Insect Management in Pumpkins and Other Vine Crops

Rick Foster
Department of Entomology
Purdue University
## Pumpkin Pests

<table>
<thead>
<tr>
<th>Pest</th>
<th>Frequency</th>
<th>Severity</th>
</tr>
</thead>
<tbody>
<tr>
<td>Squash bug</td>
<td>Annual</td>
<td>Moderate/Severe</td>
</tr>
<tr>
<td>Cucumber beetles</td>
<td>Annual</td>
<td>Moderate</td>
</tr>
<tr>
<td>Squash vine borer</td>
<td>Annual</td>
<td>Moderate</td>
</tr>
<tr>
<td>Whiteflies</td>
<td>Rare</td>
<td>Low/Moderate</td>
</tr>
<tr>
<td>Aphids</td>
<td>Periodic</td>
<td>Low/Moderate</td>
</tr>
<tr>
<td>Mites</td>
<td>Periodic</td>
<td>Moderate</td>
</tr>
</tbody>
</table>
Squash Bug

• Damaging as adult and nymphs
• Suck plant juices from vines, leaves, or fruit
• May also vector a disease, yellow vine decline
• In Indiana, not usually a problem on watermelon, muskmelon, or cucumbers
• Hubbard and some other winter squash more severely damaged than other squash or pumpkins
Squash Bug
Yellow Vine
Avoiding Squash Bug Problems

• Destroy crop residue at the completion of harvest to eliminate overwintering sites
Squash Bug Sampling

• Direct observation for adults during seedling stage
• Direct observation for egg masses just before and during flowering
Squash Bug Thresholds

- At seedling stage, treat if wilting is observed (and squash bugs)
- At flowering, treat if > 1 egg mass is found per plant
- Yellow vine is controlled by controlling the squash bug
Squash Bug Insecticides

- Work best on small nymphs
- Admire or Platinum applied at planting or as a side-dress application
- Pyrethroids: Brigade, Mustang Max, Warrior and Baythroid are better than Asana, Pounce, and Ammo
Striped Cucumber Beetle

- Overwinters as adults
- One generation per year
- Feeds on leaves, stems, fruit
- Transmits bacterial wilt
Spotted Cucumber Beetle

• Arrives later in summer
• Less likely to transmit bacterial wilt
• Very numerous in 2010
Cucumber Beetle Damage

Not striped cucumber beetles
Striped Cucumber Beetles vs. Western Corn Rootworms

Striped Cucumber Beetle
• Feed on leaves, stems, and fruit
• Carry bacteria that causes bacterial wilt
• Arrive in April/May

Western Corn Rootworm
• Feed primarily on pollen
• Do not transmit bacterial wilt pathogen
• Arrive in July
Bacterial Wilt of Cucurbits

- Pumpkins may be susceptible when plants are very small
Cucumber Beetle Threshold
Direct Counts

• Seedling pumpkin plants – 1 beetle per plant
Cucumber Beetle Management Options

• Seed-furrow or transplant applications of Admire or Platinum may give 2-4 weeks of control
• Seed treatments will give 2 weeks control
New Seed Treatments

- Over the last 15 years there has been increased use of seed treatments with systemic insecticides, primarily neonicotinoids, for various crops.
- Thanks to Celeste Welty from Ohio State.
# Neonicotinoids on Vegetables

<table>
<thead>
<tr>
<th>Active Ingredient</th>
<th>Soil</th>
<th>Foliar</th>
<th>Seed Treatment</th>
</tr>
</thead>
<tbody>
<tr>
<td>Imidacloprid</td>
<td>Admire</td>
<td>Provado</td>
<td>Gaucho; Concur</td>
</tr>
<tr>
<td>Thiamethoxam</td>
<td>Platinum</td>
<td>Actara</td>
<td>Cruiser; FarMore</td>
</tr>
<tr>
<td>Acetamiprid</td>
<td></td>
<td>Assail</td>
<td></td>
</tr>
<tr>
<td>Thiacloprid</td>
<td></td>
<td>Calypso</td>
<td></td>
</tr>
<tr>
<td>Clothianidin</td>
<td></td>
<td>Clutch</td>
<td>Poncho</td>
</tr>
<tr>
<td>Dinotefuran</td>
<td>Venom</td>
<td>Venom</td>
<td></td>
</tr>
</tbody>
</table>
Systemic Activity of Neonicotinoids

- Soil applied move from roots to shoots and last about 4 weeks
- Foliar applied only move into the tissue sprayed and not to the roots; only last 7-10 days
FarMore DI400

