RESEARCH NOTE

AN ATTEMPT TO CONTROL *SITONA DISCOIDEUS*
LARVAE WITH SYSTEMIC INSECTICIDES

B.I.P. BARRATT

Invermay Agricultural Research Station, MAF, Private Bag, Mosgiel

SUMMARY

The systemic insecticides oxamyl and fenamiphos were applied at two rates as foliar sprays to lucerne (*Medicago sativa*) in late September when over 30% of sitona (*Sitona discoideus*) eggs laid up to that time (about 9,500/m²) had hatched. These chemicals, which are translocated downward to the roots as well as within the foliar regions of the plant, did not reduce larval numbers in summer, or increase lucerne yield.

INTRODUCTION

Sitona weevil, first recorded in New Zealand in 1974 (Esson 1975), has since become widespread wherever lucerne is grown (Kain and Trought 1982). Eggs are laid from April to mid-December with peak numbers occurring during August-September (Goldson *et al* 1984). The larvae feed on root nodules and root hairs to the extent that high larval densities can reduce vigour and yield of lucerne (Goldson 1984) particularly in young stands (Goldson and French 1983). Larval control with soil-applied insecticides has proved unsuccessful (T.E.T. Trought; D. Hopkins pers comm) probably because the early larval stages are well protected where they feed within the root nodules. There are no insecticides currently registered for sitona larval control.

The trial reported here was an attempt to control newly-emerged sitona larvae during root nodule colonisation using two root-translocating systemic insecticides.

METHODS

The trial was located at Dunback (North Otago) in a 1-year-old stand of lucerne (cv. AS 13R) growing on an Eyre-Paparua alluvial silt loam. Treatments were applied to 6.5 m × 4.5 m plots replicated 10 times in randomised blocks as follows:

- (1) Control: untreated
- (2) Oxamyl (Vydate L) 240 g ai/ha
- (3) Oxamyl (Vydate L) 480 g ai/ha
- (4) Fenamiphos (Nemacur 400 EC) 2000 g ai/ha
- (5) Fenamiphos (Nemacur 400 EC) 4000 g ai/ha

A hand-held 1.2 m boom fitted with flat fan tip nozzles (730154) operating at 213 kPa was used to apply the insecticides in approximately 200 litres of water/ha. The lucerne was about 15 cm high when sprayed on 28 September 1982.

Sitona egg density was assessed on 28 September 1982 by taking 20 × 0.1 m² vacuum samples (10 from either side of the trial boundary) to a depth of 5-10 mm. The soil was passed through a 1 mm mesh sieve and the eggs extracted using a saline flotation technique. Eggs were counted and the proportion of the total laid up to the time of sampling which had hatched was estimated by recording those egg fragments which constituted more than half of an entire egg. The coarse material retained by the sieve was placed in heat extraction funnels to remove live adult weevils. Adults were sampled again on 4 October 1982 by taking 2 × 0.1 m² vacuum samples from each plot. Sitona larvae were sampled on 1 December 1982 by taking 10 cores (10 cm diam. × 15 cm deep) randomly per plot and extracting the larvae by saline flotation.

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The lucerne was inspected in October-November for aphid infestation, and samples were taken in November from vegetation and soil for nematode extraction.

The plots were harvested in November 1982 and January 1983 by cutting a 6 × 4 m area from the centre of each plot, and in March 1983 by cutting a 5 × 1 m strip from the centre of each plot. The herbage was weighed and samples taken for dry matter determination.

RESULTS AND DISCUSSION

The results, which were analysed by ANOVA using orthogonal contrasts, showed that the insecticides did not reduce sitona larval numbers in comparison with the control plots (Table 1), although the time of application corresponded with the period during which egg hatch and root nodule colonisation would have been occurring. Adult mortality was achieved with all insecticide treatments which suggests that oviposition taking place after the end of September did not contribute substantially to the final larval population. Frampton (1984) found that in one season in Canterbury, 84% of the final larval population of 2144/m² had established from eggs laid by mid-September.

TABLE 1: Results of sitona sampling and lucerne dry matter production.

Pre-treatment:		Mean					SEM
28 Sept 1982	Egg density (No./m ²)	9490					1670
28 Sept 1982	Eggs hatched (%)	31.2					1.5
28 Sept 1982	Weevil density (No./m ²)	33.0					5.6
Post-treatment:		Mean					SEM
	Treatment	(1)	(2)	(3)	(4)	(5)	
4 Oct 1982	Weevil density (No./m ²)	18.0	0.5	1.0	0	0.5	4.6*
1 Dec 1982	Larval density (No./m ²)	1590	1770	1760	1770	1360	115
30 Nov 1982	Dry matter yield (t/ha)	3.28	3.32	3.12	3.19	3.40	0.11
17 Jan 1983	Dry matter yield (t/ha)	2.99	3.19	2.91	3.11	3.06	0.09
14 Mar 1983	Dry matter yield (t/ha)	2.68	2.76	2.77	2.73	2.70	0.10
	Total dry matter yield	8.94	9.28	8.79	9.03	9.16	0.09

*Treatment 1 only

Lucerne dry matter production was not substantially affected by any of the insecticide treatments although yellowing of the foliage was observed in the fenamiphos plots in October.

No aphids were found before the first harvest. Very low numbers of *Pratylenchus* sp (root lesion nematode) were found and were considered to be of no pest significance (G.M. Harper pers comm) and no parasitic nematodes were found in the foliage samples.

CONCLUSION

Oxamyl and fenamiphos were unsuccessful in causing mortality on sitona larvae feeding on lucerne root nodules at the rates used. Reasons for this are unknown, but possible explanations may be that the insecticides were not translocated into root nodules, or not in sufficient concentrations to bring about larval mortality.

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REFERENCES

- Esson, M.J., 1975. Biology and distribution of three recently discovered weevils in Hawkes Bay. *Proc. 28th N.Z. Weed and Pest Control Conf.*: 208-212.
- Frampton, E.R., 1984. The seasonal pattern of *Sitona discoideus* larval establishment in Canterbury lucerne and its implications for control. *N.Z. J. Exp. Agric.* 12: 319-322.
- Goldson, S.L. 1984. Sitona weevil in lucerne biology and control. *AgLink FPP 548, Information Services, MAF, Private Bag, Wellington.*
- Goldson, S.L., Frampton, E.R., Barratt, B.I.P. and Ferguson C.M. 1984. The seasonal biology of *Sitona discoideus* Gyllenhal (Coleoptera: Curculionidae), and introduced pest of New Zealand lucerne. *Bull. ent.* 74: 249-259.
- Goldson, S.L. and French, R.A., 1983. Age-related susceptibility of lucerne to sitona weevil *Sitona discoideus* Gyllenhal (Coleoptera: Curculionidae) larvae and the associated patterns of infestation. *N.Z. J. Agric. Res.* 26: 251-255.
- Kain, W.M. and Trought, T.E.T., 1982. Insect pests of lucerne in New Zealand. pp 49-59 In Wynn-Williams, R.B. (Ed.). Lucerne for the 80's — *Special Publication, Agronomy Soc. N.Z. No. 1*: 160 pp.