INSECTICIDAL CONTROL OF BLACK BEETLE ON A PEAT SOIL TYPE

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Summary

Fensulfothion and ethoprophos granules both at three rates were either broadcast on the pasture surface or drilled into the pasture for black beetle control. The results suggest that a significant reduction in black beetle numbers may be achieved in a high organic matter soil type by placing the insecticide in a narrow band in the soil within the larval feeding zone.

INTRODUCTION

Since the use of dieldrin for the control of black beetle (*Heteronychus arator*) in pastures was prohibited in 1967, no effective insecticidal control has existed. Trials over the past three seasons have shown several insecticides give a significant reduction in black beetle numbers on several soil types (Esson pers. comm.).

On mineral soil types, fensulfothion, quinelphos and ethoprophos reduced population numbers of black beetle by 80-90% relative to the control plots (Esson, pers. comm.). However, on a peat soil containing over 60% organic matter, control seldom exceeded 40%, even at the 3 kg/ha rate (Esson, pers. comm.). This finding is confirmed by a number of similar results reported in the literature.

The aim of this trial was to investigate the effect of changing the method of application from broadcasting to a system where the insecticide is drilled into the soil in a narrow band. This would place the active ingredient immediately within the larval feeding range and possibly reduce the amount of insecticide actually absorbed by the organic matter.

EXPERIMENTAL

The insecticides were applied at three rates, 1.12, 2.24 and 3.36 kg/ha to 12 x 5.5 m plots on a pasture sited on a Ngatea peat soil type at Patetonga. Each plot was split, one half drilled, one half broadcast with six replications arranged in a randomised design.

Pre-treatment sampling on the 20 November 1973 showed egg and first instar larvae stages of black beetle to be present over the area at a mean number of 57/m². Insecticides were applied with 125 kg/ha of superphosphate as a broadcast application on 26 November 1973 and drilled with a triple disc, 'Duncan Multiseeder' on 28 November 1973.

No rainfall was recorded at the site from the time of application until the 26 December 1973. Between this date and the 2 January 1974 57.2 mm of rain was recorded. On the 11 February 1974, post-treatment numbers of black beetle were assessed from ten, 10 cm diameter cores taken in each plot.

RESULTS

TABLE 1: EFFECT OF INSECTICIDE RATE AND METHOD OF APPLICATION ON BLACK BEETLE LARVAE NUMBERS

Treatment	Rate kg/ha	Black Beetle Numbers/m ²	
		Broadcast	Drilled
control		53.4 a	71.9 aA*
ethoprophos	1.12	41.4 a	34.9 bcABC
ethoprophos	2.24	37.0 a	47.2 abAB
ethoprophos	3.36	34.9 a	28.7 cBC
fensulfothion	1.12	34.9 a	28.7 bcABC
fensulfothion	2.24	39.1 a	14.4 cC
fensulfothion	3.36	30.8 a	16.4 cC

* Duncans Multiple Range test carried out on transformed means.

DISCUSSION

The insecticide activity of organo-phosphate compounds is very dependent on rainfall and adequate soil moisture levels. The long period without rainfall is primarily responsible for the unsatisfactory results from the broadcast application of the insecticides. However, although soil moisture levels had declined to 17% by weight in the top 6 cm of the soil by the 12 December 1973, drilling the insecticide into the pasture has significantly reduced the black beetle population, compared with the controls, with the exception of one treatment.

This evidence indicates that placing the insecticide in the soil can significantly improve the performance of the drilled material over a broadcast application. In much of the area of black beetle distribution, rainfall is extremely unreliable after the middle of November, and consequently soil moisture levels are often unfavourable for maximum insecticide efficiency. The activity of the drilled insecticide was possibly adversely affected by the low soil moisture levels after application.

Further investigation is required using this technique earlier in November, in an effort to improve efficiency at lower application rates. Considerable refinement in the design of machinery used to drill insecticides into the pasture is also possible.

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