

FINAL REPORT FOR 1999-2000

TITLE: Leafroller Biology and Potential for Control with Insect Growth Regulators

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FUNDING HISTORY: Funding in 1999-2000 (Year Initiated): \$21,014

SIGNIFICANT FINDINGS:

Newly hatched larvae of oblique-banded leafroller were more susceptible to field-weathered residues of CONFIRM than late instar larvae.

Mortality of small larvae occurred on CONFIRM residues field-aged for up to 5 weeks; large larvae were killed by field-residues of 3 weeks in age.

Egg hatch was reduced on 1-week old CONFIRM residues early in the season but not later in the season; spray coverage may have been better early in the season.

OBJECTIVES:

Determine whether moths collected from CONFIRM-treated orchards show reduced fecundity and egg fertility (as suggested by earlier laboratory trials by Knight and Horton).

Quantitatively describe field-persistence of CONFIRM against oblique-banded leafroller larvae and egg-masses.

PROCEDURES:

Light traps equipped with mesh bags were placed in CONFIRM-treated and untreated orchards to collect live female moths. As with last year, captured moths were entirely male, thus the project was discontinued.

CONFIRM was applied with a standard airblast sprayer to a 10 acre block of 'Gala' apples on May 1, 2000 and again on June 6, 2000. The application rate was 17 oz of product per 100 gallons of water per acre. Foliage was collected from this orchard and a neighboring unsprayed orchard 24 hours following application, 1 week following application, and 3 weeks following application. Foliage samples were placed in large glass vials to which a single OBLR larva per vial was added. Two larval ages were compared: newly hatched larvae and 4th - 5th instar larvae. There were 25 replicates per treatment combination. Survival of larvae was determined at 4 days and 7 days.

We allowed laboratory-reared moths (OBLR) to deposit eggs on field-collected foliage. Egg masses were collected and allowed to hatch; number of larvae hatching was determined for each egg mass. After hatch had been completed, area of the egg mass was determined using a LI-COR area-meter. Hatch is expressed as number of larvae per cm² of egg mass. Sample sizes were 5 to 20 egg masses per treatment combination (adults were highly variable in egg-laying capacities, which explains the variable sample sizes).

The experiment was repeated in early August at the experimental orchard located at Moxee. Two

rows of Golden Delicious apples were sprayed with CONFIRM using a small airblast sprayer pulled by an ATV. Two control rows were sprayed with water. Foliage was collected at 24 hours, 1 week, 3 weeks, and 5 weeks, and assays were conducted as above. Rates were the same as at the commercial site.

RESULTS AND DISCUSSION:

Light-traps equipped with mesh bags collected only 10 moths; all were male, and the project to determine effects of field residues on field-collected, female moths was discontinued.

Figure 1 shows larval survival at 4 days (panels 1 and 2) and 7 days (panels 3 and 4) for small and large larvae fed foliage collected in early May. The grower applied Guthion between the week 1 and week 3 foliage collections, so the survival data for week 3 reflect the combined effects of Guthion and CONFIRM residues. Mortality of small larvae on the 1-week residues was 100%; mortality approached 100% for the large larvae.

Figure 2 shows larval survival for the June experiment. Again, the grower applied Guthion before the week 3 foliage sample could be taken. Mortality of larvae fed 1-week old residues was again high, irrespective of larval age.

Figure 3 shows results for the Moxee orchard, and indicate that small larvae suffered high mortality rates up to 5 weeks following the CONFIRM application (panel 3), and that large larvae suffered high mortality rates up to 3 weeks following the spray (panel 4).

Figure 4 shows that egg hatch rates were severely reduced on CONFIRM-treated foliage for the two trials conducted in the commercial orchard. However, there was no significant reduction in egg-hatch for the trial conducted in August at the experimental orchard in Moxee (Figure 5). Our results for the larval survival suggests that we had better spray coverage at the commercial sites than at the Moxee site (compare Figures 1-2 vs Figure 3), which may explain the poor egg-kill for the Moxee experiment.

CONCLUSIONS:

CONFIRM residues provided kill of newly-hatched and large larvae of oblique-banded leafroller up to and exceeding 3 weeks following the application. Results for egg-kill were less clear, due to poor results for the August trials; however, results at the commercial orchard for applications made in May and June suggest that residues caused substantial egg mortality at least up to one week following the spray application.

Figure 1.
Survival of
small and large
larvae after 4
days or 7 days
feeding on field-
collected
foliage. Early
May study.
Commercial
orchard.
Guthion
application
made between
weeks 1 and 3.

Figure 2. Survival of small and large larvae after 4 days or 7 days feeding on field-collected foliage. Early June study. Commercial orchard. Guthion application made between weeks 1 and 3.

Figure
small
after 4
feeding

foliage.
study.

orchard.

3. Survival of
and large larvae
days or 7 days
on field-
collected
Early August
Moxee
(experimental)

Figure 4. Larvae hatched per square cm of egg mass. Commercial orchard.

Figure 5. Larvae hatched per square cm of egg mass. Moxee experimental orchard.