Tart Cherry Integrated Orchard Management Project

Michigan State University ● University of Wisconsin - Madison
Utah State University ● Cornell University ● Haley Consulting Services
A collaborative research project funded by USDA CSREES
Risk Avoidance and Mitigation Program

2004 Utah research update
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Extension Entomologist
Utah TC IOMP

- USDA Funding: Oct 2003 – Sep 2007 (4 years)

- Project Budget:
  - Total grant: $1.4 mill.
  - Utah’s portion: $94,686
    - 1 grad student (3 yr) $48,000
    - 2 undergrad students (4 yr) $29,760
    - Benefits (8.3%) $ 6,456
    - Supplies $ 5,900
    - Travel $ 4,170
    - Pub costs $ 400
Utah Research Objectives

I. Develop alternatives to organophosphate (OP) insecticides for insect management

1. Western cherry fruit fly
   - On-farm (registered materials)
   - USU Kaysville Research Farm (unregistered or unproven materials)

2. Plum curculio
   - Home yards and wild plum thickets
   - Biological control (insect parasitic nematodes)
   - Lab bioassays and field trials
Utah Research Objectives

II. Optimize control timing with alternative tactics
III. Economic analysis
IV. Outreach
   1. UT TC industry
   2. USU Extension staff
V. TC IOMP Project Team
   2. Diane Alston, research/extension rep.
Control of Western Cherry Fruit Fly with Alternative Insecticides

1. Three on-farm trials with Provado
   - Grower cooperators: (Payson, Santaquin, Genola)
   - Alternative insecticide: Provado vs. Guthion, Imidan, Dimethoate
   - Provado (imidacloriprid)
     - Neonicotinoid
     - Contact, stomach
     - Neurotoxin, antifeedant
     - Systemic
On-Farm Trial Plots

Genola
- ca. 2 acres Provado
- ca. 6 acres Guthion

Payson
- ca. 2 acres Provado
- ca. 12 acres Dimethoate/Guthion

Santaquin
- ca. 5 acres Provado
- ca. 2 acres Guthion
- ca. 5 acres Imidan

= Provado plot
Fruit Injury

• No fruit injury!
• In-season: Larval emergence from fruit
  • 5 samples of 100 fruit per date (500 fruit)
  • 7 fruit collection dates:
    May 25; Jun 2, 8, 16, 22, & 28; Jul 13
• Harvest: Growers reported no floating larvae, injury, or down-grading of fruit
• All treatments were effective for eliminating larval injury
WCFF Adult Trap Catch

- 16 traps placed in each treatment plot
  - 8 on borders (2 per side)
  - 8 within interior (evenly distributed)
- AM Pherocon (yellow sticky trap)
  - + Ammonium carbonate bait box
How did insecticides influence WCFF adult densities?

WCFF Trap Catch – All Sites

Substantial WCFF pressure at one site; low numbers at a second site

No consistent difference in adult catch among insecticide treatments

Despite adult activity at two sites, no fruit injury
Was source of WCFF a factor in trap catch counts?

Trap Catch on Borders vs. Interiors: Payson

Trap catch generally higher on borders in both Dimethoate and Provado plots (trend for higher border catch in Provado late in the season)
Was source of WCFF a factor in trap catch counts?

Trap Catch on Borders vs. Interiors: Genola

Trap catch higher in interiors in both Guthion and Provado plots.

In 2003, 3x more WCFF caught in interiors vs. borders (12 orchards)
Did insecticides influence mite population densities?
Genola – Economic mite populations

Provado increased spider mite densities vs. Guthion
Pred mites increased in mid July – too late
Did insecticides influence mite population densities?

