Insect Management Updates for Apples and Peaches

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Regulatory changes
- Limit of one application (2 lbs product) of Guthion to apples in 2013 (not labeled for use in peaches) … this is a 1-year extension because of the 2012 freeze
- No use of Endosulfan in peaches from now on
- Use the 2013 Spray Guide!!

Same old, same old …
- Superior oil for San Jose scale, European red mite eggs, and rosy apple aphid eggs (apples) between green tip and bloom
- An insecticide that is effective against plum curculio and stink bugs / plant bugs (peaches) at petal fall and first cover
- Additional sprays or mating disruption as indicated by traps and scouting

Prebloom in apples ... Oils at green tip to pink suffocate insect stages that are coated with spray
- Dormant oil / superior oil at 2 percent by volume early, decreasing to 0.5 to 1 percent by volume at pink
- Controls San Jose scale, rosy apple aphid eggs, and red mite eggs
- Successive applications of oil in this period improve control
- Not harmful to beneficials at this time. No cross-resistance or resistance management issues
- May add Lorsban, Supracide, or Diazinon to improve scale and aphid control, but oil alone is very effective
- May add Esteem for increased scale control, but later application against crawlers is also effective.
- Early timing (green tip) is best for scale control; later timing (half-inch green to pink) is better against European red mite and rosy apple aphid

Against mites
- Oil at green tip to pink
- Apollo, Savey, or Agri-Mek at petal fall
- Nexter, Zeal, Acramite, Portal, Kanemite, Envidor in summer cover sprays
- Summer oils at ½ to 1 percent; consider fungicide compatibility

Monitoring key insects in apples
- Bloom: Pheromone traps (or mating disruption) in place for codling moth ... monitor twice weekly through harvest
- Weekly scouting beginning at petal fall: rosy apple aphid, woolly apple aphid, San Jose scale, European red mite, other miscellaneous pests
- Consult the Midwest Tree Fruit Pest Management Handbook and multiple newsletters
Bloom

- Hang codling moth pheromone traps
  - Order from Great Lakes IPM, Suterra, or Gempler’s
  - Use at least 3; then 1 per 5 acres up to 10 – 12 traps per farm
- Hang codling moth mating disruption dispensers or begin applications of other formulations if mating disruption is to be used against codling moth
  - Use additional 10x lures in traps to measure success of mating disruption

Pheromones for mating disruption in apples

- “Twist-tie” and twin-tube type dispensers
  - Isomate C-Plus, Isomate CM Flex, NoMate–CM, CheckMate–CM
  - Isomate OFM Rosso
- “Twin-tubes” … Isomate CM Flex 2 CM Flex, 2 OFM, and mixed
- Sprayable pheromones
  - CheckMate CM from Suterra, Certis markets 3–M’s sprayable pheromones
  - Last Call
  - Pheromone plus permethrin, dispensed in small droplets (IPM Tech)
- Others

All pheromone products are effective against only the target species. Specific products are available to disrupt mating of codling moth, oriental fruit moth, dogwood borer, and the peachtree borers.

Petal fall in apples

- Plum curculio is key target … make spray decisions on prior experience and proximity to woods.
  - Effective insecticides include: Avaunt, Imidan, Guthion, Assail (also some pyrethroids, but they trigger mite outbreaks … see Spray Guide)
- Monitor traps for codling moth
- Scout for rosy apple aphid, plant bugs, European red mite
- See Tree Fruit Pest Management Handbook for additional scouting details

For codling moth in 2013 (same as 2012)
plan to manage populations resistant to organophosphates and pyrethroids

