

Managing Leafroller Pests in Caneberries with Biological Control and Pesticide Timing

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Background

The orange tortrix, *Argyrotaenia franciscana*, is a leafrolling insect that is the major harvest contaminant in caneberry production.

To meet near-zero contamination tolerances set by processors, growers have traditionally used broad-spectrum insecticides.

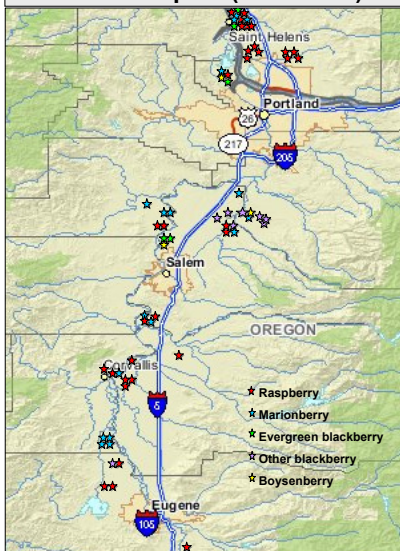
These sprays induce resurgent leafroller populations, because of high mortality among parasitoid wasps (Families Braconidae & Ichneumonidae).

The obliquebanded leafroller, *Choristoneura rosaceana*, while not a major contaminant, is of interest as an alternate host for orange tortrix parasitoids.

Approach / Methods

- Using degree day models to forward-track and back-track field data to ID peak periods of parasitoid attack
- Hazard to parasitoids is determined in grower fields, bioassays and field plot experiments
- Relative toxicity of common materials compared in field cage studies and bioassays on parasitoids from cultures
- Parasitoid larval sampling done in grower fields with different pesticide programs by host-larval searches:
 - 2005 - 24 unsprayed & 99 conventional fields
 - 2006 - 33 unsprayed & 67 conventional fields

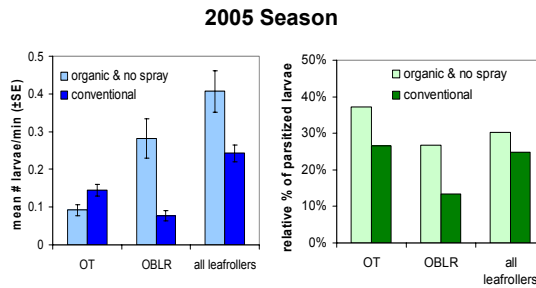
Fields Sampled (2005-2006)



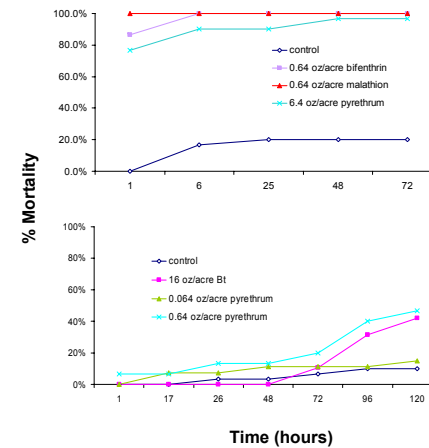
Project Objectives

- Determine toxicity effects of insecticides on leafroller parasitoids
- Develop phenology models for key leafroller parasitoids
- Develop new IPM monitoring and decision making methods for leafrollers in caneberries
- Find novel post harvest contaminant removal methods
- Evaluate risks and economics of new IPM methods vs. conventional practices

Leafroller Incidence & % Parasitism in Fields with Different Pesticide Programs



Bioassays of the effects of pesticides on key leafroller parasitoid species

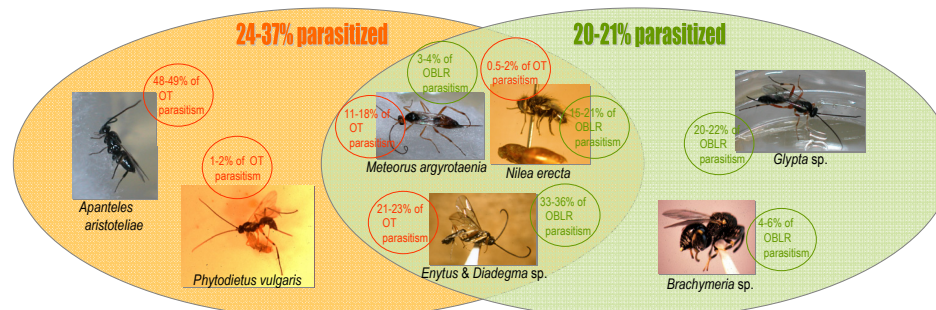


- Parasitoids exposed to tile & petri dish arenas coated with dried desopits of different treatments in the concentrations above
- 30 *Apanteles aristoteliae* individuals exposed to each treatment
- Bioassays will also be performed on a leaf substrate
- Additional materials to be tested include spinosad and tebufenozide
- Dilutions of the relatively toxic materials will also be tested

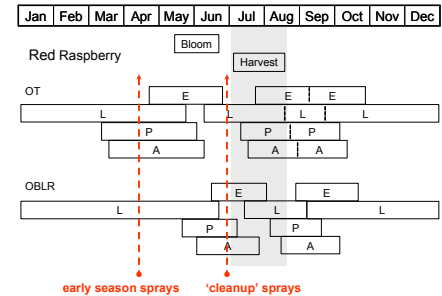
Key Players of the Leafroller Parasitoid Complex (2005-2006)

Orange Tortrix (OT)

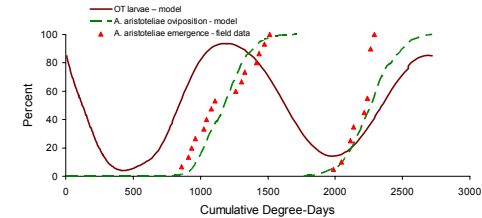
Obliquebanded Leafroller (OBLR)



Generalized Leafroller Phenology



Phenological Models for Pest and Parasitoid Management



Phenology models of orange tortrix larvae and attack by *Apanteles aristoteliae*, plus its field emergence

- We are moving from a generalized understanding of phenology (upper figure), to a more quantitative framework, with new phenological models of pest and natural enemy
- Temperature development studies of key parasitoid species are being conducted so that the time of attack of field-collected specimens can be back-calculated, and the time of emergence can be forward-calculated (as in the graph immediately above)
- These peak periods of leafroller and parasitoid activity in the field can then be used to assess the periods of greatest pesticide susceptibility

Ongoing Work

- Develop improved IPM / Extension guidelines
- Conduct 4-6 outreach events during the course of the project
- New post harvest separation methods for contaminants
- Evaluate economics and risk of IPM program components