PORINA CONTROL IN WAIKATO DAIRY PASTURES

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SUMMARY

Trials were carried out in 1984 to investigate optimum rates and formulations for insecticide control of porina (*Wiseana* spp.) in dairy pastures. Both granule and EC formulations of diazinon and fenitrothion were applied at rates within and below the recommended range. Fenitrothion EC sprays at 0.9-1.2 kg ai/ha gave control ranging from 83-100%. The 0.6 kg ai/ha rate was less effective. The granule formulation of fenitrothion was less effective than the EC. Diazinon EC and granule formulations gave no effective control. There was no significant pasture DM response to insecticide control suggesting that porina densities up to 60/m² do not justify control measures in Waikato dairy pastures where high mortality from water-logged soil occurs in winter-spring.

INTRODUCTION

Pasture damage by porina has usually been considered a problem confined to the South Island and southern regions of the North Island. Savage and French (1981) noted that porina were of no importance north of a line running from Hawkes Bay to northern Taranaki. Most trials evaluating insecticides for porina control have been carried out in the traditional problem areas.

In 1983 and 1984, insecticides were applied to dairy pastures in several areas in the Waikato for porina control. There is an absence of information on porina phenology, damage thresholds and optimum control strategies for this area. This paper reports results from trials to evaluate insecticides, formulations and rates for porina control in dairy pastures and the pasture response to insecticide application.

METHODS

Trials were carried out during winter-spring 1984 on three farms in the Waikato. Site A was on a Waitoa soil type at Ngarua near the Kaimai Ranges and Sites B and C were on peat soil types near Puketaha and Taupiri respectively. Trial design was similar at each site. Plots, 2.5 x 2.5 m, surrounded by 1 m wide buffer areas, were arranged in a randomised block design, with five replicates of each insecticide treatment and 10 replicates of the untreated control. At Sites A and B, two trials were laid down at each site, one trial evaluating fenitrothion EC and granule formulations and the other diazinon formulations. A single trial evaluating rates of fenitrothion EC formulation was laid down at Site C.

The insecticide treatments were fenitrothion as 'Caterkil 60EC' or 'Verthion 10G' and diazinon as 'Dyzol 80 EC' or 'Dyzol 20G'. Both formulations of the insecticides were evaluated at rates within the recommended range for porina control, and at two low rates of granule formulations below the recommended range. EC formulations of insecticides were applied in 300 litres/ha through a 'Mystifier' knapsack sprayer with a 2.4 m boom, fitted with Spraying Systems flat nozzles (No. 730154) and operating at 210 kPa. Granule formulations were applied with a hand shaker.

At the time of laying down the trials, porina numbers were assessed from four, 10 cm diameter soil cores/plot. Post-treatment assessments of porina control were carried out using the plough strip method of Kain *et al* (1979). Porina tunnels were counted in two strips, 2-3 cm deep, 13.5 cm wide and 2 m long taken from each plot.

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Measurements of pasture production were carried out at Sites B and C only. At Site B, production was measured over the period 20/8/84 to 21/9/84. Difficulties with grazing management prevented measurement after this period. At Site C, production was measured over the period 20/8/84 to 7/11/84. Pre- and post-grazing DM estimates were taken at both sites. An electronic pasture probe (Design Electronics Ltd., Palmerston North) was used to assess DM mass. To calibrate the probe, 10 readings were taken within a 0.22 m² frame in each plot of one control treatment and an insecticide treatment with the highest level of porina control. Pasture within the frame was then cut close to ground level to obtain a probe reading — DM calibration relationship. The 0.22 m² assessment area was placed to be representative of the range of pasture height and composition present in the plots. Twenty probes per plot were taken from the two control treatments and the two insecticide treatments with the highest porina control to assess porina pasture damage. For the post-grazing assessment of DM carried out on 20/8/84 at both sites, before post-treatment porina numbers were assessed, probe readings were taken from the highest insecticide rate treatments where porina control was expected to be greatest.

Specific trial details at each site were:

Site A: Porina pre-treatment numbers were 27/m² with a mean caterpillar length of 55 mm (range 33-80 mm). Treatments were applied on 9 August and post-treatment assessments of porina made on 10 September 1984.