- Four alternative and reduced-risk chemistries are available:
  - Assail and similar neonicots – Assail: Limit of 4 applications, 7-day PHI; excellent against CM, OFM, aphids, leafhoppers, leafminers; fair to good against plum curculio, apple maggots, San Jose scale, plant bugs, and Japanese beetle. (See labels for Calypso and Belay)
  - Rimon. Limit of 4 applications, 14-day PHI; excellent against CM, leafrollers, leafminers and OFM; some activity against Japanese beetle, and a little suppression of leafhoppers and plant bugs, but primarily a Lep killer
  - Altacor (and Belt). Limit of 3 applications (at recommended rate), 5-day PHI in apples, 7– to 10–day PHI in peaches. Altacor is excellent against CM, OFM, and other Leps. Belt label does not list OFM.
  - Delegate. Limit of 4 applications, 7-day PHI (14 for peaches). Use against CM, OFM, other Leps … not effective against other pests

Plum curculio

Guthion, Imidan, and Avaunt are products of choice for PC control at petal fall (and sometimes first cover) … Exrel coming??
Commercial-scale Organics

- Mating disruption against codling moth
- Codling moth virus against codling moth
- Entrust against codling moth (fair at 7–10-day intervals), apple maggot, STLM, leafrollers
- GF–120 (same ingredient as in Entrust) as a bait for apple maggot control
- BT (Dipel and others) against leafrollers
- Oils against San Jose scale, mites, and aphids
- Neemix and pyrethrins against Japanese beetle

San Jose scale

- Still increasing problems in several orchards in recent years (even in managed orchards)
- Why?
  - Long-term population density cycle on other hosts?
  - No post-bloom use of Lorsban or Pennco–M to kill crawlers
- Innates males and females overwinter under scales, and males emerge and fly to females around bloom. Females give birth to live nymphs under the protective cover of the scale. Crawlers become active a few weeks later.

Possible cover spray program for apples, southern IL, 2013

This program does NOT include controls for apple maggot

- Biofix
- Petal Fall
  - Avaunt OR Imidan OR [Rimon + Imidan]

1st cover ... still probably <240 dd since biofix
- Avaunt OR [Rimon + Imidan]

Sprays at petal fall target plum curculio & leafrollers. Codling moth egg laying is underway, so Rimon can be used for early CM control, but it will not control PC.

Either of these choices will finish off PC control if needed and provide adequate early control of CM as egg hatch may begin before the next spray.

Summer covers
- Same products as above for CM control

Of the reduced-risk products for CM control, Assail is most effective against Japanese beetle and apple maggot; it also provides some suppression of woolly apple aphid and San Jose scale. AM and somewhat useful against WAA and SJS.

Possible cover spray program for apples, 2013

2nd cover
- Begin sprays aimed at codling moth
- Rimon
- Assail or Calypso
- Altacor or Belt
- Delegate

Summer covers
- Same products as above for CM control

First generation insecticide applications against OP-resistant codling moths.

- Assail or Altacor or Delegate
- Imidan or Guthion or Deltamethrin or Intrepid

Effectiveness of an insecticide rotation against OP-resistant codling moths.

- Minimum effective residue

Effectiveness of control

- +
- -
- +

Residue Remaining on Fruit after Application

- First cover: [Rimon + Imidan] or Avaunt (also used at petal fall)
- Second cover: Altacor
- Third cover: Altacor
Residue Remaining on Fruit after Application

Second generation insecticide applications against OP-resistant codling moths.

- 4th cover: Assail
- 5th cover: Assail
- 6th cover: Assail

Minimum effective residue

Effectiveness of control

Mixtures

- Where resistance is already an issue for several pests, mixtures may be valuable to control multiple pests (one ingredient against some, the second against others), but mixtures are not well suited for preventing resistance development.
- Rates of each ingredient have to be high enough to provide control for the necessary treatment interval.

Woolly apple aphid management

- David Biddinger, Penn State University:
  - Problems may be related in part to reductions in natural enemies where Rimon or Delegate is used
  - Insecticide choices:
    - Lorsban by ½-inch green in delayed dormant sprays
    - Diazinon when aphids first noticed above-ground
    - Movento - must include a penetrant ... postbloom only
    - Especially susceptible varieties include Fuji, Rome, Greening, York, and Ginger Gold

Key concerns in peaches

- Oriental fruit moth
  - Pyrethroid resistance confirmed in Calhoun County
    - Survival at diagnostic dose that should kill 99%, 2009–2010:
      - Lab colony: 1.3%
      - Urbana susceptible: 0.7%
      - Calhoun 1: 9.3%
      - Calhoun 2: > 81%
  - Alternatives
    - Mating disruption – problems in mixed blocks
    - Altacor or Belt, Assail (not Calypso), Delegate, Rimon

Peaches, continued ...