- Registered for cucurbits
- Three fungicides
  - Apron
  - Maxim
  - Dynasty
- One insecticide
  - Thiamethoxam
Ohio Conclusions

• FarMore was as good as in-furrow treatment
• Control was generally good during the critical cotyledon to 2-leaf stage
• Control was not consistent beyond 2-leaf stage
• More convenient than in-furrow treatment
• Lower cost than in-furrow treatment
  – Seed treated with FarMore - $62/acre
  – Untreated seed + Admire - $102/acre
• Won’t be effective if using transplants
Cucumber Beetle Management Options

- Seed-furrow or transplant applications of Admire or Platinum may give 2-4 weeks of control
- Seed treatments will give 2 weeks control
- Sevin XLR
- Pyrethroids: Brigade, Hero, Mustang Max, Baythroid, Asana, Pounce, or Ammo
Recent Developments with Striped Cucumber Beetles

• In the northeast, there have been recent reports of early season virus problems in pumpkins

• Vector of these virus diseases has been confirmed to be striped cucumber beetles

• Have any of you had early season virus problems that could have been caused by striped cucumber beetles?
Squash Vine Borer

- Adults are wasp-like moths that fly in the daytime
- Lay eggs on vines
- Larvae bore into vine and eat water-conducting tissues
- Plants wilt and die
- Occasionally, will have second generation that will attack the fruit
Squash Vine Borer
Avoiding Squash Vine Borer Problems

• Destroy crop residue at the completion of harvest to eliminate overwintering sites
Sampling for Squash Vine Borers

• If you had a problem last year, you are likely to have a problem this year
• Usually more serious in small plantings than in large commercial fields
• Using pheromone traps to monitor for adults is problematic
• Direct observations, looking for entrance holes in stems and/or frass coming out of the holes
Squash Vine Borer Treatment

• No specific thresholds are available
• Two sprays 5-7 days apart after damage is first noticed or after vines start to run will usually provide satisfactory control
• Pyrethroids offer effective and economical control
Aphids

- Secondary pests, usually controlled by natural enemies
- Outbreaks are usually the result of too many insecticide applications killing natural enemies
Aphids
Natural Enemies
Aphid Thresholds

• No specific thresholds are available
• Infestations are often localized
• Look for presence of natural enemies
• Mark infested areas
• Check again in 5-7 days to see if infestation is increasing or if natural enemies are keeping it under control
Virus Transmission

- Winged aphids determine the suitability of a host plant by landing and taste testing
- Aphids pick up virus particles on their mouthparts by feeding on infected plants – crops or weeds
- When aphids carrying a virus feed on an uninfected plant, transmission occurs in seconds
- Even if the aphid dies shortly after beginning to feed, the disease is already transmitted and the plant is infected
Aphid Management

• Conserve natural enemies by spraying only when necessary for other pests – Sevin and pyrethroids are especially problematic
• Remember that you cannot control viruses by killing aphids with insecticides
• Avoid viruses by planting as early as possible
Aphid Insecticides

• Specific Insecticides
  – Actara
  – Admire
  – Assail
  – Fulfill
  – Platinum
  – Venom

• General Insecticides

• Organic Insecticides
Aphid Insecticides

- Specific Insecticides
- General Insecticides
  - Dimethoate
  - Endosulfan
    - Cucumbers, melons, summer squash – 7/31/12
    - Pumpkins, winter squash – 7/31/15
  - Malathion
  - Lannate
- Organic Insecticides
Aphid Insecticides

- Specific Insecticides
- General Insecticides
- Organic Insecticides
  - Neem
  - Insecticidal soap
Mite Management

• Usually more of a problem in hot, dry weather
• Excessive insecticide applications may kill natural enemies resulting in an outbreak
• Infestations may be spotty and may start near a dusty road
• Effective miticides include Acramite, Agri-Mek and Oberon
Whitefly Management

• Usually not a problem this far north
• Escapes from greenhouses may be source of infestations
• Effective insecticides include Actara, Admire, Assail, Brigade, Danitol, Fulfill and Oberon
• Neem and insecticidal soap are organic alternatives
# Melon Pests

