Blueberry Guthion Transition Task Force

First Meeting
February 11, 2008
Trevor Nichols Research Complex
Michigan State University

Agenda

- Introductions
- Mission of the Task Force
- Background and details of AZM changes
- Current role of Guthion in MI blueberries
- Status of alternative management options
- Prioritizing research and education activities
- Next meeting
Blueberry Guthion Task Force

Blueberry growers, processors, and industry leaders
Michigan Blueberry Growers Association
Michigan Blueberry Advisory Committee
Michigan State University
Environmental Protection Agency
United States Department of Agriculture
Michigan Department of Agriculture
Michigan Farm Bureau
Michigan Integrated Food and Farming Systems
Wilbur-Ellis Company
United Ag Products
Robertson's Crop Dusting

Mission of the Task Force

To help the Michigan blueberry industry respond to phase-out of Guthion while maintaining fruit quality and yield

1. Meet annually to review the current status of the phase-out and determine the industry’s ability to meet the phase-out challenge.

2. Identify the most promising IPM program alternatives to Guthion.

3. Develop research and education priorities to most efficiently help growers successfully transition from Guthion.

4. Implement a research and education program that addresses the Task Force-identified priorities.
Background

FQPA passed into law in 1996 - requires EPA to review pesticide registrations
EPA prioritized to review the 'worst first'

Reviewed risk of insecticides to consumers, workers, and the environment
Guthion phase-out driven by concerns for workers, environment (not consumers)
Restrictions left Guthion registered only in crops with greatest grower need

More detailed review of these remaining crops conducted in 2005
Final phaseout plans released in November 2006

- Brussel sprouts, nursery stock – Sept 2007
- Almonds, pistachios, walnuts – Sept 2009
- Blueberries, cherries, apples, pears, parsley, pears – Sept 2012

EPA’s phase-out plan for Guthion in blueberries

- Driven by concerns regarding worker exposure and environmental impact
- Aerial sprays allowed only until Sept. 30, 2009
- Gradual reduction in allowable season limit of Guthion 50WP
  3.0 lb per season in 2007 (no reduction)
  2.5 lb per season in 2008 and 2009
  1.5 lb per season in 2010, 2011, 2012
  0.0 lb per season after Sept 30, 2012
- Maximum single application rate
  1.5 lb of Guthion 50WP
- Buffer zones
  To bodies of water = 60 ft for ground and 150 ft for aerial application
  To occupied dwellings or recreational areas = 60 ft
- Other restrictions
  30-42 day REI on U-pick fields, 7 day REI for other uses
  7 day PHI for all uses
Primary concerns with AZM phase out for Michigan blueberry industry

- Zero tolerance for key pests, and highest pressure is in Michigan
- Few registered, tested, effective, and economical alternatives
- Loss of aerial application in 2009
- Lack of export tolerances for alternative insecticides
- Lagging development and implementation of IPM tactics (mating disruption, biocontrol, degree day model)
- Concerns for adoption of alternative insecticides:
  - can be more expensive
  - may need better timing
  - may need better coverage
  - many are untested under commercial conditions

Impact of Guthion on Michigan’s blueberry export market

- Michigan blueberries exported globally
- UK, Canada, and Japan are the main export markets
- These countries have a MRL set for Guthion or use the Codex MRL
- MRL’s are not in place for most effective alternatives to Guthion
- MRL’s for some insecticides are much lower

Examples:
- U.S. MRL for esfenvalerate = 3 ppm  U.K. MRL is 0.02 ppm
- U.S. MRL for carbaryl = 10 ppm      U.K. MRL is 0.05 ppm
Importance of Guthion in the Great Lakes blueberry industry

Zero threshold

Targeted insect pests
- Japanese beetle, blueberry maggot
- Cranberry/cherry fruitworm, PC, OBLR
- Blueberry maggot
- Japanese beetle, blueberry maggot
- Blueberry aphid
- Japanese beetle, fruitworms
- Fruitworms
- Blueberry aphid, Japanese beetle

% of crop treated

Main target of Guthion – cranberry fruitworm

Applications after petal fall
- Cherry fruitworm
- Plum curculio
- Leafrollers
- Blueberry maggot

2005 USDA-NASS

0 20 40 60 80 100

Uncontrolled fruitworms cause yield loss and crop contamination (up to 80%)

2007 management failures estimated at $2,400 per acre at one farm
Current use of Guthion in Michigan blueberries

- **What pests** is it used to control?
- **When** is it applied?
- **Number of sprays** per season?
- **What rates** are applied?
- **How** is it applied?

