Section VI: Pests of Turf and Ornamentals

INVESTIGATION OF AMBER SNAIL MANAGEMENT TREATMENTS IN NURSERY PRODUCTION FACILITIES

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Goal and Explanation of Project:
Growers in Oregon have experienced expensive plant shipment treatment or destruction orders, and shipment refusals due to plant shipments containing populations of amber snails. While many questions remain regarding integrated pest management of these snails, growers have suggested that examination of dis-infestation strategies for nursery crops prior to shipment, would be valuable information. In addition,

growers are looking for tactics that reduce re-entry interval restrictions at a critical time when they handling and moving plants for shipment.

Project objectives:

1. Evaluate dis-infestation treatments for amber snails including emphasizing "soft" products with zero or low re-entry intervals.

Methods and materials:

We have conducted three molluscicide trials to date with the amber snails. The trials were situated in a peaked bay of a Cravo greenhouse at the North Willamette Research and Extension Center. Amber snails were collected from an infested nursery site. These snails were allowed to establish one day prior to application by applying a known number of snails onto potting substrate in 4-inch containers. These containers were placed on upside down-, 4-inch containers which were set on a liner surrounded by a salt water moat to prevent escape of snails to surrounding area using protocol suggested by Hollingsworth (pers. comm.). Each treatment consisted of five replicates. In trial one, eight snails were applied to each rep for a treatment total of 40 snails. For trial two, 15 snails were applied to each rep for a treatment total of 75 snails. For trial three, 20 snails were applied to each rep for a treatment total of 100 snails. The area surrounding the replications was kept wet periodically prior to the application to increase humidity for better survival.

Seven treatments were evaluated: 1) untreated control; 2) carbaryl (Sevin SL, 5.6 ml/m^2); 3) methiocarb (Mesurol, 0.38g ai/m^2; 4) cinnamon oil (Slug and Snail Away, 4.73ml/m^2); 5) metaldehyde (Slug Fest, 1.13ml/m^2); 6) capsaisin + mustard oil (Dazitol, 21.58ml/m^2); 7) limonene (Orange Guard, 145 ml/m^2). Molluscides were applied as a banded foliar application using a CO^2 backpack spray applicator (Spray Systems) with a flat fan nozzle and 30 lbs. PSI. Applications occurred on the mornings of Aug. 17, 2010 (Trial one); Aug. 24, 2010 (Trial two); and Sept. 29, 2010 (Trial three).

Evaluation consisted of a 24-hour assessment. Each snail in all reps was located and determined as to whether it was alive, dead, missing, or morbid. The location on each rep (on soil, in inner liners, in salt moat, etc.) was also noted for each snail.
Data was analyzed using (ARM, Gylling Data Management, Inc.) and Tukey's HSD (P=.05)

Results:

Trial one and Trial two data included high mortality across all treatments including the untreated control, excluding any useable data. It was determined that the high temperatures (96°, 90° and 75° F during trial 1; 93-95° F during trial 2) and low humidity that occurred during the weeks of the first two trials lead to the high mortality. The temperature range for trial three (84°, 78°, 77°, and 86° F) did not have a deleterious impact on the amber snails. Only data for the Trial three is shown in this report (Chart 1).

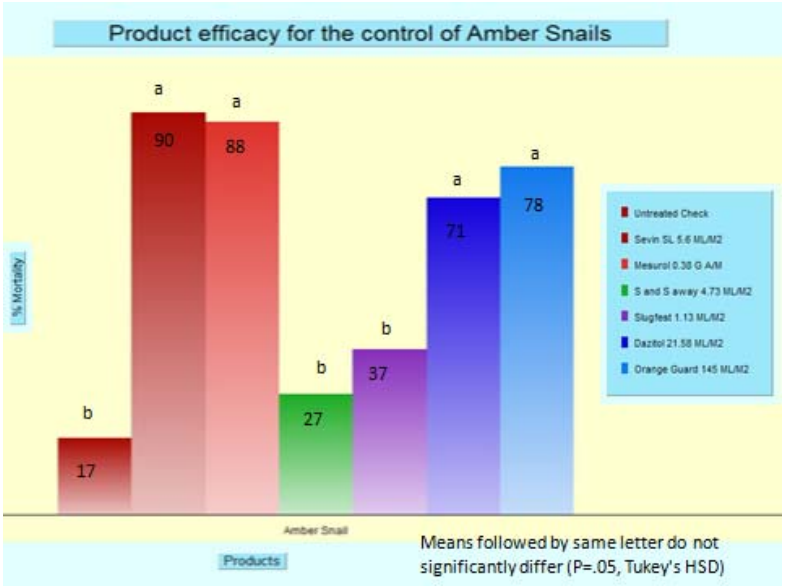

Chart 1. Product efficacy for the control of Amber Snails.

Discussion:
One of the initial strategies implemented in this research was to compare existing chemical management tactics used by growers for amber snails. Several carbamate pesticides are used currently including: methiocarb (Mesurol), metaldehyde (various formulations), and carbaryl (Sevin). In addition, one of the objectives of this work is to investigate activity of a wider range of active ingredients that might provide an alternative to carbamates or an additional rotation or tactic to dis-infest plant shipments. Ideally, these would have low or no re-entry intervals so application would not hinder shipping or work in the area.

Analysis of the results of the chemical trial showed that two of the carbamate molluscides, Sevin and Mesurol, provided good control of amber snails within 24 hours (90% and 88% respectively). The amber snail chemical trial showed very promising results of two of the botanically-based molluscicides to kill amber snails within one day of application. There was no statistical difference between the percent mortality of Orange Guard (78%) and Dazitol (71%) and the carbamate products, Sevin (90%) and Mesurol (88%). The product Orange Guard, is 5.8% d-Limonene, a steam-distilled byproduct of citrus peels. This naturally derived product is water-based with food-grade ingredients which are classified as G.R.A.S. (generally recognized as safe) by the FDA. It is OMRI-listed. Dazitol Concentrate is a product with two active ingredients: Capsaicin and allyl isothiocyanate. Capsaicin is derived from hot peppers and the allyl isothiocyanate is from essential oil of mustard. It has a 4 hour REI and a Caution Label.

Percent mortality of Slugfest (37%) and Slug and Snail Away (27%) were not statistically different than the untreated control (17%). The metaldehyde product works by both direct uptake and by ingestion. Growers have suggested that amber snails do not appear to be eating either metaldehyde or iron phosphate baits. That might be a factor in the low mortality of this carbamate product in this trial. More investigation of bait attraction should occur with amber snails. Similarly, the active ingredient of Slug and Snail Away, cinnamon oil, might work more effectively as a repellent or anti-feedent rather than a toxicant with amber snails. Our trial was designed to assess mortality with foliar sprays rather than deterrence which will likely require a barrier evaluation research design. The repeated trials associated with heat failure in the first two trials delayed our ability to conduct barrier trials this year but they are planned for the future.

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