Payson – Near economic mite populations

Dimethoate increased spider mite densities vs. Provado
Did insecticides influence mite population densities?
Santaquin – Well below economic mite populations

No differences among treatments
Insecticide Economics

- **Provado (7 d PHI)**
  - Rate: 6 oz/A  Price: $521/gal  Cost: $24/A/appl.
- **Guthion 50 W solupak (15 d PHI)**
  - Rate: 1.5 lb/A  Price: $10.80/lb  Cost: $16/A/appl.
- **Imidan 70 W (7 d PHI)**
  - Rate: 2.5 lb/A  Price: $6.85/lb  Cost: $17/A/appl.
- **Dimethoate 4 EC (28 d PHI)**
  - Rate: 2 pt/A  Price: $38.40/gal  Cost: $10/A/appl.
- **Diazinon 4 Spray (21 d PHI)**
Conclusions

On-Farm WCFF Trials

- No fruit injury
  - All insecticides performed well under WCFF population levels tested (zero, low, high)
- Adult trap catch
  - Adult populations similar among insecticide treatments (trend for higher catch in Provado on borders at one site)
- Mite populations
  - Provado elevated mite densities at one site
  - Dimethoate elevated mite densities at another site
- Provado is a reasonable alternative for OPs, but best to use rotations
- 2005 research trials? (Success, Provado, rotations, mode of action on life stages)
Control of Western Cherry Fruit Fly with Alternative Insecticides

2. Dow GF-120 NF Naturalyte Bait
   • USU Kaysville Research Farm
   • Facts about the bait:
     • Feeding attractant + 0.02% spinosad
     • Large droplets (5 mm or 0.2 inch)
     • 0-day PHI, 4-hour REI
     • 4-wheeler, 15 gal spray tank with electric pump and handgun (ca. $250 sprayer assembly)
     • D-3 nozzles, 10-12 mph
     • 20 fl oz bait product/acre (1:5 dilution; bait:water) ($12.80/A/appl.)
     • Applied to both sides of every row
     • Reapply every 7 days
Research Trial Plots

Untreated Control

Guthion 50 WP
1.5 lb/acre
every 14 days
(5/26, 6/7, 6/15)

GF-120 Bait
20 fl oz/acre
every 7 days
(5/26, 6/3, 6/9, 6/15, 6/22)

Plot size: 0.7 acre
(9 rows x 14 trees)

Biofix (First Fly Catch): May 17
High population pressure

Subplots: Trap & Fruit Sample

N
In-Season Fruit Injury
May 20 – Jun 24, 2004

Mean # larvae per 100 fruit

GF-120 Bait
Guthion
Untreated

High injury in Untreated (up to 24 larvae per 100 fruit)
Low injury in GF-120 Bait (0.2-1.2 larvae per 100 fruit)
No injury in Guthion
Harvest Fruit Injury
June 30, 2004

High injury in Untreated
Low injury in GF-120 Bait and Guthion
Influence of fly source on fruit injury

In-Season

<table>
<thead>
<tr>
<th>Untreated Control</th>
<th>Guthion 50 WP</th>
<th>No injury</th>
</tr>
</thead>
<tbody>
<tr>
<td>68%</td>
<td>32%</td>
<td>9%</td>
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</table>

Harvest

<table>
<thead>
<tr>
<th>Untreated Control</th>
<th>Guthion 50 WP</th>
<th>No injury</th>
</tr>
</thead>
<tbody>
<tr>
<td>56%</td>
<td>44%</td>
<td>91%</td>
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WCFF injury came from Untreated plot and exterior sources
Low injury in Guthion plot affected adjacent plots
How did insecticides influence WCFF adult densities?

WCFF Trap Catch - Kaysville

GF-120 Bait and Guthion dramatically suppressed WCFF pops.
Guthion: 76% flies caught next to Untreated
GF-120 Bait & Guthion suppressed populations post-harvest
Conclusions
GF-120 Bait Trial

• Bait controlled WCFF as well as Guthion under high population pressure
  • In-season injury (up to ca. 1.2% vs. 0%)
  • Harvest injury (ca. 0.3% vs. 0.7%)
• Post-harvest residual control
• Promising for sites with low populations and isolation from outside sources
• Organic, safe product, concern for wash-off
• Cost: $12.80/A/appl. X 5 appl. = $64/A
• Quick application time (2-5 min per acre)