Fruitworm IPM Components

- **Monitoring traps**
  - Used to detect emergence of fruitworms
- **Scouting**
  - Can be done for eggs but time consuming and difficult to detect
  - Scouting for infestation can provide pest distribution
- **Degree day model**
  - In advanced development for timing sprays to protect fruit from cranberry fruitworm
- **Biological control**
  - Conservation of endemic natural enemies
  - Insect–feeding nematodes
  - Release of biocontrol agents
- **Insecticides**
  - Broad spectrum – Asana, Danitol, Mustang Max, Sevin, Imidan
  - Selective – Confirm, B.t.
  - Reduced-risk – SpinTor, Entrust, Delegate
Monitoring and prediction of cranberry fruitworm

- Large plastic delta traps are most reliable and durable.
- Placement at field edges in top third of canopy.

- GDD accumulation starts on March 1\textsuperscript{st}
- Pheromone-baited traps out \(\sim 300\) GDD base 50 F
- First male moths expected \(\sim 375 \pm 20\) GDD base 50 F
- Biofix at first consistent male catch.

- First eggs predicted at \(\sim 460 \pm 20\) GDD base 50 F
- Confirm timed at biofix+100 GDD\textsubscript{50} provided equivalent control to Guthion in 2007 trials

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Carlos Garcia degree day model predicts cranberry fruitworm moth activity and egg-laying

- CBFW Moths: First sustained catch = 374\(+/-30\) GDD
- CBFW Eggs: Start = 463\(+/-10\) GDD

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For Confirm applications, timing is critical

2007 trial at TNRC compared Guthion at 2 lb/acre post bloom to Confirm 2F at 100, 200, or 300 GDD$_{50}$ after biofix, reapplied 7 days later

Alternative fruitworm insecticides

REGISTERED
- **Broad-spectrum insecticides**
  - Guthion, Sevin, Imidan, Asana, Mustang Max, Danitol, Malathion, Lannate

- **Selective insecticides**
  - Confirm, Dipel

- **Reduced-risk insecticides**
  - Spintor, Entrust, Delegate

PROMISING PIPELINE INSECTICIDES
- Intrepid, Altacor, Alverde, Assail, Avaunt, Belt, Calypso, Rimon, Proclaim
Insecticidal activity on cranberry fruitworm

<table>
<thead>
<tr>
<th>Compound</th>
<th>Life-stage Activity</th>
<th>Mode of Entry</th>
</tr>
</thead>
<tbody>
<tr>
<td>Guthion</td>
<td>Eggs, Larvae, Adults</td>
<td>Contact / Ingestion</td>
</tr>
<tr>
<td>Imidan</td>
<td>Eggs, Larvae, Adults</td>
<td>Contact / Ingestion</td>
</tr>
<tr>
<td>Lannate</td>
<td>Eggs, Larvae, Adults</td>
<td>Contact / Ingestion</td>
</tr>
<tr>
<td>Asana</td>
<td>Eggs, Larvae, Adults</td>
<td>Contact / Ingestion</td>
</tr>
<tr>
<td>Esteem</td>
<td>Eggs, Larvae</td>
<td>Under/over Egg, ingestion</td>
</tr>
<tr>
<td>Confirm</td>
<td>Eggs, Larvae</td>
<td>Ingestion / over egg</td>
</tr>
<tr>
<td><em>B.t.</em>’s</td>
<td>Larvae</td>
<td>Ingestion / over egg</td>
</tr>
<tr>
<td>Assail</td>
<td>Eggs, Larvae, Adults</td>
<td>Contact / ingestion / over egg</td>
</tr>
<tr>
<td>SpinTor/Entrust/Delegate</td>
<td>Eggs, Larvae</td>
<td>Ingestion / contact</td>
</tr>
</tbody>
</table>
Not yet registered ‘pipeline’ insecticides

Intrepid (methoxyfenozide).
Registration expected 2008. Similar to Confirm, but more active. Safe to bees.

