Grape berry moth management with monitoring, models and new insecticides

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Outline

Grape berry moth

Degree day model

Insecticide options

Tests of model-timed sprays

IPM program using model and border sprays
Grape berry moth
Berry moth reduces berry weight (but not Brix)

* = significantly different at this sample
Managing berry moth, without breaking the bank

• Distribution is spotty – focus control in areas that need it.

• Plan during the winter, and sample vineyards through the season to identify which regions need control.
  – Sample post-bloom, before berry touch, and early September

• Ensure coverage of clusters by increasing gallonage, adjusting sprayer.

• Time sprays for early-mid July, mid-late August using degree day model.

• Use insecticides with high activity, residual control, and rainfastness
Timing sprays for grape berry moth

- Timing generation 2 and 3 sprays is difficult. Traps and scouting don’t give a good signal of the ‘right’ time to spray.

- Application of an effective insecticide at ideal timings should improve control.

- Can improve return on time and money spent spraying.

*Can degree days be used to identify best times for mid- and late-season sprays?*
Vine and GBM development based on **date**

- **Vine development**
  - Bloom
  - Berry sizing
  - Ripening

- **Moths**
  - Warm year
  - Cool year

- **Eggs**
  - Warm year
  - Cool year

*Date*
Vine and GBM development based on **degree days**

Degree days (from March 1, base 47 °F)
When are GBM eggs laid on clusters?

Accumulated degree-days from March 1, base 47 °F

- **Wild grape bloom**: 810 GDD after wild grape bloom
- **Start of Gen 2**: 1620 GDD after wild grape bloom
- **Start of Gen 3**: 2300 GDD after wild grape bloom

**Vitis riparia**
Timing sprays for economical GBM control

Post-bloom: Omit if rosechafer or leafhopper not a problem
Mid-season: 810 GDD from wild grape bloom (or 910 for broad-spectrum insecticides)
Late-season: 1620 GDD from wild grape bloom (or 1720 for broad-spectrum insecticides)
How can I track berry moth degree days?

www.enviroweather.msu.edu

- Stations across Michigan
  - Pagel (Berrien Springs)
  - Dongvillo (Scottdale)
  - SWMREC (Berrien Springs)
  - Grandview (Watervliet)
  - Winkel (Keeler)
  - High Acres (Hartford)
  - Mandigo (Lawrence)
  - Oxley (Lawton)

- Reports GDD daily and predicts for the week ahead

- GBM model released for 2009 season
The MSU berry moth degree day model

Online: www.enviroweather.msu.edu

1. Click on the weather station nearest to your farm
2. Go to Fruit page
3. Select Grape Berry Moth model
4. Use default/current date
5. Change date range
7. Degree day accumulation (Base 47°F, from 3/1 to 5/19/2009: 402.6)
Registered insecticides with ‘excellent’ ranking for grape berry moth

- **Altacor 35WG (2-4.5 oz):** rynaxypyr (CTPR) is in a new chemical class, with high activity on lepidopteran pests including grape berry moth. 14 days activity.

- **Belt 4SC (4 oz):** new chemical class with high activity on moth pests. 14 days activity.

- **Brigade 2EC (3.2-6.4 oz), Danitol 2.4EC (10.6 oz), Baythroid XL (2.4-3.2 oz):** pyrethroid insecticides with broad activity on all insects. Contact insecticides with 7 days activity. High initial activity, susceptible to UV, heat, and wash-off.

- **Imidan 70 WP (2.12 lb/ac):** broad-spectrum organophosphate with 7-10 days activity on all life-stages when applied at 2.1 lb/ac in water at pH 5.5.

- **Intrepid 2F (8 oz):** selective insecticide with high activity on GBM. Active on eggs and larvae, and requires excellent coverage to be effective. 14-21 days activity, resistant to wash-off.
Registered **pre-mix** insecticides with ‘excellent’ ranking for grape berry moth

- **Voliam Flexi 40WDG (4-5 oz):** CTPR + thiamethoxam. Excellent activity on moths from CTPR, with leafhoppers and beetle activity from thiamethoxam.

- **Brigadier (5.1-6.4 oz):** bifenthrin + imidacloprid. Labeled for beetles, leafhoppers, moths.

- **Tourismo:** flubendiamide + buprofezin pre-mix. High activity on GBM and JB in 2009 trials.

- **Leverage 2.7 SE:** cyfluthrin + imidacloriprid. Broad activity expected.