<table>
<thead>
<tr>
<th>Pest</th>
<th>Frequency</th>
<th>Severity</th>
</tr>
</thead>
<tbody>
<tr>
<td>Seedcorn maggots</td>
<td>Periodic</td>
<td>Low/Severe</td>
</tr>
<tr>
<td>Wireworms</td>
<td>Periodic</td>
<td>Low/Moderate</td>
</tr>
<tr>
<td>Cucumber beetles</td>
<td>Annual</td>
<td>Moderate/Severe</td>
</tr>
<tr>
<td>Mites</td>
<td>Periodic</td>
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<tr>
<td>Aphids</td>
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</tr>
</tbody>
</table>
Seedcorn Maggots
Seedcorn Maggot

• Worse on early-planted cucurbitis during cool, wet weather and/or high organic matter
• Several generations per year but only first is important
• Eggs hatch in 2-3 days; larvae complete development in 7-10 days
• Nothing can be done after plants are infested – except replant
• Best to avoid the problem
Seedcorn Maggots Study
SWPAC 2008

• Muskmelons planted on April 25
• 5 soil treatments (at plant), 1 foliar treatment (weekly), control
• Control and soil treatments received no foliar treatments until May 29
• Counts of dead plants started on May 2
• Yields taken through August 15
Insecticides

- Brigadier = bifenthrin (Brigade) + imidacloroprid (Admire or Provado) - not labeled
- Hero = bifenthrin + zeta cypermethrin (Mustang Max)
- Capture and Brigade labeled for use on cucurbitis, but not for seedcorn maggots
### Percentage Dead Muskmelon Plants
Vincennes, IN 2008

<table>
<thead>
<tr>
<th>Treatment</th>
<th>Rate</th>
<th>May 2</th>
<th>May 16</th>
<th>May 29</th>
</tr>
</thead>
<tbody>
<tr>
<td>Untreated</td>
<td>-----</td>
<td>52.1</td>
<td>58.3 abc</td>
<td>64.6 abc</td>
</tr>
<tr>
<td>Admire</td>
<td>16 fl. oz./A</td>
<td>64.6</td>
<td>77.1 a</td>
<td>85.4 a</td>
</tr>
<tr>
<td>Admire</td>
<td>24 fl. oz./A</td>
<td>41.7</td>
<td>62.5 abc</td>
<td>68.7 abc</td>
</tr>
<tr>
<td>Platinum</td>
<td>5 fl. oz./A</td>
<td>58.3</td>
<td>70.8 ab</td>
<td>77.1 ab</td>
</tr>
<tr>
<td>Platinum</td>
<td>8 fl. oz./A</td>
<td>50.0</td>
<td>41.7 bcd</td>
<td>47.9 bcd</td>
</tr>
<tr>
<td>Brigadier*</td>
<td>6 fl. oz./A</td>
<td>25.0</td>
<td>16.7 d</td>
<td>25.0 d</td>
</tr>
<tr>
<td>Hero</td>
<td>5 fl. oz/A foliar (weekly)</td>
<td>25.0</td>
<td>35.4 cd</td>
<td>41.7 cd</td>
</tr>
</tbody>
</table>

* Not Labeled

Planted April 25
# Muskmelon Yield/10 plants
# Vincennes, IN 2008

<table>
<thead>
<tr>
<th>Treatment</th>
<th>Rate</th>
<th>Fruit</th>
<th>Lbs.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Untreated</td>
<td>-----</td>
<td>9.8</td>
<td>76</td>
</tr>
<tr>
<td>Admire</td>
<td>16 fl. oz./A</td>
<td>8.5</td>
<td>67</td>
</tr>
<tr>
<td>Admire</td>
<td>24 fl. oz./A</td>
<td>12.0</td>
<td>91</td>
</tr>
<tr>
<td>Platinum</td>
<td>5 fl. oz./A</td>
<td>8.0</td>
<td>57</td>
</tr>
<tr>
<td>Platinum</td>
<td>8 fl. oz./A</td>
<td>15.0</td>
<td>95</td>
</tr>
<tr>
<td>Brigadier*</td>
<td>6 fl. oz./A</td>
<td>15.25</td>
<td>108</td>
</tr>
<tr>
<td>Hero</td>
<td>5 fl. oz/A foliar (weekly)</td>
<td>18.25</td>
<td>113</td>
</tr>
</tbody>
</table>

* Not Labeled
Avoiding Seedcorn Maggot Damage

- Plant on well-drained soils if possible
- Limit amount of organic matter
- If planting after cover crop, plow it down 3+ weeks before planting
- Plant when soils have warmed to 70°F if possible
- Soil insecticides?
- Foliar insecticides?
Soil Insecticides

