

Section V.  
Soil Arthropods

EVALUATION OF SURROUND KAOLIN CLAY FILM AS A  
MANAGEMENT TOOL FOR ROOT WEEVILS IN STRAWBERRIES

Diane Kaufman, Wei Qiang Yang, Glenn Fisher, and Judy Kowalski  
Oregon State University, North Willamette Research and Extension Center  
15201 NE Miley Rd., Aurora, OR 97002  
503/678-1264

[diane.kaufman@oregonstate.edu](mailto:diane.kaufman@oregonstate.edu), [wei.yang@oregonstate.edu](mailto:wei.yang@oregonstate.edu)  
[fisherg@bcc.orst.edu](mailto:fisherg@bcc.orst.edu) and [judy.kowalski@oregonstate.edu](mailto:judy.kowalski@oregonstate.edu)

The experiment was conducted in a third year planting of 'Totem' strawberries at the North Willamette Research and Extension Center that was naturally infested with strawberry root weevils. The objective was to evaluate the effect of Surround on feeding and behavior of adult root weevils during spring through summer, 2003. A preliminary trial previously conducted with containerized nursery plants had suggested that a coating of Surround on plant leaves tended to repel adult root weevils. This experiment was designed to see if Surround would have a repellent effect in field-grown strawberries. Pitfall traps (12 per plot) were monitored every week during the summer in an attempt to track the movements of adult root weevils and see if they were feeding preferentially among the different treatments.

The following treatments were applied regularly from first bloom (4/15/03) to the first week of September: Surround product #1 applied every 7 days (S#1 – 7); Surround product #2 applied every 7 days (S#2 – 7); Surround product #1 applied every 14 days (S#1 – 14); untreated control. The only difference between Surround products #1 and #2 was the surfactant used in the formulation. Both Surround products coated the plants in white. Treatments were arranged in a randomized complete block design with five replications. Individual plots were four rows wide (13.3 feet) by 25 feet long. All other strawberry plants were disked under in early spring, 2003, thereby leaving our plots surrounded on all sides by bare ground to facilitate containment of adult weevils within the experimental area.

Because weevils were primarily concentrated in one area of the experimental area, each plot was "enriched" with 12 to 14 larvae on April 22, 2003 (following procedures used by Tanagoshi et al.), in an attempt to have weevils more uniformly distributed over all plots. Weevil larvae used to enrich plots were primarily late instar black vine and rough strawberry removed from primroses growing in pots. Larvae were added to plots by making a 3 to 6 inch deep hole with a pencil near a strawberry crown, dropping in a larvae, and re-filling the hole with soil.

Each pitfall trap consisted of a 16 oz plastic cup lined with a short plastic cup, and topped with a tapered 7 oz plastic cup with the bottom removed to act as a funnel. Twelve pitfall traps per plot were installed on June 2, 2003. Insect numbers were recorded from pitfall traps examined two to three times per week from June 9 to August 14, 2003. The objective of monitoring adult root weevil populations during summer was to determine if the Surround had a repellent effect, thereby causing increasingly more weevils to gravitate toward untreated control plots over time. Because previous research has shown that 4 to 5% of a known adult root weevil population tend to fall into pitfall traps, they provide a means for tracking populations and movements over time. Populations of potential root weevil predators (carabid ground beetles and spiders) caught in pitfall traps were also recorded. All insects caught in traps were released on-site.

Table 1. Total number of adult root weevils recovered from pitfall traps, 6/9 – 8/14/03.

Treatment	Strawberry	Rough strawberry	Black vine	Total
S#1 – 7	78	3	1	82
S#2 – 7	77	2	2	81
S#1 – 14	63	5	3	71
Control	76	2	3	81
Significance	ns	ns	ns	ns
Mean	73.5	3	2.25	78.75

There were no differences among treatments in number of root weevil adults recovered from pitfall traps from early June to mid-August, 2003. The small number of rough strawberry and black vine weevil adults recovered from pitfall traps may suggest poor survival and establishment of transplanted larvae in the field.

Because another indicator of adult root weevil activity is leaf-notching, the number of notched leaves counted in two minutes per plot were also recorded during week 4 (6/30/03) and week 8 (7/28/03) of the trial.

Table 2. Number of notched leaves.

Treatment	Notched leaves 6/30/03	Notched leaves 7/28/03
S#1 – 7	17.8	28.4
S#2 – 7	24.0	23.8
S#1 – 14	11.8	22.8
Control	13.6	19.0
Significance	ns	ns
Mean	16.8	23.5

There were no differences among treatments in the number of notched leaves counted on either date.

Because number of eggs laid and number of larvae produced per treatment is the most critical factor, root weevil larvae will be dug and counted during winter 2003/2004.

There were also no differences among treatments in number of carabid ground beetles or spiders recovered from pitfall traps during any week of the trial. Mean weekly carabid ground beetle pitfall trap counts remained fairly consistent and ranged from a low of 60 during the week of July 7, to a high of 97 during the week of August 11, 2003. Spider counts were highest during the first week of June (mean of 88) and fell steadily during each week to a low of 6.5 during the week of August 11, 2003. There was also a change from a predominance of hunting spiders early in the summer to web weavers later in the summer.