Altacor (rynaxypyr)
New insecticide class. High performance against fruitworms in recent trials.

Alverde (metaflumizone)
New insecticide class. High performance against fruitworms in recent trials.

Avaunt (indoaxacarb).
Good performance against fruitworms with activity against aphids, leafhoppers, etc.

Belt (flubendiamide).
Specific against moth larvae. Tested first in 2007 with high performance against fruitworms.

Proclaim (emamectin benzoate).
Active on moth larvae, and good control of fruitworms in 2006 trial.

Calypso (thiacloprid).
Good performance against fruitworms, aphids, etc., but registration is currently on hold.

Rimon (novaluron).
Growth regulator with 2 years excellent fruitworm control. Active on all life stages. Potential IR-4 application for 2008, after formulation issue is resolved.

Small plot testing of potential new insecticides for fruitworm control
2006

- Guthion out-performed Confirm in five of six years testing in research station trials
- 2006 trial indicated high activity of Rimon, but phytotox. concerns have delayed IR-4 prioritization
- Confirm, Avaunt, and Proclaim gave good performance too

Wise and Isaacs (2006) Trevor Nichols Research Complex Efficacy Program Reports
Small plot testing of potential new insecticides for fruitworm control
2007

- Some new insecticides show excellent performance
- 2007 trial indicates high activity of Altacor, Alverde, Belt, and Rimon
- Research still needed to optimize program
- No blueberry experience of these insecticides in commercial setting until they are labeled

Comparison of standard and reduced-risk IPM program in Michigan blueberry fields – the RAMP Project

<table>
<thead>
<tr>
<th>Month</th>
<th>Crop stage</th>
<th>Target Pest</th>
<th>Standard</th>
<th>Reduced-risk (RAMP)</th>
</tr>
</thead>
<tbody>
<tr>
<td>May</td>
<td>Bloom</td>
<td>Cran. Fruitworm</td>
<td>Dipel</td>
<td>Confirm</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Cherry Fruitworm</td>
<td>Dipel</td>
<td>Confirm</td>
</tr>
<tr>
<td>June-July</td>
<td>Post bloom</td>
<td>Cran. Fruitworm</td>
<td>Guthion, Asana</td>
<td>Confirm, Asana</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Oblig. leafroller</td>
<td>Lannate</td>
<td>Confirm</td>
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<tr>
<td></td>
<td></td>
<td>Blueberry aphid</td>
<td></td>
<td></td>
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<tr>
<td></td>
<td></td>
<td>White grubs</td>
<td>-</td>
<td>Admire</td>
</tr>
<tr>
<td>July-August</td>
<td>Mid-season</td>
<td>Japanese beetle</td>
<td>Imidan, Sevin</td>
<td>Provado, Asana</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Blueberry maggot</td>
<td>Malathion, Imidan</td>
<td>Provado, SpinTor</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Blueberry aphid</td>
<td>Lannate</td>
<td>Provado</td>
</tr>
<tr>
<td>July-Sept.</td>
<td>Pre-harvest</td>
<td>Japanese beetle</td>
<td>Imidan, Sevin</td>
<td>Provado, Evergreen</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Blueberry maggot</td>
<td>Malathion</td>
<td>Provado, SpinTor</td>
</tr>
</tbody>
</table>

Program adapted in Year 3, to include Asana for fruitworm, maggot, beetle control
Slightly higher cluster infestation, but lower survival in fruit

- 100 clusters sampled from each field before each harvest
- Samples held to assess larval survival (hibernaculae)

