CONTRACT REPORT

Determination of Vine Weevil oviposition sites in Nursery Stock

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ADAS

Report To: Horticultural Development Council
18 Lavant Street
PETERSFIELD
Hampshire
GU32 3EW

Tel: 01730 263736
Fax: 01739 265394

ADAS Contract Manager: Dr John Buxton
ADAS Worcester
Whittington Road
WORCESTER
WR5 2LQ

Tel: 01905 768619
Fax: 01905 768698

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John Buxton
ADAS Worcester

HDC Co-ordinator: Mr R Wellavize
Round Pond Nurseries
Chobham
Surrey

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RELEVANCE TO GROWERS AND PRACTICAL APPLICATION

The trial showed clearly that significantly more vine weevil eggs were laid in the outer areas of the pot, rather than being concentrated around the stem base of the *Euonymus* plants used in the trial.

This result was surprising, but it does have practical significance for growers. If most eggs had been laid on the central 'core' of compost, then the rate of compost incorporated insecticide (SuScon Green) could have been highest here, and reduced in the outer areas, thus saving money.

Unfortunately, the results of this trial show that this approach would be impractical, and would probably lead to reduced levels of vine weevil control. However, only one plant/weevil combination was used, and it is possible that different plants, could give differing results.

Further work is needed along these lines, to using a range of host plants, to confirm these findings.

SUMMARY

Euonymus 'Emerald and Gold' plants were potted into 3 litre pots, and fitted with perspex petri dish covers which neatly divided the compost surface into three concentric circles, an inner area (around the stem base), middle and an outer area.

Silver sand with or without SuScon Green incorporated was placed onto the petri dishes up to the level of the lip of the dish, and then all the plants were placed into vine weevil cages for oviposition to take place.

After 10 days, eggs were removed from each layer and counted. Significantly more (P= 0.05) eggs were recovered from the outermost area than in the middle or inner areas even after all areas were standardised to 100 cm^2.

There was no significant difference between the number of eggs laid in middle or inner areas.

The incorporation of SuScon Green had no effect on weevil oviposition; there was no significant difference in counts of eggs from untreated sand or SuScon treated sand, for any of the three areas.

INTRODUCTION

Vine weevil adults are capable of laying up to several thousand eggs during their life-time, and oviposit readily in laboratory cultures. ADAS has maintained colonies of weevils at several laboratories for many years, and has obtained eggs to inoculate pots when carrying out efficacy trials with insecticides against vine weevil larvae. In the condition of the colony, weevils seem to oviposit at random, with eggs laid on the floor of the cage, on plant material, or even on the glass plate covering the top of the cages.

However, there is little or no information available regarding the placement of vine weevil eggs in their natural habitat. The nursery stock situation is unique: with large numbers of pots stood out either under protection or outdoors, on drained sand beds or on mypex over hardcore. The question was asked : do vine weevils crawl up the pot and lay the majority of eggs around the stem base, or are they scattered at random on the surface of the pot? The aim of this experiment was to help answer these questions.

MATERIALS AND METHODS

Large perspex cages (80cm x 40 cm x 40cm) were used to contain the vine weevil used during the trial. The *Euonymus* plants (variety 'Emerald and Gold') were placed inside each cage. The plants were in 3 litre pots which had been adapted so that the compost surface was divided into 3 zones. Figure 1 shows the adapted pot.

Plastic petri dishes of different sizes were used to form concentric circles on top of the compost. The innermost dish (the smallest diameter) was drilled with a central hole and lined with foam rubber to ensure a good seal around the *Euonymus* stem.

A layer of silver sand was then placed on top of the petri dishes, so that the level of sand was flush with the top of the pot.

Treatments

1. Untreated Zones 1 - 3

2. SuScon Green Zones 1 - 3

The sand in treatment 2 had SuScon Green evenly incorporated at the rate of 1kg/m^3 just before the start of the trial.