- Stink bugs
  - Pyrethroids (Asana, Baythroid, Mustang Max, Pounce, Warrior, and their generics)
  - Pre-mixes
    - Leverage (Provado a.i. plus Baythroid a.i.)
    - Voliam Xpress (Altacor a.i. plus Warrior a.i.)

I recommend against buying these ... if you need to control OFM and stink bugs, buy components separately and mix if needed. The ingredients in Leverage are not the best choices against respective pests anyway. You cannot alter the rates independently if you use the premix. Same thoughts apply to using mixes in apples.
Peaches, continued …

- Peachtree borer and lesser peachtree borer
  - Trunk sprays still effective
    - Lorsban 4EC … not to contact fruit
    - Timing generally early May for LPTB … earlier?
    - Asana or Warrior postharvest for LPTB and PTB if Lorsban applied in Spring
    - Consider transplant dips/drenches for young trees
      - Lorsban 75WG or 4EC
    - Mating disruption
      - Isomate PTB Dual has replaced Isomate LPTB

- Japanese beetle
  - Sevin XLR, Assail, or pyrethroids listed for stink bugs

Brown marmorated stink bug

- Halyomorpha halys
  - Introduced (NOT intentionally) from Asia, first detected in Allentown, PA, in 1998
  - Now established as far west as OH, KY, and IN … detections in IL
  - Overwinters as an adult, aggregates in large numbers in homes and other shelters
  - Expect 2 generations per year in IL

White bands on legs and antennae are diagnostic

Brown marmorated stink bug

- Severe damage to apples, peaches, tomatoes, sweet corn, many other crops
- Many noncrop hosts serve as reservoirs for population buildup
- Very difficult to control … pyrethroids kill nymphs and adults present at the time of application

http://ento.psu.edu/extension/factsheets/brown-marmorated-stink-bug
http://ohioline.osu.edu/hyg-fact/pdf/FS_3824_08.pdf

Common Stink Bugs

Over 45 stink bug species occur commonly throughout North America. Euschistus servus (upper left), Euschistus variolarius (upper right), and Euschistus conspersus (lower left), all of which are brownish, are often-cited pests of a variety of crops.
Send in suspected specimens

- Kill by freezing 3–5 days or placing in rubbing alcohol
- Send in a crush-proof container
- Mail to:
  - Rick Weinzierl
  - Univ. of Illinois Department of Crop Sciences
  - 1102 South Goodwin Avenue
  - Urbana, IL 61801

References on Insecticide Efficacy


BMSB Toxicity Testing

Lethality Index

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<tr>
<th>Active Ingredient</th>
<th>Trade Name</th>
<th>Lethality Index</th>
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<th>Trade Name</th>
<th>Lethality Index</th>
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http://extension.psu.edu/fruit-production/files/bmsb-slide-presentation

Direct contact topical bioassays

Brief description of methods:

- BMSB adults from overwintering colony;
- Male and female adults (30 from each gender) tested separately.
- Commercial grade insecticide solutions at rate, surfactant added;
- Each individual bug treated dorsally with 2 μl of solution.
- Mortality assessed at 4, 24, 48, 72, 96 and 120 hours after treatment;
- Surviving individuals kept for further observation.

http://extension.psu.edu/fruit-production/files/bmsb-slide-presentation

References on Insecticide Efficacy

### BMSB Mortality based on Direct Contact Bioassays – Organophosphates, IRAC 1B

<table>
<thead>
<tr>
<th>Product</th>
<th>Active Ingredient</th>
<th>Field Rate used</th>
<th>Fruit Registration*</th>
<th>Percent Direct Mortality**</th>
<th>Residual-Lethal Lethality Index</th>
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<td>Acrophen SFP</td>
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* Based on dry residue bioassays T. Leskey, USDA-ARS

