INSECTICIDAL CONTROL OF MANUKA BEETLE

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SUMMARY

Numbers of manuka beetle (*Pyronota* spp) were significantly reduced with isazophos, isofenphos and fensulfothion in two trials at Bideford in the Wairarapa. These chemicals also controlled porina (*Wiseana cervinata*). Significant increases in pasture response, based on visual scoring, were recorded from the use of these insecticides. Lindane initially gave poor control of manuka beetle larvae but in the year following application gave 74-95% control presumably through activity against the adults. Diazinon had no effect on pest populations.

INTRODUCTION

Manuka beetle can be a problem in pastures in parts of Taranaki and the central North Island. Recently the pest has also been found to be widespread in parts of the Wairarapa with heavy infestations occurring in farmland being developed out of manuka scrub. Development of such areas by root raking, where pockets of scrub have been left in gullies, appears to have provided an ideal environment for the insect and large populations have caused serious damage. These areas in the summer wet hill country of the Wairarapa are also prone to porina attack and the combined effect of both pests is very severe.

Although similar to grass grub in many respects (Thomson *et al* 1979) manuka beetle are more tolerant of insecticides (Thomson *et al* 1978). This paper reports on two chemical trials conducted against manuka beetle in the Wairarapa.

METHODS

Two insecticide trials were laid down at 2 sites on a farm heavily infested with manuka beetle at Bideford in the Wairarapa. Porina numbers were also high, particularly in Trial 1. The first trial site was on an exposed hill top on a Ngaumu sandy silt loam. Trial 2 was on the lower slopes on a Mangamahu silt loam.

In both trials plot size was 2 x 2 m with eight replicates of each treatment in a randomised block design. The insecticides used and rates of application are given in Table 1. Chemicals were applied with a hand shaker on 19.4.82. Trial 1 was sampled on 16.6.82 and Trial 2 on 30.6.82 by taking four 14.5 cm spade squares per plot. Samples were hand sorted and numbers of manuka beetle and porina recorded. Prior to sampling, pasture in each plot was given a visual score by four people independently. The score, on a scale of 0-10, was based on pasture cover and vigour.

On 23.7.82, five 2.5 cm soil cores were taken from each of the lindane plots in Trial 2 and analysed for lindane residues by standard techniques (Lauren *et al* 1982) by Dr D.R. Lauren of Ruakura. The lindane treatments were assessed again for numbers of manuka beetle and porina on 21.3.83 by taking spade samples from lindane and control plots in both trials as previously described.

RESULTS

The densities and percent control of manuka beetle and porina in both trials 8-10 weeks after treatment are given in Table 1. Fensulfothion (Dasanit 5G), isazophos (Miral 10G) and isofenphos (experimental material) all significantly reduced numbers of both pests. The control given by these three chemicals did not differ significantly for either insect in either trial ($P > 0.05$) but they gave significantly better control than lindane (Nexa-Lindane 12G) of manuka beetle in both trials ($P < 0.01$) and of porina in Trial 1 ($P < 0.05$). In all cases diazinon (Dyzol 20G) was ineffective.

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TABLE 1: Control of manuka beetle and porina 8 to 10 weeks after treatment in two trials at Bideford.

Treatment	Rate of application	Manuka Beetle % control		Porina % control	
		1	2	1	2
lindane	2.0	21 NS	48***	41*	90**
isofenphos	2.0	58***	78***	94***	100**
fensulfothion	2.2	71***	89***	94***	100**
diazinon	2.2	+ 6 NS	+ 6 NS	0 NS	9 NS
isazophos	2.0	69***	79***	77***	90**
Untreated population (no/m ²)		828	1185	52	16

Significance of reductions in numbers:

NS Not significant

* p < 0.05

** p < 0.01

*** p < 0.001

The four individual pasture scores for each plot were added together, then meaned for each treatment and from this a percent response from each insecticide was calculated. The results are given in Table 2. In general, pasture response closely follows the level of control of manuka beetle and porina achieved in each trial, with fensulfothion, isazophos and isofenphos all giving significant increases in pasture score. Although lindane failed to control manuka beetle in Trial 1 it did have a significant effect on pasture, probably through the 41% control of porina.

