Mating Disruption/SIR

Mating Disruption of Moth Pests in Michigan Peaches and Apples Using the MSU Microsprayer

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Project Objectives

1. Evaluate the season-long mechanical performance of a single-canister version of the Michigan State University Microsprayer.
2. Evaluate the season-long disruption efficacy of multiple major pheromone components released from Microsprayers against multiple peach and apple pests.

Methods

Microsprayers field-tested during 1999 consisted of a 7 cm diam. x 26 cm tall steel aerosol can containing ethanolic solutions of pheromone components and pressurized by the low molecular weight hydrocarbon propellant A70. This reservoir was coupled by a stainless steel adapter to a Ford automotive fuel injector whose solenoid valve was instantaneously opened every 4 min. so as to release 8 microliters of solution as droplets ranging in diameter from infinitely small up to several millimeters. A 9-volt smoke detector battery powered the simple control circuit consisting of one capacitor, two transistors, and two resistors. Microsprayers were hung by a flexible wire handle high in the tree canopy and angled so that some pheromone solution was deposited at all elevations from tree top to orchard floor.

Tests in peaches were aimed at lesser- and greater peachtree borers, as well as oriental fruit moth. On-farm tests were conducted at four locations in the Hart, MI, area using ca. 5 acre plots of processing peaches. Rates of release of (E)3,(Z)13-18:Ac for borers and (Z)8-12:Ac for OFM were 40 and 260 mg/acre/day, respectively. The density of Microsprayers was two units per acre. The test was designed to permit comparisons at each location with plots receiving hand-applied pheromone, as well as with plots receiving conventional controls. Moth captures in pheromone-baited traps were recorded weekly. Shoot strikes and fruit damage from OFM were recorded at mid- and end of the growing season.

Tests in apples were set up similarly and were aimed at obliquebanded and red-banded leafrollers ([Z]-11-14:Ac at 820 mg/acre/day) and OFM as well as lesser appleworm ([Z]8-12:Ac at 260 mg/acre/day). In one site with codling moth pressure, codlemone was supplied by hand-applied ropes and two of the four Microsprayer plots received a two-tree deep border spray of Asana at weekly intervals. At one large and highly uniform orchard, the effects of Microsprayer density was evaluated at densities of: 0.5, 1, 2, and 4 per acre, all emitting the same (see above)

overall amount of pheromone per acre.

Results

In the peach tests, trap catch shut-down for lesser and greater peach tree borers was 98% and 99%, respectively. Microsprayers performed as excellently as did hand-applied dispensers. Trap catch shut-down of OFM in peaches was more variable and less convincing—ca. 80%. Percent damage/infestation of fruit in Microsprayer plots was less than 0.3%, however, several applications of soft insecticides were made by two of the growers.

RBLR and LAW were highly disrupted in all apple tests, even at densities of below 2 Microsprayers per acre. OBLR, on the other hand, was disrupted at only about 70-85%. A significantly positive relationship was found between Microsprayer density and disruption of OBLR. At 0.5 Microsprayers per acre, disruption of OBLR was not significant. Control in plots of apples under very high pest pressure receiving ties for codling moth and Microsprayers for leafrollers and OFM was encouraging. Fruit damage from OFM and leafrollers was less than 5%, while that from CM was about 12%. Border sprays of Microsprayer plots with Asana further decreased damage by about 50%.

Microsprayer mechanical performance over the 1999 season was judged very good. Units held their pressure, released over the whole season without plugging up, used only the expected amount of battery power, and stayed in place throughout the season. Phytotoxicity at our rates of emission was very low and fully acceptable to growers.

Conclusions

1. Microsprayers as currently used appear effective against some but not all moth pests of peaches and apples.
2. Further work is needed on optimizing use of Microsprayers, e.g., blends of ingredients, dosages, and density of units.
3. Several modes of pheromone formulation and dispersal are likely to be justified where there is a diverse complex of moth pests, like in Michigan.