THE CONTROL OF SLUGS AND SNAILS

C. K. PROUDE

Henry H. York & Co. Ltd., Wellington

Summary

During the spring of 1968 and 1969, small plot trials were conducted with methiocarb 4% w/w baits* for the control of slugs and snails. Rates of 0.4 lb gave control of the European slug (*Agriolimax reticulatus*), the garden slug (*Arion hortensis*) and the garden snail (*Helix aspersa*). In the trials, control was also achieved of slaters (*Porcellio* spp.) and leather jackets (Tipulidae) with methiocarb baits. In all trials, the molluscicide metaldehyde 3% w/w bait at 1.5 lb was used as a standard. Results obtained with this bait were disappointing, only partial control of slugs and snails being achieved, and no control of slaters and leather jackets. Bait numbers, attractiveness and weathering of baits to slugs and snails, effect on soil fauna and possible effects on bird life are discussed.

INTRODUCTION

SLUGS and snails are an ever-present problem in agriculture and horticulture, but perhaps are of greater concern in the home garden. Slugs are reported to have caused damage to field crops such as potatoes, kumaras and wheat. It is difficult to find reference in New Zealand to the extent of damage slugs do to these crops but reported losses in potatoes in the Rangitikei/Manawatu area can be as high as 20%. In those areas where known slug damage occurs, broadcasting of metaldehyde baits at the rate of 1.5 lb, usually twice at a 14- to 21-day interval, has given generally satisfactory control.

Slugs are active throughout the year and will cause trouble whenever the temperature and moisture conditions are favourable. They are particularly active when humidity reaches 100%. It is unfortunate that, under these conditions when most plant damage is done, metaldehyde baits do not give good control. Serious slug damage is of a somewhat sporadic nature. Overseas slug damage is reported to occur to cereals, peas, clover, brassicas — all mainly at the seedling stage — and to potato tubers.

It appears that the garden slug (*Arion hortensis*) is implicated in causing the initial damage to the potato tuber and it is thought from English work (Barnes and Weil, 1945) that the European slug (*Agriolimax reticulatus*) may be a severe secondary pest of potatoes. There appears to be considerable difference in susceptibility of potato varieties to damage by slugs. For example, it is thought that in New Zealand the variety Aucklander. Short Top is more susceptible to damage than the variety Ilam Hardy. Overseas work indicates that slugs may become a more serious

*All further references to methiocarb and metaldehyde baits are to those containing 4% w/w and 3% w/w, respectively, all rates given in active ingredient per acre.

problem in horticulture and agriculture where cultivations become less necessary to the growing of arable crops, particularly where precision drilling is being carried out. The following three trials were an attempt to find methods for control of slugs and snails in New Zealand.

TRIAL 1

The aim of this trial was to compare methiocarb baits with metaldehyde baits for control of European slugs.

METHOD

Baits were applied at the rate of 0.4 lb methiocarb and 2 lb metaldehyde to an area of grass sward covered by a sack (3 ft 8 in. × 2 in.). There were two replicates per treatment. The site was selected for its large number of European slugs. There appeared to be a greater attraction to the baited area than to the untreated area.

Assessments of kill were made every 24 hours, for four days, the counts being made each morning. The European slugs were removed from under each sack, placed in wooden boxes and covered for 24 hours. Those that showed signs of activity after this period were counted as alive, those that did not were recorded as dead.

RESULTS

Table 1 shows the results.

TABLE 1: RESULTS OF TRIAL 1

Figures in parentheses are the number of European slugs dead 24 hr after collection.

	<i>Total Slugs Collected</i>				<i>Total Dead</i>
	<i>1st Day</i>	<i>2nd Day</i>	<i>3rd Day</i>	<i>4th Day</i>	
methiocarb	17 (17)	27 (25)	33 (30)	22 (19)	91
metaldehyde	20 (16)	28 (19)	23 (17)	7 (5)	57
Untreated No. of live European slugs counted not removed	26	35	24	21	
CV 18.5%					

There was no significant difference in this trial between metaldehyde and methiocarb in initial control of European slugs. However, the trial showed that both the baits used appeared to lose their attractiveness very rapidly, presumably because of the micro-climatic conditions created under the sacks. The metaldehyde baits had completely disintegrated on the 4th day, whereas the methiocarb baits were still intact but were beginning to show signs of mould development.

A greater number of snails recovered from the effect of the metaldehyde baits than from the methiocarb treatment. This is thought to be an important disadvantage of the use of metaldehyde under damp conditions. No effects on earthworms were noticed — *i.e.*, no dead earthworms were collected from the surface of any plot.