TABLE 2: Pasture scores based on visual estimates and calculated per cent pasture response from application of insecticide in trials 1 and 2.

Treatment	Mean		Pasture Score	
	1	2	1	2
control	12.4	11.0	—	—
lindane	17.4*	15.3*	140	139
isofenphos	22.6***	16.2**	182	147
fensulfothion	21.3***	17.8***	171	161
diazinon	11.6	10.6	93	96
isazophos	20.9**	15.9**	168	144

*p < 0.05

**p < 0.01

***p < 0.001

The individual effects of manuka beetle and porina on pasture response was assessed by a linear regression of the density of each pest against pasture score for each plot. In Trial 1, with a higher density of porina, both manuka beetle and porina contributed equally to the pasture score but in the second trial only manuka beetle had a significant effect (Table 3). There was more variation in scores in Trial 2 and overall percentage pasture response was less than in Trial 1.

Lindane residue analyses of cores taken in July from Trial 2 showed that the top 0-10 mm layer contained 4.6 ppm of lindane with negligible amounts in levels below this.

TABLE 3: r^2 values of pasture score regressed linearly against each pest density and sum of both pests over all treatments in each trial.

	vs porina	vs manuka beetle	vs both pests
Trial 1	43.5 (P < 0.01)	43.1 (P < 0.01)	50.8 (P < 0.01)
Trial 2	8.5	32.8 (P < 0.1)	36.5 (P < 0.1)

In the year following application, 74% and 95% control ($P < 0.01$) of manuka beetle was recorded in the lindane treatments in Trials 1 and 2 respectively. Populations in the controls were 1254/m² (Trial 1) and 922/m² (Trial 2). No significant control of porina was found in Trial 1. In the second trial, there was an indication of second-year effect, but numbers of porina were too few to be analysed.

DISCUSSION

Previous work has shown fensulfothion, isazophos and diazinon to be effective against manuka beetle (Thomson *et al* 1978, Stewart pers comm.). Results with fensulfothion and isazophos in this study were comparable with these but we cannot explain the failure of diazinon to control either porina or manuka beetle.

In these, as in other trials (Thomson *et al* 1978; Stewart pers comm), lindane has given poor control of manuka beetle larvae in the year of application. However, a delayed effect of lindane was recorded, similar to that found by Stewart. Under certain conditions after an autumn application, lindane residues can remain high enough to be effective against grass grub adults emerging in October (Henzell *et al* 1981; Lauren *et al* 1982). In a similar manner it seems most likely that the delayed effect of lindane is due to it acting on the manuka beetle adults as they emerge or return to lay eggs in December and January. The residues found in Trial 2 of 4.6 ppm, if they remained at those levels until December, would seem to be adequate to affect grass grub adults (Henzell *et al* 1981) and probably also manuka beetle.

The percent control achieved with all chemicals was greater in Trial 2 than in Trial 1. This is possibly due to a higher organic matter, which has been shown to reduce the activity of insecticides (Henzell *et al* 1981), on the flat hill top site compared to the steeper slope of the second trial.

The reduction in numbers of both pests had a significant effect on pasture production, although the visual scoring of pasture cannot be translated into absolute terms. The response was less at the second site, despite the greater control, probably due to lower fertility. Damage done by the pests was obvious not only in terms of pasture production but also in the reversion to scrub occurring in areas which had been damaged for 2 or 3 successive years. Despite this, the economics of pest control in this situation is still questionable with the high cost of chemicals and the doubtful recovery of a severely damaged pasture.

Although lindane, the cheapest of the chemicals tested, has no immediate benefits its effect on the subsequent population possibly makes it the best of the chemical options. However, the variability of lindane residue levels in different soil types and according to times and conditions of application (Henzell *et al* 1981; Lauren *et al* 1982) still make it a dubious control method. It is particularly difficult to get an even distribution of chemical where aerial application is made to hill country (Kain and Crabtree 1972). Thus in this area there seems little chance of retaining sufficient residues of lindane from an autumn aerial application for effective control of adult manuka beetle emerging over summer. The farmer on whose property these trials were conducted had himself aerially applied lindane, ostensibly for a grass grub problem which was later identified as manuka beetle, with no apparent benefits.

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