### BMSB Mortality based on Direct Contact Bioassays – Pyrethroids, IRAC 3

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* Based on dry residue bioassays T. Leskey, USDA-ARS

### BMSB Mortality based on Direct Contact Bioassays – Carbamates (IRAC 1A)

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* Based on dry residue bioassays T. Leskey, USDA-ARS

### BMSB Mortality based on Direct Contact Bioassays – Nonnicotinoids, IRAC 4A

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<td>Assail 35DG</td>
<td>thiamethoxam</td>
<td>4 oz</td>
<td>PF, SF, G</td>
<td>87</td>
<td>87</td>
</tr>
<tr>
<td>Assail 35DG</td>
<td>thiamethoxam</td>
<td>8 oz</td>
<td>PF, SF, G</td>
<td>83</td>
<td>83</td>
</tr>
<tr>
<td>Assail 70W</td>
<td>thiamethoxam</td>
<td>8 oz</td>
<td>PF, SF, G</td>
<td>83</td>
<td>83</td>
</tr>
<tr>
<td>Bio-Cy</td>
<td>thiamethoxam</td>
<td>4 oz</td>
<td>PF, G</td>
<td>106</td>
<td>100</td>
</tr>
<tr>
<td>Calypso 4F</td>
<td>thiamethoxam</td>
<td>4 oz</td>
<td>PF</td>
<td>58</td>
<td>82</td>
</tr>
<tr>
<td>Endigo 20</td>
<td>thiamethoxam</td>
<td>5 oz</td>
<td>PF, SF, G</td>
<td>93</td>
<td>95</td>
</tr>
<tr>
<td>Endigo 20</td>
<td>thiamethoxam</td>
<td>10 oz</td>
<td>PF, SF, G</td>
<td>93</td>
<td>95</td>
</tr>
<tr>
<td>Leverage 800</td>
<td>thiamethoxam</td>
<td>4 oz</td>
<td>Apple, Pear, G</td>
<td>85</td>
<td>89</td>
</tr>
<tr>
<td>Susepion 100G</td>
<td>thiamethoxam</td>
<td>15 oz</td>
<td>Apple, Pear, SF</td>
<td>91</td>
<td>98</td>
</tr>
<tr>
<td>Vapate L</td>
<td>thiamethoxam</td>
<td>6 oz</td>
<td>Apple, Pear</td>
<td>87</td>
<td>97</td>
</tr>
</tbody>
</table>

* Based on dry residue bioassays T. Leskey, USDA-ARS

### BMSB Mortality based on Direct Contact Bioassays – Mixes, IRAC Various

<table>
<thead>
<tr>
<th>Product</th>
<th>Active Ingredient</th>
<th>Field Rate used</th>
<th>Fruit Registration*</th>
<th>Percent Direct Mortality**</th>
<th>Residual-Lethal Lethality Index</th>
</tr>
</thead>
<tbody>
<tr>
<td>Endigo ZC</td>
<td>chlorpyrifos</td>
<td>3 oz</td>
<td>PF, SF</td>
<td>93</td>
<td>95</td>
</tr>
<tr>
<td>Endigo ZC</td>
<td>chlorpyrifos</td>
<td>5 oz</td>
<td>PF, SF</td>
<td>100</td>
<td>98</td>
</tr>
<tr>
<td>Hero</td>
<td>chlorpyrifos</td>
<td>10 oz</td>
<td>Not registered</td>
<td>93</td>
<td>87</td>
</tr>
<tr>
<td>Lemonade</td>
<td>chlorpyrifos</td>
<td>2.8 oz</td>
<td>PF, SF, G</td>
<td>95</td>
<td>93</td>
</tr>
<tr>
<td>Voltum Xpress</td>
<td>chlorpyrifos</td>
<td>10 oz</td>
<td>PF, SF, G</td>
<td>40</td>
<td>40</td>
</tr>
<tr>
<td>Voltum Flex</td>
<td>chlorpyrifos</td>
<td>6 oz</td>
<td>PF, SF, G</td>
<td>100</td>
<td>100</td>
</tr>
</tbody>
</table>

