Management of the Fuller Rose Beetle Microsprinkler Clogging Problem

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Project No.:

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Objective: To test several methods of FRB disinfestation for prevention of egg laying and clogging of microsprinkler heads.

Problem and its Significance:
Over the last few years, Fuller rose beetle (FRB) has emerged as a significant nuisance pest in many North San Joaquin Valley microsprinkler-irrigated almond orchards. Adult FRB lay eggs in the bearing of spinning-type microsprinklers, rendering them unable to open or spin properly. It is very labor intensive to replace or clean a large percentage of clogged sprinkler heads prior to each irrigation. Although egg laying can occur at any time of year, the vast majority of adult activity occurs during late summer and fall, including during the busy harvest period. This is an especially problematic time as growers rush to irrigate their trees after the lengthy, dry harvest period. A preliminary review of available microsprinklers has not revealed any that resist FRB egg laying problems.

Fuller rose beetle (*Asynonychus godmani*) is primarily a nocturnal insect with one generation per year. After hatching, larvae drop to the ground where they feed on almond roots in the top few inches of soil for six - ten months. After a pupation period of one to two months, adult FRB emerge from the soil. These flightless adults must crawl to a food source and feed for 1-2 weeks before laying their eggs. FRB lay their eggs parthenocarpically in sticky masses of 10 – 60 eggs each in protected crevices, including the bearings of microsprinklers.

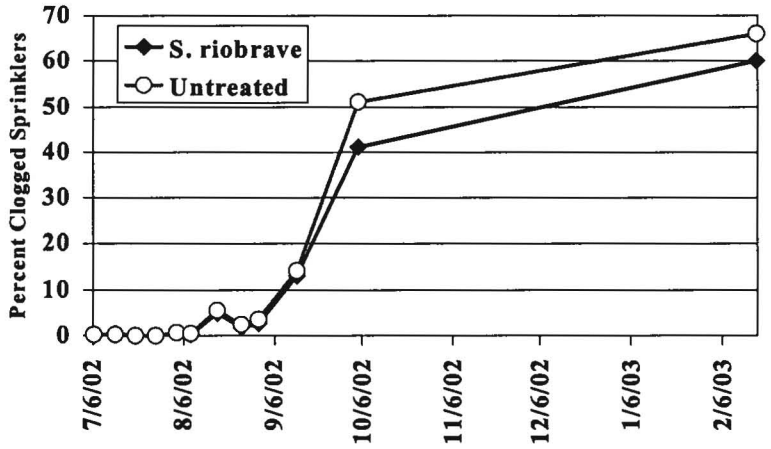
Methods. Two separate trials were conducted targeting FRB in various stages of development. The first trial was initiated in 2002 in the Cressey area of Merced County. Trial #2 was conducted in 2004 in the Waterford area of Stanislaus County.

Trial 1. As stated above, fuller rose beetles spend the first 6 – 10 months of their lives as very small grubs in the top few inches of soil. In the first trial, we attempted to use *Steinernema riobrave*, a non-plant parasitic, entomopathogenic nematode species reported to seek out and parasitize fuller rose beetle larvae. The soil was pre-irrigated the night prior to application. On July 2, 2002, ten gallons of BioVector® (Certis USA)

was applied through the microsprinkler system to a 40 acre orchard in a randomized complete block design (approximately 20 acres were treated). BioVector is a granulated formulation of live *S. riobrave* nematodes. The nematodes were applied over a two-hour period between 7:00 and 9:00 p.m. Random exploration of the surface few inches of soil indicated most fuller rose beetles were in the larval stage on the date of treatment, although approximately 5% were pupating. Nematodes were applied a second time after harvest and again in July of the following year.

