MGK Update

IR-4 Biopesticide Food Use Workshop
Atlanta, GA
September 9-10, 2014
- Only product registered with EPA using *sabadilla* as primary active ingredient

- Veratran D is now OMRI-listed and NOP-approved
What *is* sabadilla?

- A natural, botanical insecticide
- Contains 2 primary alkaloids: Veratradine & Cevadine
- Broad-spectrum insect control
- Sodium channel disruptor—may have **unique** mode of activity to pyrethrum
- Very low mammalian toxicity ($LD_{50} = 4000$)
Sabadilla labels from 1990’s

**Labeled Vegetables:**
- Beans, Cole Crops, Cucurbits, Leafy Vegetables, Corn, Tomatoes, Peppers

**Labeled Fruits:**
- Berries, Grapes, Apples, Melons, Stone Fruit, Citrus

**Labeled Insects:**
- Stink Bugs, Squash Bugs, Lygus, Beetles, Aphids, Thrips, Leafhoppers, Cabbage Worms, Grasshoppers

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<table>
<thead>
<tr>
<th>CROP</th>
<th>INSECT</th>
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</thead>
<tbody>
<tr>
<td>Vegetable such as beans, broccoli, cabbage, cauliflower, collards, cucumbers, horseradish, knuckles, corn, kohlrabi, peanuts, potatoes, pumpkins, squash, tomatoes, and zucchinis.</td>
<td>Aphids, Cabbage Worms, Diamondback Moth, flea beetle, German, Reapers, Grapes Hoppers, Green-Clover Worm, Green Measuring Worm, Green Stink Bug, Hairy Chinch Bug, Harlequin Bug, Lygus Bug, Leafhopper, Mexican Bean Beetle, Milkweed Bug, Squash Bug, Stink Cucumber Beetle, tarnished Plant Bug.</td>
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<tr>
<td>Fruits and Berries such as apples, blackberries, grapes, melons, peach, raspberry, and strawberry.</td>
<td>Green Stink Bug, Harlequin Bug, Lygus Bug, Squash Bug, Stink Cucumber Beetle, Tarnished Plant Bug.</td>
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<tr>
<td>Citrus</td>
<td>Citrus Thrips (combine with sugar water).</td>
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<tr>
<td>Field Crops such as alfalfa, clover, and sunflowers.</td>
<td>Grasshoppers, Leafhoppers, Green-Clover Worm, Sunflower Weevil, Tarnished Plant Bug.</td>
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Veratran D – current status

- Very encouraging results in past year with efficacy in lab bioassays and preliminary field trials

- Focus for Veratran D field efficacy trials:
  1. Key invasive pests
  2. Highest opportunity crop groups
  3. Organic/Sustainable segment

- R&D efforts underway to **standardize** sabadilla formula (similar to pyrethrum)
BMSB Early Instar efficacy on Bell Pepper

University of Maryland
Beltsville Research and Education Center. June, 2013

Veratran and Entrust’s results are statistically superior to other Organic options

<table>
<thead>
<tr>
<th>Product</th>
<th>Number of Instars per 8 plants</th>
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<tbody>
<tr>
<td>Veratran D (15 lbs)*</td>
<td>1.3</td>
</tr>
<tr>
<td>Entrust (5 oz)*</td>
<td>2.6</td>
</tr>
<tr>
<td>M-Pede (2%)</td>
<td>12.3</td>
</tr>
<tr>
<td>PFR-97 (1.5 lbs)</td>
<td>18.3</td>
</tr>
<tr>
<td>Untreated</td>
<td>24</td>
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</tbody>
</table>

# early BMSB instars per 8 plants
### BMSB Lifestage Efficacy on Bell Pepper

**University of Maryland**  
Beltsville Research and Education Center. June, 2013

<table>
<thead>
<tr>
<th>Product</th>
<th>Adults</th>
<th>Late instars</th>
<th>Early instars</th>
</tr>
</thead>
<tbody>
<tr>
<td>Untreated</td>
<td>8.1</td>
<td>7.1</td>
<td>6.3</td>
</tr>
<tr>
<td>PFR-97 (1.5 lbs)</td>
<td>7.5</td>
<td>6.4</td>
<td>5.1</td>
</tr>
<tr>
<td>M-Pede (2%)</td>
<td>5.9</td>
<td>4.3</td>
<td>3.1</td>
</tr>
<tr>
<td>Entrust (5 oz)</td>
<td>6.8</td>
<td>2.3</td>
<td>0.4</td>
</tr>
<tr>
<td>Veratran D (15 lbs)</td>
<td>4.8</td>
<td>1.4</td>
<td>0.1</td>
</tr>
</tbody>
</table>
Percent damage on Bell Pepper by BMSB

University of Maryland
Beltsville Research and Education Center. June, 2013

- Veratran D and Entrust's results are statistically superior to other Organic options
- Veratran D (15 lbs)*: 26.2%
- Entrust (5 oz)*: 39.7%
- M-Pede (2%): 74.7%
- PFR-97 (1.5 lbs): 90.5%
- Untreated: 92.7%

% Fruit damaged by BMSB
Efficacy on Bagrada Bug

University of Arizona - Lab Bioassay
Yuma Agricultural Center
April, 2014

Cumulative % Mortality

3 hrs  6 hrs  12 hrs  24 hrs  48 hrs  72 hrs

Hours After Treatment

Veratran D (15 lbs)  Entrust SC (4 oz)  Untreated
Veratran D provided similar or better control of thrips than other Organic insecticides on blueberries.

2007, UC Co-op Extension, Kern County
Veratran D 2014 Field Efficacy trials

- Univ Minnesota
  - CPB on potato
- Rutgers
  - BMSB on peaches
  - SWD on berries
- Cornell
  - Squash bug, Striped Cuke Beetle, Flea Beetle, Swede Midge, Onion Thrips, Colo Potato Beetle
- North Carolina St.
  - SWD on blackberries
- Michigan St.
  - SWD on caneberries
- Univ. Maryland
  - BMSB, CPB
- Univ. Arizona
  - Bagrada bug on broccoli
Alignment with Listed Biopesticide Priorities

- Postharvest/export crops
- Spotted Wing Drosophila – All crops
- Plant bugs – All crops
- Brown Marmorated Stink Bug – All crops
- Mite/Thrips. Whiteflies/Aphids – vegetables
- Flea Beetles – eggplant
- Squash bugs  Cucurbits
- Aphids and whiteflies – Vegetables
- Colorado Potato Beetle – Potato
- ACP- Citrus
- Whiteflies and Psyllids – GH Tomato
- Chili thrips – Dragon Fruit
- Cabbage Looper – Brassica
- Pepper weevil – GH Pepper
Thank you for your support!

MGK Crop Protection
2014 IR-4 Biopesticide Food Use Workshop
Atlanta, GA
September 10, 2014