

Section 4- Chemical control

RESIDUAL EFFECT OF SIRENE® AGAINST CODLING MOTH, OBLIQUEBANDED LEAFROLLER, AND PANDEMIS LEAFROLLER

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INTRODUCTION. Attract and Kill (A+K) is a relatively new technique that control pests using a mix of synthetic sex pheromones and insecticides. There are A+K formulations (as Sirene®) for *Pectinophora gossypiella*, *Cydia pomonella* (CM), *Heliothis* spp, *Spodoptera littoralis*, and other species. Sirene-CM is applied as drops on the branches, avoiding contamination of the fruits and damage to beneficial arthropods. It is also economically competitive with Mating Disruption technique, becoming in an interesting alternative for control of moths. Sirene-CM attracts adults due to the pheromone present in the formulation. Once it occurs the physical contact between the mix and the males, they die due to the insecticide activity. The grease formulation of Sirene it allows the chemicals to persist for long periods. Therefore, the objectives of this research were: 1) to develop a bioassay for the insecticide activity of Sirene against adult males; 2) to evaluate residual effect of Sirene-CM against codling moth, oblique banded leafroller (OBLR), and pandemis leafroller (PLR), under conditions in central Washington.

BIOASSAY METHODS FOR ADULT MOTHS. The responses from adult moths to insecticide have not been well studied in many species. Some methods described in the literature are: **the residual film-method; topical application; flight tunnel test.** Some limitations of these methods are: no control/accuracy of insecticide exposure or individual dosage; use of chilling treatment or anesthesia (CO₂); difficulty to handle insects; difficulty to use with small species. Another method is the **vacuum method** described for small insects as flies. This latter method avoids the potentially negative physiological effects anesthesia could have on test organisms and provides an easy handling method, even with relatively small species. In addition, it can be modified to mimic the real action of Sirene in the field, allowing control of the time and number of contacts with the pesticide, even when the individual dosage is unknown.

METHODOLOGY. Sirene-CM drops were applied on apple tree branches, protected with a wire mesh screen, and left under field conditions 0, 10, 20, 30, 40, 50, and 60 days. Pieces of branches were cut, put into a styrofoam piece, and stored at less than -14° C. Immediately before the bioassay, samples were held at 25° C for 20 minutes and then fanned for 5 minutes. Pupae were obtained from the Wapato-USDA (CM) and TFREC-WSU (OBLR and PLR) colonies, sexed, and kept under 16:8=L:D; 60-68% HR, and 25°C (chamber conditions), until adults emergence which were supplied with honey water solution. Only 1-3 days old male adults were used for the bioassay, taking at least 25 moths per replication/Sirene field aged sample. Immediately before the bioassay, the cups with moths were kept in a ice bath (10-15°C), allowing an easier capture of moths by their pronotum with the vaccum device. Every sample was brought close to the moth

until contact with at least one leg was observed. Then, they were left individually in a plastic cup under chamber conditions and supplied with honey water solution until assessments. Knock down, mortality, and leg autotomy (1h,24h) were recorded.

Preliminary Results. The check treatment (handled, but no Sirene) demonstrated that the bioassay was non harmful for CM, OBLR, and PLR males as no mortality (evaluated at 24h) was observed. Recent observations of Sirene control (handled and contact with Sirene -no pheromone and insecticide-) also demonstrated non harmful for CM. Using aged-Sirene samples, mortality between species was greater than 94% and 68%, for Sirene 0-day and 20-day aged-Sirene sample, respectively. Knock down was greater than 97% with the 0-day aged-Sirene but declined to 77% (for PLR exposed to 20-day aged-Sirene). Evaluations of the full range of aged-Sirene samples are yet to be completed. Following completion of all samples, data will be subjected to statistical analysis. These preliminary results appear to be unique as similar reports were not found during an extensive literature search. **Leg autotomy**, an external stimulus induced self-amputation of legs, was observed for males of CM, OBLR, and PLR. Between 37% and 70% of the individuals dropped one or more legs by the 24h evaluation. The values for the respective checks averaged less than 9.5% at the same evaluation period. This phenomenon has been thought to be a behavioral response to escape from predators; to stop hemorrhage, or to reduce the spread of a toxicant in some arthropods. It has been observed using the residual film method for adult of Diamondback moth. Since Sirene depends on the contact between the moth and product, leg autotomy might become in a reducing factor for its activity.