* Based on dry residue bioassays T. Leskey, USDA-ARS

### Insecticides for the Control of BMSB

<table>
<thead>
<tr>
<th>Product</th>
<th>Active Ingredient</th>
<th>Rate tested/ oz</th>
<th>Mortality / %</th>
<th>PHI / REI</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>Beryl</td>
<td>clothianidin</td>
<td>6.0 oz</td>
<td>100/96</td>
<td>21/12h</td>
<td></td>
</tr>
<tr>
<td>Lannate SP</td>
<td>methomyl</td>
<td>16.0 oz</td>
<td>98% / 90</td>
<td>14 / 72h</td>
<td></td>
</tr>
<tr>
<td>Actors</td>
<td>thiamethoxam</td>
<td>5.0 oz</td>
<td>98% / 95</td>
<td>35 FD/ 14h</td>
<td></td>
</tr>
<tr>
<td>Assail 35DG</td>
<td>acetamiprid</td>
<td>8.0 oz</td>
<td>95% / 19</td>
<td>7/12h</td>
<td></td>
</tr>
<tr>
<td>Ademar Pro</td>
<td>imidacloprid</td>
<td>7.0 oz</td>
<td>88% / 40</td>
<td>21/12h</td>
<td></td>
</tr>
<tr>
<td>Danilo 1.4EC</td>
<td>fenpropathrin</td>
<td>16.0 oz</td>
<td>82% / 67</td>
<td>140 / 24h</td>
<td></td>
</tr>
<tr>
<td>Vapate L</td>
<td>oxamyl</td>
<td>0.5 oz</td>
<td>82% / 34</td>
<td>140 / 48h</td>
<td></td>
</tr>
<tr>
<td>Thiator</td>
<td>oxamyl</td>
<td>2.0 lb</td>
<td>100% / 90</td>
<td>210 / 20a</td>
<td>Processing fruit fumigation</td>
</tr>
</tbody>
</table>

* Based on dry residue bioassays T. Leskey, USDA-ARS

** Based on dry residue bioassays (120 h after treatment)
Spotted Wing Drosophila

- Native to East Asia, where it is a pest on fruit.
- Detected in CA in 2008, OR, WA, BC, FL in 2009, UT, SC, NC, MI, WI in 2010
- Widespread in IL surveys in 2012… damage primarily to fall raspberries… outdoors and in high tunnels

Where has SWD been detected?
- Detected in CA in 2008, OR, WA, BC, FL in 2009, UT, SC, NC, MI, WI in 2010

SWD detections in Illinois through October, 2012
Fruit affected by SWD

<table>
<thead>
<tr>
<th>Highest risk</th>
<th>Moderate risk</th>
<th>Alternate hosts</th>
</tr>
</thead>
<tbody>
<tr>
<td>Strawberries</td>
<td>Peaches</td>
<td>Wild plants with berries, such as...</td>
</tr>
<tr>
<td>Raspberries</td>
<td>Grapes</td>
<td>Snowberry</td>
</tr>
<tr>
<td>Cherries</td>
<td>Pears</td>
<td>Elderberry</td>
</tr>
<tr>
<td>Nectarines</td>
<td>Apples</td>
<td>Pokeweed</td>
</tr>
<tr>
<td>Blueberries</td>
<td>Tomato</td>
<td>Dogwood</td>
</tr>
</tbody>
</table>

Monitoring SWD

- Plastic cup with side holes, apple cider vinegar bait ... Yeast-plus-sugar-water bait more effective.
- Add a small yellow sticky trap to capture flies. Or, use only the bait with a drop of unscented soap.
- Hang in fruit canopy near fruit and in the shade.
- Change bait weekly, and dispose away from trap.
- Best detection potential expected as fruit ripens.
- Check weekly, and record catches.