Site B: Pre-treatment numbers were 40/m², mean caterpillar length 31 mm (range 16-53 mm). Treatments applied 3 August and post-treatment numbers assessed 31 August 1984.

Site C: Pre-treatment numbers were 59.2/m², mean caterpillar length 27 mm (range 20-44 mm). Treatments applied 10 August and post-treatment numbers assessed 20 September 1984.

The weather following insecticide applications was characterised by mild conditions with no frosts but heavy and frequent rainfall.

Analysis of post-treatment counts was carried out on transformed ($\log n + 1$) data.

TABLE 1: Porina control with fenitrothion sprays and granules.

Formulation	Rate kg ai/ha	Mean No. porina/m ²		
		Site A	Site B	Site C*
fenitrothion 60 EC	1.2	0	2.2	4.1
"	0.9	0	4.4	5.9
"	0.6	0	14.8	14.8
fenitrothion 10 G	1.2	1.1	8.9	-
"	0.9	0.4	10.3	-
"	0.6	1.9	9.6	-
"	0.45	1.1	19.2	-
"	0.3	0.7	21.9	-
untreated		4.4	35.6	34.1
LSR		1.88	2.33	2.27

*no granule treatments at Site C

RESULTS AND DISCUSSION

Porina control with fenitrothion insecticide for each formulation and rate at the three sites is shown in Table 1. At Site A, large decrease in porina numbers occurred in the control plots between August and September with numbers declining from 27 to 4/m². Rainfall was high over this period, flooding of the paddock occurred and it is assumed considerable caterpillar mortality from drowning took place. This limits the conclusions which can be drawn from this site. However no porina were found in the fenitrothion spray treatments. At Site B, all treatments were significantly better ($P < 0.01$) than the controls. The EC formulation at 1.2 and 0.9 kg ai/ha gave significantly greater ($P < 0.01$) control than 0.6 kg ai/ha, and the EC was better

($P < 0.01$) than the granule formulation at 1.2 kg ai/ha. Other workers (e.g. Logan *et al* 1975) have also noted that fenitrothion sprays were superior to granules. Taylor (1969) considered granules were superior to sprays on long pasture, but pasture was long (to 15 cm) at Site B. Granules at the 1.2 kg ai/ha rate were only significantly better than the two lowest rates. All treatments at Site C were significantly better ($P < 0.01$) than the control and 1.2 and 0.9 kg ai/ha rates gave significantly greater control than 0.6 kg ai/ha.

The level of porina control with diazinon EC and granule formulations is shown in Table 2. At Site A there was a large decrease in porina numbers in the untreated areas over the period between laying down the trial and the post-treatment assessment which limits conclusions. Diazinon as an EC and granule treatment at 0.9 kg ai/ha significantly reduced porina numbers. There were no significant treatment differences at Site B and although the results suggest that the EC formulation may have been more effective than the granule, there was no significant control.

TABLE 2: Porina control with diazinon sprays and granules.

Formulation	Rate kg ai/ha	Mean No. porina/m ²	
		Site A	Site B
diazinon 80 EC	1.2	5.6	23.7
"	0.9	1.9	30.4
"	0.6	3.0	24.4
diazinon 20 G	1.2	4.1	29.3
"	0.9	0.4	35.6
"	0.6	4.4	34.1
"	0.45	2.6	40.4
"	0.3	2.2	23.0
untreated		6.3	38.5
LSR		2.35	1.78

The failure of diazinon to give any control at Site B was unexpected in view of the large number of trials where 70-80% porina control was achieved at the 1 kg ai/ha rate (e.g., Christie 1965; Perrott 1969; Henzell and Lauren 1983). However, Henzell and Lauren (1983) found both diazinon EC and granules gave porina control of only 40-45% in one trial.

Comparison of the two insecticides has been made previously, and while Rastrick and Uprichard (1968), Lowe (1969) and Henzell and Lauren (1983) found both materials gave similar levels of control as sprays or granules, Taylor (1969) found fenitrothion was more effective in six trials.

Pasture DM production from plots treated with 1.2 kg ai/ha of fenitrothion EC at Site B did not differ significantly ($P > 0.1$) from untreated plots being only 50 kg DM/ha greater. The ryegrass-white clover pasture was growing vigorously over this period and although porina feeding damage was very evident at the time of applying the treatments, little damage was noted over the period production was measured. This suggests either a rapid decline in porina numbers occurred or that a level of 35-40 porina/m² in vigorously growing dairy pasture in spring is below the damage threshold.