*If using pre-mixes, consider the two chemical classes used for your resistance management plan*
Grape berry moth control with insecticides, 2008

Trial at TNRC in mature Concords

Untreated,
Three GBM sprays, or GBM programs

Assessed in July & August

% clusters infested

Treatments against Gen 1, 2, 3

Program 1
Sevin 1 qt
Baythroid 3.2 oz
Imidan 2 lb

Program 2
Intrepid 8 oz
Delegate 5 oz
## Degree-day driven GBM programs, 2009

*Plots sprayed with four different insecticide treatments, or untreated*

<table>
<thead>
<tr>
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</thead>
<tbody>
<tr>
<td><strong>Post bloom</strong></td>
<td>Danitol 10.6 oz</td>
<td>No spray</td>
<td>No spray</td>
<td>Brigade 3.2 oz</td>
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<tr>
<td></td>
<td>10 d p-bloom</td>
<td></td>
<td></td>
<td>10 d post bloom</td>
</tr>
<tr>
<td></td>
<td>(6/24)</td>
<td></td>
<td></td>
<td>(6/24)</td>
</tr>
<tr>
<td><strong>Mid-season</strong></td>
<td>Danitol 10.6 oz</td>
<td>Danitol 10.6 oz</td>
<td>Intrepid 8 oz</td>
<td>Sevin XLR 64 oz</td>
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<tr>
<td></td>
<td>early Aug</td>
<td>810 GDD</td>
<td>810 GDD</td>
<td>910 GDD</td>
</tr>
<tr>
<td></td>
<td>(8/11 @ 1452 GDD)</td>
<td>(7/14 @ 837)</td>
<td>(7/14 @ 837)</td>
<td>(7/21 @ 967)</td>
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<tr>
<td><strong>Late-season</strong></td>
<td>Sevin XLR 64 oz</td>
<td>Danitol 10.6 oz</td>
<td>Intrepid 8 oz</td>
<td>Imidan 2 lb</td>
</tr>
<tr>
<td></td>
<td>early Sept</td>
<td>1620 GDD</td>
<td>1620 GDD</td>
<td>1720 GDD</td>
</tr>
<tr>
<td></td>
<td>(9/14 @ 2101)</td>
<td>(8/18 @ 1639)</td>
<td>(8/18 @ 1639)</td>
<td>(8/25 @ 1768)</td>
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Degree-day timings improved GBM control, 2009

- Untreated
- Standard
- GDD Danitol
- GDD Intrepid
- GDD Broad Spectrum

<table>
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<tr>
<th>GBM from 50 infested berries</th>
<th>Cost per acre</th>
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<tr>
<td>47</td>
<td>$0</td>
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<tr>
<td>22</td>
<td>$53.36</td>
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<tr>
<td>15</td>
<td>$45.25</td>
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<tr>
<td>12</td>
<td>$30.32</td>
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<tr>
<td>7</td>
<td>$39.90</td>
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Testing a cost-effective GBM IPM Program

Can targeted application to vineyard borders reduce costs while achieving control?

Typically ~1 acre next to woods out of 10 acres has high pressure.

Depends on the row orientation for this to be an option.
On-farm evaluation of IPM Program incorporating GBM model, new insecticides, and border sprays

- Four farms, 2 x 3-5 acre vineyards
- Growers standard program vs. IPM

| TIMING      | STANDARD 
|-------------|----------------|
|             | Applied to whole vineyard | IPM* 
|             | **Mid- and Late sprays to border only** | 
| Post bloom  | Brigade 2EC 3.2 oz | Brigadier 5.1 oz |
| Mid-season  | Sevin XLR 64 oz 910 GDD | Intrepid 8 oz 810 GDD |
| Late-season | Imidan 2 lb 1720 GDD | Altacor 3 oz 1620 GDD |

*Two growers used Assail 30WG for leafhopper/Japanese beetle control in July*
Cluster infestation by GBM, 2009

Cost per acre based on control for the whole vineyard, including JB/LH control

Std = $43.81
IPM = $32.84

One grower delayed Intrepid spray to 945 GDD in the IPM Program
Delayed application in July at Farm 1 (135 GDD later than planned on July 20) resulted in much less effective control of GBM than farms where degree day model timings were used (July 9, 10, and 14).
A new mating disruption product: SPLAT-GBM

1-6 acre vineyards treated with 1250 drops/acre (1kg/acre) rate. On top of insecticide program.

Application in early May and late June (early-mid) or mid June and late July (mid-late)

Late September assessment

<table>
<thead>
<tr>
<th>SPLAT treatment</th>
<th>Interior</th>
<th>Border</th>
</tr>
</thead>
<tbody>
<tr>
<td>No SPLAT</td>
<td>a</td>
<td></td>
</tr>
<tr>
<td>Mid-late SPLAT</td>
<td></td>
<td>ab</td>
</tr>
<tr>
<td>Early-Mid SPLAT</td>
<td></td>
<td>b</td>
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Infested clusters (%)
Summary

• Degree day model available in 2010 through MSU’s Enviroweather ([www.enviroweather.msu.edu](http://www.enviroweather.msu.edu)) to help identify the start of Generation 2 and 3 egglaying by grape berry moth.

• Many new insecticides are available for grape growers, including some with excellent activity and residual control for GBM in mid-late season.

• Programs that integrate these products applied at optimal timings, and focused in pest hot-spots can provide cost-effective control of berry moth.

• SPLAT-GBM now registered for use in Michigan vineyards.
Resources for Integrated Vineyard Management

What's new...

- Grape berry moth management update (pdf)
- Review last season’s IPM update
- New winegrape variety trial in Michigan (pdf file)
- The regional Grape Pest Management Strategic Plan
- Winter Injury to Grapes and Methods of Protection (106-page bulletin E2930). How to understand, recognize, manage and recover from winter injury.
- Enviro-weather: MSU's upgraded weather resources for fruit growers