Pots of both treatments were placed at random into each of two large cages; 20 pots in total in a completely randomised design.

100 adult vine weevil were then introduced evenly into each cage, and left to oviposit on any area they chose. After a period of 10 days, when counts on spare plants indicated that enough eggs had been laid, all the plants were removed, and the weevils placed back in the colony. The silver sand was then carefully removed from each zone, bagged up and then treated with a solution of saturated magnesium sulphate, in which vine weevil eggs float.

Each plant was assessed separately, so that there were 10 replicates of each treatment, and each zone. The results were statistically analysed. The purpose of comparing plants with straight silver sand, and sand containing SuScon Green, was to show whether the insecticide had any repellent effect - ie. reduced the oviposition of vine weevils.

RESULTS

The mean number of eggs recovered from each area is shown in Table 1. All figures have been corrected to an area equivalent of 100 cm^2; but actual areas were as follows: Inner area 63 cm^2 ; Middle area 90 cm^2; and Outer area 100 cm^2.

TABLE 1

Number of eggs recorded in each area, for each replicate in the trial

Treatment	Number of eggs laid per 100 cm^2										MEAN*
	Rep 1	2	3	4	5	6	7	8	9	10	
Inner zone	4.8	12.7	6.4	1.6	6.4	11.1	6.4	1.6	12.7	11.1	7.5 a
Middle zone	12.1	8.8	6.6	1.2	13.2	13.2	12.1	1.2	19.8	13.2	10.1 a
Outer zone	17	40	29	8	28	44	26	10	48	26	27.6 b
SED ±											2.65

* Means followed by the same letter are not significantly different (Duncan's New Multiple Range Test, P = 0.05)

When the mean egg counts from the pots treated with SuScon Green or untreated pots were compared , there was no significant difference. Table 2 shows the variation in egg counts obtained in the experiment, and the overall means. The data from all 'zones' or areas has been pooled in this table.

TABLE 2

Total number of eggs recorded from insecticide treated or untreated sand

Treatment	Number of eggs laid per 100 cm^2					MEAN
	Rep 1	2	3	4	5	
SuScon Green	31	39	63	12	74	43.8 a
Untreated	56	10	44	41	45	39.2 a
SED ±						13.04 ns

DISCUSSION

Preliminary trials in May did not obtain enough eggs to give an acceptable result, but by June the vine weevil were ovipositing well, and total number of eggs laid over the 10 day period was more than enough to show up treatment differences.

There were obviously differences in the surface area of each zone; ie. inner, middle and outer, with the outer zone being the largest in area. However, even when egg counts were corrected for this, there were still significantly ($P = 0.05$) more eggs laid here rather than middle and inner areas.

This was a surprising result as it had usually been supposed that weevils would be attracted to the plant stem and concentrate most eggs here. However, the process of laying more eggs near the edge of the pot may be a survival strategy, as hatching larvae may find a young fibrous root more easily in this zone. It is known that if vine weevil larvae do not find a suitable root within a short time, they die.

The results only hold true for the particular plant/compost combination (ie. *Euonymus* and peat/bark compost in 3 litre pots) used. It is possible that different plants, with different growth habits may not give similar results.

The lack of repellent action from SuScon Green was not unexpected, as this material, although incorporated into the sand at the highest label rate (1 kg/m^3), releases the active ingredient - chlorpyrifos - very slowly and so any activity of chlorpyrifos would be at a low level at any one time.

However other insecticides which are more volatile, or which have a known repellent effect on vine weevil such as pyrethroids, can reduce oviposition levels (see HDC report HNS 61 for full details).

It is concluded that while this was a very interesting result, the work should be repeated using a range of host plants to check if there were any differences. The experimental technique used was satisfactory, and worked well in practice, although large numbers (200 plus) of vine weevil adults are needed at any one time in order to obtain enough eggs.

Figure 1

Euonymus plant used in the trial showing the plastic petri dishes in place to divide the compost surface into 3 concentric zones.