

Thresholds, Monitoring and Sampling

Inhibition of Leafroller Captures in Pheromone Traps

Jay F. Brunner¹ and Joan Fisher²

¹Washington State University Tree Fruit Research and Extension Center, Wenatchee, WA

²Scenturion, Clinton, WA

Keywords: pandemis leafroller, obliquebanded leafroller, pheromone traps, apple

The use of pheromone traps to monitor leafroller populations in Washington has increased in recent years in response to the increased pest status of these insects in apple orchards. This has been especially true in orchards adopting mating disruption as a major tactic to control the codling moth. In these situations leafrollers have caused more fruit damage probably because of a reduction of organophosphate applications for codling moth control. In the Codling moth Areawide Management Project (CAMP) leafrollers have been monitored with pheromone traps at densities of one trap every 10-20 acres. In 1997 coordinators of the CAMP sites noted that capture of leafrollers in pheromone traps was much less than expected based on previous experience and anticipated from the previous year's fruit damage and larval monitoring results. An investigation was initiated to determine if the lower than expected captures were real and if so what might be the cause. It was noted that traps baited with the Scenturion lures were not capturing as many moths as those baited with Trécé lures and Joan Fisher, President of Scenturion, became actively involved with the investigation into the problem.

There are two dominant species of leafroller in Washington fruit orchards, the pandemis leafroller, *Pandemis pyrusana* Kearfott, and the obliquebanded leafroller, *Choristoneura rosaceana* (Harris). The pheromone reported for the pandemis leafroller is a blend of Z-11 tetradecenyl acetate and Z-9 tetradecenyl acetate. The pheromone for the obliquebanded leafroller was originally reported as a blend of Z-11 tetradecenyl acetate, E-11 tetradecenyl acetate and Z-11 tetradecenol. However, the addition of an aldehyde added to the original blend increased captures for obliquebanded leafroller in western Canada.

The major component of the pandemis and obliquebanded leafroller pheromone is Z-11 tetradecenyl acetate so it was thought that a previously unidentified inhibitor in this component might be the cause of reduced attraction of traps baited with Scenturion lures. Scenturion, working closely with the basic manufacturer, Bedoukian Research, Inc., discovered that the Z-11 tetradecenyl acetate used in lures manufactured in late 1996 and 1997 contained a synthetic byproduct that in the past had been low, only 0.2% (maximum) of the sample, but was as high as 0.96% in current samples due to a purification procedure requested by Scenturion. This byproduct was identified as Z-9 dodecenyl acetate and became the primary candidate for the inhibition of leafroller captures. Subsequent research focused on determining the role of this product in the inhibition of leafroller moth captures.

Scenturion obtained a new batch of Z-11 tetradecenyl acetate from the manufacturer that contained only 0.05% Z-9 dodecenyl acetate for subsequent testing. Pheromone blends were prepared for pandemis leafroller and obliquebanded leafroller using the new material. The

pheromone blend for each insect was then "spiked" with Z-9 dodecenyl acetates to final concentrations of 0.3, 0.5, 0.9% relative to the major component, Z-11 tetradecenyl acetate.

Pheromone traps were placed in orchards with known populations of pandemis or obliquebanded leafroller and baited with one of the four lures. Four to six replications of each lure treatment (traps) were used at each location. Traps were checked 2 to 3 times per week and the location of traps rotated at each inspection to remove position effects.

Results

Table 1 shows the average number of moths captured per trap over the duration of the trapping period at each location. The Lanphere and Birchmont locations were monitored with pandemis lures and the Milton-Freewater and Mattawa locations with obliquebanded leafroller lures. There was little effect of increasing concentrations of Z-9 dodecenyl acetate in lures on the capture of the pandemis leafroller at either location. Captures of moths at both locations were low in part because of low populations (Birchmont) and trapping started late in the second night (Lanphere). We remain concerned that there may be other minor constituents in the pandemis pheromone blend that are suppressing moth captures in traps, however, Z-9 dodecenyl acetate is evidently not the cause.

There was a strong inhibitory effect of Z-9 dodecenyl acetate on the capture of the obliquebanded leafroller at all concentrations and at both locations. From these data it is clear that Z-9 dodecenyl acetate plays an important role in the attractiveness of moths to traps baited with lures that contain even 0.3% of this chemical. These data do not show a lower limit at which this chemical has no inhibitory effect on the obliquebanded leafroller.

Table 1. Average number of leafroller moths captured in pheromone traps baited with lures containing different levels of a minor component, Z-9 dodecenyl acetate, suspected of inhibiting the attraction of moths.

Treatment	Average moths per trap during period			
	Lanphere	Birchmont	Milton-Freewater	Mattawa
0.05% Z9:14ac	9.2a	11.0bc	718.8b	144.0b
0.3% Z9:14ac	12.5a	11.4c	25.0a	5.8a
0.5% Z9:14ac	8.7a	6.0a	17.4a	5.8a
0.9% Z9:14ac	7.3a	6.6ab	30.0a	2.8a
Standard	--	--	96.0a	11.3a

Duration of trapping period: Lanphere—28 days; Birchmont—59 days; Milton-Freewater—60 days; Mattawa—37 days; data transformed for analysis $\log(x+1)$. Means with the same letter in the same column are not statistically different (Fisher's Protected LSD, $P=0.05$).