

Final Report to the NYS IPM Program, Agricultural IPM 2000-2001

Title: A New, Low-Toxicity Slug Control Material for Strawberries

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Type of Grant: Pheromones; biorationals; microbials; conventional pesticides

Project Location: Throughout the northeast

Abstract:

"Sluggo" is a new low-toxicity slug control product formulated with the active ingredient ferric phosphate and a proprietary bait. Strawberry slug damage was measured in 2000 to compare treatments of Sluggo and the standard material, "Deadline Mini Pellets" (active ingredient, metaldehyde, plus bait) to untreated control plots. Metaldehyde is a fairly toxic material. If ferric phosphate bait can be shown to provide adequate control of slug damage, growers could use it with confidence and reduce environmental and consumer hazards in comparison with current practice. In particular, growers are concerned that use of metaldehyde in a U-pick situation where young children are present can present a hazard. Yet, if slug damage is heavy, they have had to make the choice between accepting the damage or using the potentially hazardous metaldehyde. Having a viable low-toxicity option would be welcome.

Research plots were laid out at two U-pick strawberry farm and at the Cornell Orchards. After rainy weather induced slug damage in the crop, a consistent trend was found. Plots treated with Sluggo showed reductions of about 50% in slug damage compared to the control, statistically significant at two of three locations. Damage in the metaldehyde-treated plots was intermediate.

Background and Justification:

Slugs can cause significant marketable yield loss in strawberries, costing growers lost revenue and sometimes making the U-pick experience less attractive. Cornell's 2000 Pest Management Guidelines for Small Fruit Crops recommends applying metaldehyde products in September to "reduce [slug] egg-laying, while an application prior to fruit ripening will reduce the new generation. Avoid contamination of edible plant parts. If fruit is ripening restrict bait to alleyways." While metaldehyde products have been

recommended for slug control for many years, a new product based on ferric (iron) phosphate has recently come on the market.

Metaldehyde is highly toxic to humans by inhalation and moderately toxic via ingestion (Exttoxnet, 1/17/01). It is also toxic to pets and wildlife. Its oral LD50 (rats) is 227-690 mg/kg. These are important considerations in strawberries, which are often harvested by the general public. Growers are often hesitant about applying metaldehyde, even in alleyways, during the harvest period. The sweet smell and blue color of a typical formulation (Deadline Mini Pellets) could make it attractive to young children.

In contrast, ferric phosphate is relatively non-toxic, according to its material safety data sheet (#433) and label. It is exempt from a tolerance requirement, and the label states it “can be used around pets and wildlife”. Its OSHA hazard category is “irritant”, and it has oral and dermal acute LD50 toxicities of over 5000 mg/kg (species unspecified). Ferric phosphate is also a food additive used as a supplement to enrich bread.

It appears that ferric phosphate is a preferable slug control material from a human health and ecological standpoint. However, the relative efficacy of ferric phosphate in NYS for slug control in strawberries is currently unknown. Once efficacy data is collected, the decision can be made whether to include ferric phosphate as a recommended slug control in the Pest Management Guidelines.

This project is a study of a selective, IPM-compatible pesticide, and thus falls within the Management Practice NYS IPM Research Priority. Neither of these two slug control materials are an important groundwater hazard, as they have low solubilities and are relatively non-persistent in the soil.

Objectives:

1. To run controlled, replicated studies comparing the efficacy of ferric phosphate with the standard material, metaldehyde, for the control of slug damage in strawberries
2. Project evaluation--This project will be evaluated by whether it attains these objectives: 1) having its results accepted for publication, and 2) positive feedback from cooperating growers.

Procedure:

This study was carried out in 2001 on two commercial strawberry farms and at a Cornell University strawberry research planting. Experimental plots were 12 foot sections of 3 treated rows plus 2 untreated outer border rows, randomly replicated 4 times throughout each field. The three treatments compared were: 1) metaldehyde (Deadline Mini Pellets) and 2) ferric phosphate (Sluggo) applied at label rates (both 2.1 oz. per treatment, or 40#/A), and 3) an untreated control. Sluggo was sprinkled over the rows, while Deadline MP's were sprinkled in the aisles, per label directions.

Materials were applied to the two farms on 6/15 and on Cornell Orchard plots on 6/19. Farm harvests began on around 6/20. The farm plots were open for public U-pick harvest as usual, and data harvests were taken in the early mornings before the plots were opened to the public. The Cornell Orchard plots were harvested for this project only. Data harvest dates were 6/25, 7/5, and 7/12 for the Cornell plots, 6/28 and 7/11 for farm 1, and 7/2 for farm 2. Ripe fruit from the middle 6 feet of the middle row of each plot was harvested for analysis, and the percent of slug-damaged fruit determined by visual inspection.

Results and Discussion:

Early in the harvest season, the weather was dry and there was little slug damage in any plots. After heavy rains on June 23-24, however, considerable slug damage appeared in harvests. The trend that emerged from the several harvests after that date was consistent: about 50% reduction in damage in the Sluggo plots compared to the control, and a somewhat smaller reduction in the Deadline plots.

Table 1. Strawberry Harvests after 6/27/01

Site	Treatment	% slug damage	P (ANOVA)
Farm 1	Control	16.6	.054
	Deadline	14.3	
	Sluggo	9.7	
Farm 2	Control	26.4	.486
	Deadline	18.9	
	Sluggo	12.7	
Cornell	Control	20.1	.021
	Deadline	10.7	
	Sluggo	8.2	

The trend is strong, but it would be desirable to have another year of data before drawing firm conclusions. Sluggo was somewhat more effective at reducing slug damage than Deadline Mini Pellets, and both reduced slug damage compared to the controls. At this point, a reasonable recommendation would be for growers to try Sluggo on a trial basis. Note that Sluggo can be more easily applied with a broadcast spreader, since there is not a restriction on its contacting fruit as there is with Deadline MP's.

These products are not cheap. Typical prices are \$125/50# (\$100/A) for Sluggo and \$90/50# (\$72/A) for Deadline MP's. However, on a high value crop such as strawberries, reduction of damage by 10% could save \$500 or more per acre. Research on the

effectiveness of reduced rates would be helpful, as would investigations on timing applications for best control.

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