refer Table 1) with 6 replications.

Soldier Fly

The methods used for ground preparation for the trials were similar to the district cultivation practices. The plots for both trials were four rows wide x 15 m, 1971 and x 25 m 1972.

A precision planter was used to sow the maize variety PX 610 on 23 November 1971 and on 25 October 1972.

The treatments were sown along the seed lines at a depth of 5 cm using a Planet Junior model 300A on 23 November 1971, and on 26 October 1972.

Plant population in the 1972 trial was measured by counting the total number of plants in the centre 2 rows of each plot on 8 December 1972. An assessment of plant damage at the seedling stage was measured in the 1972 trial by taking 25 plants at random in the outside rows of each plot and counting the puncture marks on the mesocotyl (pers. com. Dixon)

A vigour scale of 1 to 5 (5 = maximum vigour; 1 = plants exhibiting no growth) was used to assess treatment differences at the seedling stage in both trials. Plant height was assessed by measuring from ground level to flower top from a sample of 10 plants per plot.

Soil populations of soldier fly larvae were assessed by a coring, sieving and flotation technique (pers. com., Dixon).

Pre-treatment larval sampling was carried out by taking 10 x 7 cm soil cores per block.

A larval assessment 3 months after treatment was made in the 1971 trial by counting the number of larvae present in 6 x 13 cm soil cores per plot taken from the root zone of the maize.

A similar larval assessment was carried out 1 and 3 months after treatment in the 1972 trial.

Plant yield was assessed by harvesting all cobs from the centre two rows of each replicate. These cobs were then dried, dekernelled, weighed and the treatment yield adjusted to 14% moisture.

RESULTS

In the 1971 trial although carbofuran significantly reduced larvae numbers the measured increase in maize yield just failed to reach significance (Tables 2 & 3).

In the 1972 trial parathion 2 kg and carbofuran 1 kg and 3 kg significantly increased plant population whilst parathion 2 kg significantly decreased mesocotyl damage. Both parathion 2 kg and carbofuran 3 kg significantly increased plant height (Table 1).

Carbofuran at all rates had significantly less live larvae at the 1 and 3 month assessments than the other treatments (Table 3).

In the 1972 trial all treatments with the exception of fensulfothion significantly increased grain yield (Table 2).

DISCUSSION AND CONCLUSION

Of the insecticides tested carbofuran had the most activity on soldier fly larvae. Grain yield responses were obtained from carbofuran and parathion and these appeared to have been due to the reduction in soldier fly larvae recorded.

Soldier Fly

However although large differences in larval populations were measured between the various insecticides tested no clear cut relationship could be established between larval numbers and grain yield. Further research is needed to clarify the inter-relationship between the plant, the insecticides and the pest.

TABLE 1:

Treatment	kg/ha	Plant Population		Mesocotyl Damage		Plant Height (metres)
		Thousands/hectare	1972 Trial	150 plants/treatment	Per Plant	
parathion	2	82 a		large 4.2 small 5.6	4.4 cB	2.09 a
fensulfothion	1	81 ab		large 5.7 small 7.6	6.1 abcAB	1.99 bc
carbofuran	1	82 a		large 4.9 small 8.3	5.8 bcAB	1.97 bc
carbofuran	2	81 ab		large 6.3 small 6.7	6.4 abAB	1.94 bc
carbofuran	3	82 a		large 5.3 small 9.6	6.8 abAB	qe 10'2
control		79 b		large 6.2 small 10.8	8.1 aA	1.85 c

TABLE 2:

Treatment	kg/ha ai	Plant Vigour. 12 assessments	Mean of per treatment	Grain Yield kg/ha at 14% Moisture
1971 TRIAL				
parathion	2.24		3.4	8730 a
pirimiphos-ethyl	2.24		2.6	8880 a
carbofuran	2.24		4.8	9570 a
control	2.24		2.6	8530 a
				CV = 14%
1972 TRIAL:				
parathion	2.0		4.6	9550 a
fensulfothion	1.0		2.9	9020 ab
carbofuran	1.0		3.7	9250 a
carbofuran	2.0		2.8	9430 a
carbofuran	3.0		2.9	9640 a
control			2.5	8500 b
				CV = 5%

TABLE 3: LARVAE ASSESSMENT

Mean counts per sample	
1971 TRIAL:	
parathion	20.4 abAB
pirimiphos-ethyl	21.0 abAB
carbofuran	11.2 cB
control	29.3 aA
These estimates are made from a square root transformation of each individual count.	
1972 TRIAL:	
	<div>1 month after</div> <div>3 months after</div>
	<div>Total</div> <div>Alive</div> <div>Total</div> <div>Alive</div>
parathion	180 ab 131 c 220 c 186 b
fensulfothion	194 ab 160 b 290 b 242 b
carbofuran 1	132 c 57 d 169 cd 111 c
carbofuran 2	166 abc 56 d 175 cd 107 c
carbofuran 3	151 bc 59 d 141 d 89 c
control	204 a 196 a 368 a 320 a

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