• Admire and Platinum are labeled for use on cucurbits
• Neither have seedcorn maggots on the label
• High rate of Platinum will provide some control
• Brigadier looks promising for the future
Wireworms

• Feed on roots and stems of young plants

• Worse:
  – In cool, wet soils
  – Following sod or small grains
  – In heavier soils
Wireworms – Biology and Life Cycle

- Wireworms are the larval stage of the click beetle
- Many different species
- Larval stages last 1-5 years depending on species and location
- Females like to lay eggs in grasses
- Fields recently taken out of sod or with grassy weed problems are preferred for egg-laying
Wireworms in Muskmelons

• Wireworms also attack muskmelon fruit
• In 2009, we saw this damage for the first time in Indiana
• We visited recently harvested fields from which damaged melons had been picked but found no damage
• When we visited the packing shed, damaged melons were easy to find
• Damage seems to only occur on melons off the black plastic mulch
Why Are We Seeing This Problem Now?

- May be related to loss of Furadan
- Furadan has been known to be an effective insecticide for wireworm control for many years
- Other soil insecticides, Admire and Platinum, are relatively untested for effectiveness against wireworms in cucurbitis
Predicting Your Likelihood of Having a Wireworm Infestation

• If you had a problem last year and plant in the same field again, you are likely to have problems because of long life cycle

• If the field you are planting into was sod recently or had a grassy weed problem, you are more likely to have problems

• Sampling can confirm presence of wireworms
Sampling for Wireworms

- Place a cup of flour or grain in hole about 10-12 inches deep
- Mark with a flag
- Return in 10-14 days and count wireworms
- If you find any, you have a potential problem
Wireworm Management

• Don’t plant cucurbitas after small grains or sod
• Later planted melons will have less damage
• Use of plastic mulch to warm soil may reduce problems
• Sample with grain or flour bait stations
• Threshold = 1 wireworm per bait station
• No good recommendations for treatment
Striped Cucumber Beetle

- Overwinters as adults
- One generation per year
- Feeds on leaves, stems, fruit
- Transmits bacterial wilt
Striped Cucumber Beetle Damage
Important Points to Remember

- The only way to avoid bacterial wilt is to prevent beetle feeding
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• The only way to avoid bacterial wilt is to prevent beetle feeding
• Cucumber beetles are not always present
Important Points to Remember

• The only way to avoid bacterial wilt is to prevent beetle feeding
• Cucumber beetles are not always present
• Cucumber beetles are not efficient vectors of bacteria
Bacterial Wilt of Cucurbits

• Muskmelons are very susceptible
• Cucumbers are somewhat susceptible
• Watermelons and most squashes are not susceptible
Cucumber Beetle Thresholds
Direct Counts

• Muskmelons and cucumbers – 1 beetle per plant
• Watermelon and squash – 5 beetles per plant
Cucumber Beetle Management

- Seed-furrow or transplant applications of Admire or Platinum may give 2-4 weeks of control
- Seed treatments will give 2 weeks control (not recommended if using transplants)
- Sevin XLR
- Pyrethroids: Brigade, Mustang Max and Baythroid are better than Asana, Pounce/Ambush, or Ammo
- Spraying too much can reduce yield
## Striped Cucumber Beetles/Plant
### Vincennes, IN 2008

<table>
<thead>
<tr>
<th>Treatment</th>
<th>Rate</th>
<th>May 22</th>
<th>May 29</th>
</tr>
</thead>
<tbody>
<tr>
<td>Untreated</td>
<td>-----</td>
<td>0.86</td>
<td>2.39</td>
</tr>
<tr>
<td>Admire</td>
<td>16 fl. oz./A</td>
<td>0.00</td>
<td>0.39</td>
</tr>
<tr>
<td>Admire</td>
<td>24 fl. oz./A</td>
<td>0.13</td>
<td>1.68</td>
</tr>
<tr>
<td>Platinum</td>
<td>5 fl. oz./A</td>
<td>0.38</td>
<td>0.73</td>
</tr>
<tr>
<td>Platinum</td>
<td>8 fl. oz./A</td>
<td>0.03</td>
<td>3.55</td>
</tr>
<tr>
<td>Brigadier*</td>
<td>6 fl. oz./A</td>
<td>0.10</td>
<td>3.90</td>
</tr>
<tr>
<td>Hero</td>
<td>5 fl. oz/A</td>
<td>0.04</td>
<td>0.88</td>
</tr>
</tbody>
</table>

* Foliar (weekly)

* Not Labeled

Planted April 25
Questions?