During the last five years, we have developed a variety of organically approved tools for managing insect pests of lowbush blueberry (Vaccinium angustifolium) in Maine. Two materials have shown particular promise. Spinosad is derived from the naturally occurring soil organism Saccharopolyspora spinosa. It is toxic to bees exposed to direct spray; but there is little risk once residues have dried. It is generally non-toxic to beneficial insects and does not pose a threat to groundwater when applied properly. Finally, it has low toxicity to mammals, birds, and fish. It is available in 2 formulations approved for organic production (Entrust® 80 WP) and GF-120 NF Fruit Fly bait®. Beauveria bassiana Strain GHA is a fungal pathogen available in several formulations. We used the Mycotrol® ES formulation for our trials.

**Control of Secondary Pest Insects with Organically-Approved Materials**

**General Methods**

Trials were completed against blueberry flea beetle, Altica sylvia (FB), blueberry spanworm, Itame argillacea (SW), red-striped fireworm, Arga triablamaculella (RSFW), and strawberry rootworm, Paria fragariae (SR).

Treatments were applied as foliar sprays to fruit-bearing or pruned year fields. Each material was applied in 25 gallons of water-mixture/acre with a CO2-propelled, 80-inch boom sprayer equipped with 4, flat-spray 8002VS TeeJet® nozzles operating at 35 psi and at a slow walking speed. Speed was regulated using a metronome.

In trials against FB, SW, and SR, pre- and post-spray sweep-net samples were used to estimate control. In the RSFW trials, infested stems were brought into the laboratory and examined for the presence or absence of live or dead larvae. Additionally, in the FB and RSFW trials, Beauveria bassiana (Mycotrol® ES) mortality was determined by holding field-collected cohorts in the laboratory and observing them for sporulation. Untreated larvae were also collected and reared as controls.

**Blueberry Flea Beetle Larvae**

**Trial #1** - Although Mycotrol® ES did not reduce flea beetle numbers below the recommended action thresholds of 30-50 larvae per 10 sweeps immediately after spraying, there was a significant reduction. There was also a high level of insecticide (75% at 7 days post treatment).

**Trial #2** - Mycotrol® ES (2 rates) and SpinTor® 2 SC, a non-organic formulation of spinosad, significantly reduced FB populations.

**Trial #3** - Entrust® 80 WP gave excellent control of FB larvae. The graph shows the % survival of FB larvae after 15 days. When data was adjusted to account for mortality due to B. bassiana, Mycotrol® ES (32 oz/A) was significantly different from the untreated check on day 15 of the trial. Entrust® 80 WP (2 oz/A) also gave excellent control (ANOVA, P = 0.015). Imidaclopid EC was applied as a standard. A rank transformation of the data was performed prior to analysis.

**Trial #4** - The graph shows the % survival after 7 days of FB larvae collected from plots treated with a half rate of Mycotrol® ES (16 oz/A) + a half rate of Entrust® 80 WP (1 oz/A). It was not significantly different from the untreated check on day 7 of the trial (ANOVA, P = 0.5223). However, over the entire season, Mycotrol® ES + Entrust® 80 WP significantly reduce FB larval populations in comparison to the untreated check (ANOVA, P = 0.0199).

In various trials, Mycotrol® ES has shown no adverse effects on commercial pollinators in lowbush blueberry.

**Control of Blueberry Maggot (BMF) with GF-120 NF Fruit Fly Bait®**

GF-120 NF Fruit Fly Bait® is a combination of spinosad and a bait and is formulated specifically to control fruit flies. An ATV-mounted sprayer was used to apply 2:2:1:1 Etomet spray to GF-120 NF Fruit Fly Bait® at a rate of 1.5 g/WV with water. Pre- and post-spray populations of BMF adults were monitored with baited yellow Phereoeca AM traps. Efficacy was further evaluated based on the number of BMF pupae collected from berry samples.

GF-120 NF is a short-residual material and may require frequent applications to maintain control. This is well demonstrated in Fig. 5. Following each application, there was a drop in average BMF captures followed by a recovery in fly numbers until the next application.

There was also a significant reduction in fruit infestation. On average, only 5.3 ± 2.2 pupae were found in treated berries compared to 21.0 ± 7.0 in the untreated checks (ANOVA, P = 0.0392). Data for seasonal density of adults and number of pupae were transformed by log(X + 0.1) prior to analysis.

**Summary**

**Cultural Techniques to Reduce Insect Infestation**

**Blueberry Maggot**

Harvesting techniques that reduce fruit loss can minimize the number of infested fruit left on the plants and on the ground.

**Compost, Burn and Dispose of winnow refuse.**

**Blueberry Flea beetle and Blueberry Spanworm**

Fire pruning, blueberry litter must be ignited.

**Blueberry Thrips**

Burn curled stems as soon as extensive curling occurs in early spring, but not later than June 1st in a nonbearing crop or a reduction in flower buds will occur.

**Red-striped Fireworm**

Prune field by burning, blueberry litter must be ignited.

**Organic Chemical Control Methods**

**Blueberry Spanworm**

Entrust® 80 WP or Bacillus thuringiensis (must be organic formulations)

**Blueberry Flea Beetle**

Entrust® 80 WP or Beauveria bassiana (Mycotrol® ES)

**Strawberry Rootworm**

Entrust® 80 WP

**Red-striped Fireworm**

Entrust® 80 WP

**Blueberry Thrips**

Entrust® 80 WP