Pasture production at Site C over the period 20 August-7 November is shown in Table 3. Production was some 220 kg DM/ha greater on the insecticide treated plots over the period, not significantly different ($P > 0.1$) from the untreated plots. Porina numbers in the untreated plots declined rapidly over the period being 23/m² on 21 September and 17/m² on 26 October. On this peat soil type, water-logged soil conditions resulting from heavy rainfall occurred and considerable mortality from caterpillar drowning probably took place. Although the pasture was severely damaged by the porina population of 60/m² in early August, the rapid decline in numbers probably prevented a significant pasture response from insecticide control.

Establishment of porina damage thresholds for Waikato dairy pastures is difficult. The period when damage occurs varies between areas. At Site A where peak adult flight

TABLE 3: Pasture DM production from insecticide treated and untreated areas at Site C in 1984.

Treatment	DM kg/ha			
	20.8-4.9	7.9-21.9	24.9-15.10	17.10-7.11
fenitrothion 1.2 kg ai/ha	395	169	504	509
untreated	285	140	511	418
SED	71	57	59	100

occurs in the spring, pasture damage was first noted by the farmer in May. At Sites B and C where peak flight occurs in late summer-early autumn, pasture damage did not occur until July-August. Differences in seasonal pasture growth patterns in relation to the period of porina feeding damage will greatly influence damage threshold numbers. In addition, a high rate of porina mortality due to high soil moisture levels over winter-spring, particularly on peat soil types can rapidly negate the chances of a pasture response from insecticidal control of porina.

Porina damage thresholds must be regarded as a general guide to decision making in the need for control. Thresholds of between 20-40 porina/m² depending upon soil fertility and pasture condition have been set for South Island areas (Savage and French 1981). Experience with populations of up to 60/m² suggests that high mortality in late-winter, spring in Waikato dairy pastures may prevent a response to control. The current cost of fenitrothion EC applied at the 1 kg ai/ha rate is about \$20/ha for the material. If 1 kg of milkfat is worth \$3.70 (1984 figures) and this takes about 25 kg of fully utilised DM to produce, then an increase in DM production from insecticide treatment of some 140 kg/ha will cover the cost of the chemical. The porina numbers necessary to cause this level of DM loss must still be established for dairy pastures in the Waikato.

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REFERENCES

- Christie, R.W., 1965. Departmental results for control of *Wiseana* spp. *Proc. 18th N.Z. Weed and Pest Control Conf.*: 147-150.
- Henzell, R.F. and Lauren, D.R., 1983. Conventional and micro-encapsulated spray and bait formulations for porina control. *Proc. 36th N.Z. Weed and Pest Control Conf.*: 190-194.
- Kain, W.M., Holland, T.V. and Atkinson, D.S., 1979. Rapid methods for sampling soil inhabiting insect pests of pastures. pp. 108-112. *Proc. 2nd Australasian Conf. Grassland Invert. Ecol.*
- Logan, I.C., O'Connor, B.P. and McLaughlan, W.T., 1975. Control of porina caterpillar with leptophos. *Proc. 28th N.Z. Weed and Pest Control Conf.*: 217-220.
- Lowe, A.D., 1969. Control of *Wiseana despecta* (Walk.) with some organophosphate chemicals. *Proc. 22nd N.Z. Weed and Pest Control Conf.*: 258-260.
- Perrott, D.C.F., 1969. Results of trials for the control of porina in the Nelson district. *Proc. 22nd N.Z. Weed and Pest Control Conf.*: 236-241.
- Rastrick, D.R. and Upritchard, E.A., 1968. Pasture response following insecticide treatment for the control of porina. *Proc. 21st N.Z. Weed and Pest Control Conf.*: 192-197.
- Savage, M.J. and French, R.A., 1981. Porina chemical control: determining application time. MAF. *AgLink FPP* 588.
- Taylor, R.L., 1969. Control of porina caterpillar with fenitrothion. *Proc. 22nd N.Z. Weed and Pest Control Conf.*: 242-246.