TRIAL 2

This trial was aimed at comparing methiocarb baits with metaldehyde baits for the control of slugs (and snails) attacking potatoes (variety Auckland Short Top).

METHOD

Baits were broadcast over the tops of the rows at rates of 0.4 lb methiocarb and 3 lb of metaldehyde. This gave 20 baiting points per square yard for methiocarb and 18 baiting points per square yard for the metaldehyde treatment. Three 4 sq. yd replicates in each of two rows of potatoes were used. Treatment was commenced just prior to the tops touching the rows after final cultivation.

Treatments were applied 12/12/69 by means of a Japanese midget duster over the plots. Counts were taken in the morning at 24-hourly intervals for five days. Slugs and snails were collected and placed in covered wooden boxes for 48 hours and assessed as being dead or alive after this period.

RESULTS

The results are summarized in Table 2.

TABLE 2: RESULTS OF TRIAL 2

Pre-application count, 12/12/69:									
					<i>Untreated</i>	<i>Methiocarb</i>	<i>Metaldehyde</i>		
Snails	....	....	....	....	23	36	27		
Slugs	....	....	....	....	63	57	61		
Totals from 3 replicates after 5 days:									
					<i>Dead</i>	<i>Alive</i>	<i>Dead</i>	<i>Alive</i>	<i>Dead</i> <i>Alive</i>
Snails	....	....	....		3	33	27	2	17 9
Slugs	....	....	....		6	24	18	1	12 7

Rainfall for the duration of the trial was 0.65 in. Again the metaldehyde baits lost their shape after five days but the more compact methiocarb baits retained their form until the completion of the trial and in this case did not go mouldy. Again a greater number of slugs and snails were found alive from the metaldehyde treatment than from the methiocarb-treated area.

No damage to any tubers from any replicate was noticed at harvest time.

TRIAL 3

This trial was conducted against slugs and snails attacking cabbages and spinach and commenced on 23/9/69. There were three replicates. The layout and rate were the same as for Trial 2. Assessments were made each day for five days and slugs and snails collected from the plots were kept for observation for 24 hours.

RESULTS

TABLE 3: RESULTS OF TRIAL 3

Precount figures on 23/9/69 total three replicates.

Pre-application count, 23/9/69:

				<i>Untreated</i>	<i>Methiocarb</i>	<i>Metaldehyde</i>
Snails	....	....	....	161	143	156
Slugs	....	....	....	8	9	6

Total from 3 replicates after 5 days:

				<i>Dead</i>	<i>Alive</i>	<i>Dead</i>	<i>Alive</i>	<i>Dead</i>	<i>Alive</i>
Snails	....	....	....	5	69	137	1	106	20
Slugs	....	....	....	0	6	7	1	1	4

In this trial large numbers of dead slaters (*Porcellio* spp.) were noted but not counted on the methiocarb treatment but not on the other treatment. Dead leather packets (Tipulidae) were also found only on the methiocarb plots.

Rainfall during the trial was 0.23 in.

DISCUSSION AND OBSERVATIONS

Slugs taken from the methiocarb-treated plots were jelly-like and flabby to the touch and were generally unable to move any part of their body except the head. Death appeared to occur in about 48 hours, after contact with the baits. There was no excessive secretion of mucus, whereas this symptom was common to both slugs and snails taken from the metaldehyde plots.

Metaldehyde-baited slugs moved actively even when a sublethal dose had been taken. Those that had a lethal dose obviously did not show activity and were presumed dead. A symptom of death was with the genital atrium clearly extended, together, in some cases, with part of the alimentary tract.

Similar symptoms of death were noticed for snails, except that with methiocarb the snail's body was drawn completely inside the shell.

The dead slugs and snails were disposed of by feeding to blackbirds and seagulls. No effect of either treatment on the birds was noticed.

No effect on earthworms was noticed — *i.e.*, there were no dead worms on the soil surface in any trial. The trials reported indicate that methiocarb is a superior molluscicide to metaldehyde under the conditions of the trials.

It must be stated that these trials were preliminary only. Field experience under more variable weather conditions may provide more conclusive results, and yield information on the actual damage of crops by snails and slugs in particular.

It is evident that there is a greater recovery from metaldehyde-treated plots than from the methiocarb treatments but a more critical study is needed to define what percentage kill or recovery is obtained, and under what conditions, on what number of species that occur in New Zealand.