Approx. $1/trap for materials and construction.

IPM for SWD

- If SWD is present, protection is needed from fruit coloring to harvest.
- If flies are detected, SWD is sensitive to several insecticides ... 5– to 7–day intervals?
- Beware of PHIs, REIs, safety issues.
- Entrust is the most effective organic insecticide.
- Remove overripe/infested fruit to minimize breeding sites.
- Stay informed through workshops, newsletters, websites.

SWD Insecticides

- **Brambles**
  - Brigade (3), Danitol (3), Delegate (1), Entrust (1), Hero (3), Malathion (1), Mustang Max (1)
- **Strawberries**
  - Assail (7), Brigade (6), Danitol (2), Entrust (1), Malathion (3), Radiant (1)
- **Blueberries**
  - Asana (14), Assail (1), Brigade (1), Danitol (3), Delegate (3), Entrust (3), Hero (1), Imidan (3), Lannate (1), Malathion (1), Mustang Max (1)
- **Peaches**
  - Asana (14), Assail (7), Baythroid (7), Danitol (3), Delegate (14), Entrust (14), Ispect (14), Lannate (4), Malathion (7), Mustang Max (14), Pounce (14), Warrior (14)

Numbers in parentheses indicate required preharvest interval. See the Midwest Small Fruit Spray Guide, the Midwest Tree Fruit Spray Guide, and product labels for more information.
The usual suspects and some “new” insecticides

No particular news on these unless your orchard had NO fruit in 2012 **
- Plum curculio **
- Codling moth **
- Apple maggot **
- Oriental fruit moth **
- Peachtree borer and lesser peachtree borer
- Native stink bugs and plant bugs
- San Jose scale
- Japanese beetle

Mating disruption products continue to prove effective.

Few changes for fruit insecticides for 2013

- DuPont’s Exirel … registration expected
  - Cyazapyr (same category as Altacor)
  - Against plum curculio, Leps, aphids
- Entrust 2SC
  - Spinosad, OMRI-approved, price?
- Phase-out of Provado, foliar uses added to the Admire Pro label
- Fujimite to Portal
- Clutch to Belay

Mating disruption products continue to prove effective.

Resources

- 2013 Midwest Tree Fruit Spray Guide
  - http://www.extension.iastate.edu/Publications/PM1282.pdf
- Pennsylvania Tree Fruit Production Guide
  - http://extension.psu.edu/fruit-production/tfpg
- Cornell Pest Management Guidelines for Commercial Tree Fruit Production
  - http://pmguidelines.org/treefruits/
- A Grower’s Guide to Organic Apple Production
- 2013 Midwest Commercial Tree Fruit Spray Guide
- Midwest Tree Fruit Pest Management Handbook
  - http://www.ca.uky.edu/agc/pubs/id/id93/id93.htm

Newsletters

- Illinois Fruit and Vegetable News
  - http://ipm.illinois.edu/ifvn/
- Facts for Fancy Fruit … Purdue’s fruit newsletter
- Penn State Fruit Times
  - http://extension.psu.edu/fruit-production/news
- Rutgers (New Jersey) Plant and Pest Advisory
  - http://njaes.rutgers.edu/pubs/plantandpestadvisory/… choose the month and year of interest (or review many of them) and under “All Editions” select Fruit.
- Scaffolds (Cornell, New York)
  - http://www.scaffolds.entomology.cornell.edu/

Specialty suppliers

- Great Lakes IPM (lures, traps, mating disruption products)
  - 989-268-5693; http://www.greatlakesipm.com
- Gempler's (lures, traps, mating disruption products)
  - 800-382-8473; http://www.gemplers.com
- Suterra (lures, traps, sprayable pheromones)
  - 541-317-2231; http://www.suterra.com
- Pacific Biocontrol (isomate pheromone ties)
  - 360-574-9726; http://www.pacificbiocontrol.com
- Certis (3M’s sprayable pheromones)
  - 800-847-5620; http://www.certisusa.com