CONTROL OF MANUKA BEETLE

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Summary

Larval populations of manuka beetle (*Pyronota* spp) were markedly reduced by cattle treading in winter but subsequent losses in pasture production caused by this treatment were severe (63%). The greater tolerance of manuka beetle larvae to insecticides as compared to grass grub (*Costelytra zealandica*) was shown in both field and laboratory studies. Under field conditions organophosphate insecticides were generally more effective than either lindane or DDT. High rates (5 kg/ha) of ethoprophos were required to give equivalent control to diazinon applied at 2 kg/ha which in turn gave as effective control as 2 kg/ha of fensulfothion.

INTRODUCTION

Farmers throughout Taranaki, especially those close to the bushline on Mt Egmont, have claimed that insecticides applied for grass grub control have given poor results. In some instances these areas have been found to harbour high populations of manuka beetle either alone or in association with grass grub.

A survey of Taranaki found that manuka beetle was widespread in pastures close to bush (Thomson *et al* 1978). The adult of this genus can cause severe defoliation to a variety of trees (Miller 1971) and larval damage is similar to that found in grass grub infested pastures during winter (Pottinger 1973).

This paper reports on preliminary studies to investigate the effect of winter treading and four insecticides commonly used for grass grub control on larval populations of manuka beetle.

METHODS

Treading

An area 40 x 40 m with a high larval population of manuka beetle was fenced off and stocked with 44, 18 month old Hereford steers (275/ha). Stock were confined on the site for 158 out of a possible 240 hours and given off site access to water and fresh grass as required. Larvae were sampled by taking 40, 10 cm diameter cores at the beginning and end of the trial in mid May. Dry matter production was measured over the succeeding 67 days under 10 exclusion cages. An adjacent ungrazed area was used as a control for both larval numbers and herbage production measurements.

Insecticide

Field trials were conducted at two sites, Wairoa in 1967 and Okato in 1973 and 1974. All trials were of randomised block design with plots 4 x 4 m and six replicates. Treatments and sampling data are given in Tables 1 and 2. All samples were hand sorted either in the field or laboratory.

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Pasture Pests

Prior to analyses percent control for all replicates of each treatment were transformed to arc sine percent scale.

Laboratory evaluations were carried out in the following manner. Air dried soil was mixed with insecticide dust to produce concentrations of 6, 3, 1.5 and 0.75 ppm. Each concentration was brought to 20% w/w moisture content and placed in large individual ice cube trays with 14 healthy larvae. After 7 days larvae were removed and left on the surface of the soil. Those that remained on the surface after 1 hour were classified as dead. Data was graphed on probit (mortality) log (concentration) paper and the LC_{50} and LC_{90} estimated. The insecticides screened in this manner are given in Table 3.

RESULTS

Treading

The density of manuka beetle larvae was reduced by cattle treading from $96/m^2 \pm 19$ to $45/m^2 \pm 20$, a reduction of 53%. Dry matter (DM) production in the succeeding 67 days was 470 ± 94 kg/ha from the treated plots and 1300 ± 260 kg/ha from the control plots, a reduction of 65%.

Insecticides

The results of the Wairoa and Okato insecticide trials are shown in Tables 1 and 2 respectively and the laboratory screening studies in Table 3.

TABLE 1: Effect of different insecticides on manuka beetle and grass grub at Wairoa (Duncan's letters compare all means).

Insecticide and Formulations	Rates kg/ha	% control	
		Grass grub	Manuka beetle
lindane	1.5 and	76 aAB	40 bB
prills	3.0		
DDT	2.2	87 aA	41 bB
* dry mix			
** granulated			
fensulfothion	2.2	97 aA	84 aAB

Treated March sampled in July by taking 4 20 x 20 cm spade spits per plot.

* Dry mix = DDT dust mixed with superphosphate.

** Granulated = DDT granulate with superphosphate.

All treatments differ from untreated control ($P < .05$).

Insecticide x insect spp interaction ($P < .01$).

Rate and formulation differences N S ($P > .05$).

TABLE 2: Control of manuka beetle larvae with different insecticides and rates at Okato.

Treatment		rates kg/ha	% control
1973	diazinon	2	61 a
	ethoprophos	2	39 b
	ethoprophos	5	75 a
1974	diazinon	2	73 a
	fensulfothion	2	71 a
	fensulfothion	5	87 a

Treated in March and sampled in July.

Ten, 10cm cores were taken from each plot.

All treatments differ from control ($P < .05$).

Pasture Pests

TABLE 3: Estimated LC₅₀ and LC₉₀ values (ppm) for three insecticides against manuka beetle and grass grub.

Insecticide	LC ₅₀		LC ₉₀	
	manuka beetle	grass grub	manuka beetle	grass grub
diazinon	1.65	1.45	2.60	3.00
ethoprophos	2.50	1.65	5.35	3.80
fensulfothion	5.55	3.00	12.75	7.20

NB: Fensulfothion tends to perform less well in topical screening trials than it does in the field (MacDiarmid pers comm).

DISCUSSION

Although cattle treading in winter can cause marked reductions in populations of manuka beetle larvae, severe losses in subsequent pasture production would limit the use of this method over a large proportion of any farm. Where block wintering systems for dairy or beef cattle are used this practice is more likely to be adopted as a control method for manuka beetle than in other wintering systems. However, the influence of reductions in larval populations sustained by this method on the following generation requires study before the treading can be evaluated adequately on a cost benefit basis.

Both field and laboratory studies have shown that manuka beetle larvae are more tolerant than grass grub to both organochlorine (Table 1) and organophosphate insecticides (Tables 2 and 3). In the past, manuka beetle damage may have been wrongly identified as grass grub damage. This could explain complaints made by many farmers, in areas near bush or scrub, of failure of insecticides to control "grass grub" as they may have been treating manuka beetle. It also highlights the importance of being able to identify insect pests prior to insecticidal treatment.

Results from these studies suggest that of the organophosphate insecticides available for grass grub control, ethoprophos is not as effective for manuka beetle control as diazinon (Table 2) and probably fensulfothion (Tables 2 and 3) and higher rates of both insecticides are required to give levels of control similar to those obtained with these insecticides on grass grub.

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