Over 2000 microsprinklers were monitored weekly for clogging from July through the final irrigation on October 4. Sprinklers were checked again February 17, 2003. There were no significant differences in trap catches between treatments (Figure 1). Significant egg laying activity began during mid August. By the final irrigation of the season (October 4), 41% and 51% of the sprinklers were clogged with eggs in the treated and untreated areas, respectively. On February 17, 60.1% and 66% of sprinklers were clogged in treated and untreated sprinklers, respectively. Microsprinkler clogging was again similar between treated and untreated areas in 2003.

Fig. 1. Effect of Parasitic Nematodes on Microsprinkler Clogging by Fuller Rose Beetle Egg Laying



Trial 2. In a second orchard, insecticide treatments targeted the soil-borne larvae or the foliage-feeding adult stage. Treatments were applied to approximately three acres each in a randomized complete block design. Treatments are listed below.

1. Carbaryl (Sevin XLR) @ 5 qt. per acre injected through the microsprinklers
2. Enzone (sodium tetrathiocarbamate) @ 1200 PPM injected over 4 hours
3. Carbaryl (Sevin XLR) @ 3.5 qt. per acre in a foliar spray
4. Untreated

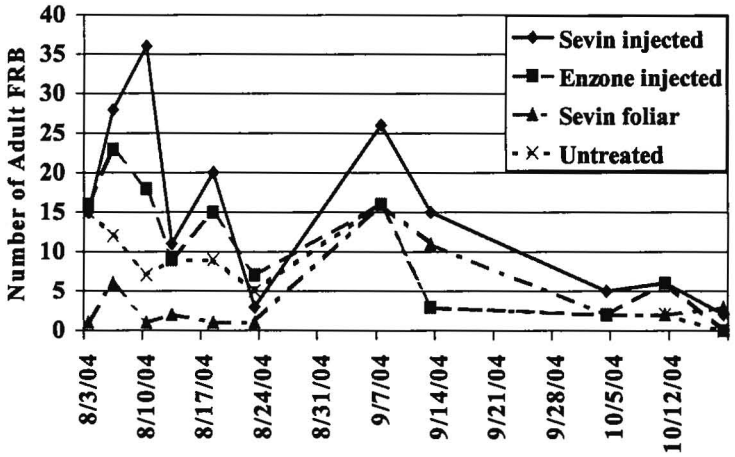
Injected materials were applied on June 25 (Enzone) and 28 (Sevin), 2004. These treatments targeted the FRB larvae in the soil. The foliar sprays of Sevin were applied

July 19 & August 29, 2004 and were directed at the trunk and lower five to six feet of canopy. The foliar sprays targeted FRB adults as they fed on almond leaves prior to egg laying. The first spray was timed for the beginning of adult emergence. The second spray was applied immediately following Nonpareil harvest, allowing for the 14-day preharvest interval for the Carmel variety.

Adult FRB populations were monitored in each treatment with modified Tedders traps. Tedders traps are black, wooden, pyramid-shaped structures two feet in height formed by attaching four right angle triangles together. The Tedders trap silhouette apparently mimics that of a tree. Cone shaped boll weevil traps placed on top of each pyramid capture FRB adults as they climb up the pyramid in search of food. Adult traps were monitored twice each week (Fig. 2).

During the first half of the monitoring period, the foliar applications of Sevin had the lowest numbers of adult FRB. However, beginning immediately after Nonpareil harvest, FRB trap catches were no different between the foliar Sevin treated areas and the untreated areas. In general, populations were very low in this orchard and varied across the field. This made it difficult to draw valid conclusions about the effectiveness of any treatment.

Fig. 2. Effect of Soil-applied and Foliar Materials on Fuller Rose Beetle Adults



Egg laying was monitored by placing twenty-five, disconnected microsprinklers in each treated area. Each week, microsprinkler bearings were removed and examined for the presence of egg masses. During the 12 week monitoring period, not even one egg mass was found in the egg traps. Incidentally, the grower had no sprinklers clogged from FRB egg masses in the trial area during the monitoring period.

Despite having significant FRB problems the previous few years, this orchard had very low populations in 2004. This made it difficult to draw valid conclusions regarding the effectiveness of any treatment.