### Cluster Infestation

<table>
<thead>
<tr>
<th>Year</th>
<th>Standard</th>
<th>RAMP</th>
</tr>
</thead>
<tbody>
<tr>
<td>2003</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2004</td>
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<td></td>
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<tr>
<td>2005</td>
<td></td>
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<tr>
<td>2006</td>
<td></td>
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</table>

### Larval Survival

<table>
<thead>
<tr>
<th>Year</th>
<th>Standard</th>
<th>RAMP</th>
</tr>
</thead>
<tbody>
<tr>
<td>2003</td>
<td></td>
<td></td>
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<tr>
<td>2004</td>
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<tr>
<td>2005</td>
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<tr>
<td>2006</td>
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</tbody>
</table>

Natural enemy abundance increased in some years

### Natural Enemies per 10 Bushes

<table>
<thead>
<tr>
<th>Year</th>
<th>Standard</th>
<th>RAMP</th>
</tr>
</thead>
<tbody>
<tr>
<td>2003</td>
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<td>2005</td>
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<tr>
<td>2006</td>
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</tbody>
</table>

* Significant difference between programs
With current tools, transition may be costly for Michigan growers

Insecticide cost per acre

<table>
<thead>
<tr>
<th>Year</th>
<th>Standard</th>
<th>RAMP</th>
</tr>
</thead>
<tbody>
<tr>
<td>2003</td>
<td>$50</td>
<td>$150</td>
</tr>
<tr>
<td>2004</td>
<td>$100</td>
<td>$200</td>
</tr>
<tr>
<td>2005</td>
<td>$150</td>
<td>$250</td>
</tr>
<tr>
<td>2006</td>
<td>$200</td>
<td>$300</td>
</tr>
</tbody>
</table>

Blueberry RAMP Project

2003-6 USDA-CSREES Blueberry RAMP Project

Use of IPM tactics, new insecticides

- Do you use monitoring traps?
  - Which kind?
  - How are they used?
  - If not, why not?

- Would you use a degree day model?
  - What would it take to adopt this tool?

- Do you scout fields for fruitworm infestation?

- Any practices used to increase biocontrol?

- Have you adopted new insecticides?
  - Which ones?
  - How well did they work?
Summary

- Blueberry growers rely on Guthion, mainly for fruitworm control but also PC, OBLR
- Alternatives are available but not widely adopted
- Cost, residual control, lack of experience, timing, coverage, export restrictions are all reasons for slow adoption
- New IPM tactics and insecticides being developed
- Guthion phase-out plan creates immediate need for testing and implementing IPM programs that do not rely on this insecticide.

Research, Extension, and Regulatory Priorities
Task Force Actions

- Develop a short-term plan for 2008
  
  **RESEARCH**
  What do we need to learn **this year** to facilitate transition from Guthion?

  **EDUCATION**
  What information needs to get to growers/consultants/scouts?

- Apply our resources to achieving these goals
  
  Internal resources already in place
  External resources – competitive funding from EPA, USDA, etc.

- Coordinate feedback to EPA on transition progress

- Review progress annually

Research Priorities

- Continued insecticide evaluations at TNRC
  
  - New insecticides?
  - Optimal timing using predictive model?
  - Programs with different Guthion rates/totals?

- Testing registered insecticide alternatives on-farm
  
  - Compare to what standard?
  - What new programs to test?
  - Experimental Use Permit?
  - Ground vs. air?
  - Where in the state?

- Cultural or biological controls?

- Feedback from growers on performance of alternatives.
Extension resources

New fact sheet on fruitworm IPM

Updated E-154 Fruit Management Guide

Website delivery of information

www.blueberries.msu.edu/  www.isaacslab.ent.msu.edu/AZM.htm

Extension Priorities

• Weekly scouting report?

• Summer field days at research plots?
  – Location
  – Format

• Winter meeting presentations?

• Updated information on websites?
Regulatory Priorities

- Measure Progress of Transition
  - Pest Incidence
  - Yield
  - Chemical Usage
  - Economics

- Benchmarks

- Report to EPA-USDA Group Annually

- Other ideas?