High Tunnel Session: Managing Aphids, Fungus Gnats & Thrips

Wisconsin Fresh Fruit and Vegetable Conference
January 17, 2012

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Green and Hoop houses are ideal for the build-up of pest populations
Insects are difficult to manage:

- Multiple generations - up to 12-15 / year
- Limited natural enemies to reduce populations
- Almost unlimited food
- More consistent / constant environmental conditions
- Some life stages are not susceptible to treatment
- Major insecticide and miticide resistance
IPM = Integrated Pest Management

IPM: is a decision-making process considers and utilizes ALL available pest management options or strategies to prevent economically-damaging pest outbreaks below an acceptable, pre-determined injury level or action threshold while reducing risks to human health and the environment.
Components of an IPM Program

- Monitoring and Sampling (inspect)
- Pest Identification (what pest)
- Decision-making (what action)
- Intervention (take action)
- Follow-up (re-inspect)
- Record-keeping (write it down, history)
- Education (learn)
What IPM is NOT!

- IPM does NOT preclude the use of pesticides!
- IPM is NOT merely a biological or “organic” pest control program
- IPM is a decision-making process, NOT a stringent or rigid management regime
Sampling or Scouting

Relative methods- tells the type and areas infested by certain pests

Examples- sticky cards, indicator plants

Absolute Methods- tells the number of a given pest per plant

Requires inspection of plants
Sampling or Scouting – Relative Measures

Sticky cards

Indicator plants
Sampling or Scouting

Absolute or Direct Sampling

• Visual inspections, use a hand lens
• blowing (exhaling) on flowers (thrips)
• sweeping or brushing a plant over a white piece of paper
Control Measures

**Cultural** - exclusion, inspection, sanitation, resistant cultivars, fallow

**Chemical** - the use of pesticides to suppress or eliminate pests; narrow or broad spectrum

**Biological** - the use of pathogens, or other arthropods for suppression of a targeted pest
Cultural Control

Exclusion - Screening

Inspection, Quarantine, and Sanitation
Cultural Control

- Weed control - inside and out
- Fallow – crop free period
Chemical controls are rather inexpensive usually adding only 1-2¢ per plant.

Preventive approach

Curative approach
Chemical Control

- Worker Protection Standards
- Phytotoxicity
- Resistance Management
Biological Control

- General Considerations
- Problems

http://learningstore.uwex.edu/Problems-C83.aspx
Aphids

- Soft-bodied insects
- Wings present or absent
- Cornicles (tail pipes)
- Honeydew
  - Sooty mold
- May transmit viruses
- Reduces plant vigor, stunting, malformation

- Green Peach Aphid
- Cotton Aphid
- Potato Aphid
- Foxglove Aphid
- Melon Aphid
Honey Dew & Sooty Mold
Aphid Monitoring

- Check as many plants as possible
- Look at terminal buds and lower leaf surfaces
- Cast skins, honeydew, & sooty mold are indications of aphid infestation.
- Yellow sticky traps can monitor winged aphids
Aphid IPM

• **Sanitation**
  – Remove weeds inside and outside of greenhouse

• **Screen vents and windows**

• **Limit the use of quick-release fertilizer**

• **Beneficial Insects**
  – Green lacewings
  – Ladybeetles
  – Parasitic wasps

http://learningstore.uwex.edu/Problems-C83.aspx
Aphid Chemical Control

- Rotate chemicals every 2-3 applications to prevent insecticide resistance
- Organophosphate resistance common

Marathon (imidacloprid) – drench / drip best
Endeavor (pymetrozine) - slow kill - but stop feeding
Avid (abamectin) – aphid suppression

Thiodan (endosulfan)
Orthene (acephate)
Talstar (bifenthrin)

Beauvaria bassiana (Botanigard)
Aza-Direct (azadiractin)
Order Thysanoptera

- Thrips, complete metamorphosis
- 4 narrow, fringed wings
- Tube-like mouthparts
- Virus vectors (TSWV & INSV)
Thrips Damage

- Rasping mouthparts puncture plant surfaces.
- Egg-laying also damages plants.
- Injury appears in streaks rather than spots ‘silvering’.
- Blossoms become brown and petals are distorted.
- Buds fail to open.
Thrips Damage – Virus Infection

- Tomato spotted wilt virus (TSWV)
- Impatiens necrotic spot virus (INSV)
Blue – Yellow Sticky Cards to Monitor Thrips
Thrips IPM

- **Sanitation**
  - Remove weeds that act as a thrips (virus) refuge.
  - Remove and destroy crop residues and affected plants after harvest.
  - Remove all soil debris from greenhouse.

- **Screen windows, vents, and fans.**

- **Pasteurize soil to kill immature thrips.**
Thrips Chemical Control

• Treat at 3-5 day intervals with very good coverage
• Rotate chemicals to prevent WFT resistance

- Conserve (spinosad)
- Radiant (spinetoram)
- Avid (abamectin)
- Pedestal (novaluron - IGR)
- Merit (imidacloprid)
- Flagship (thiamethoxam)
- Safari (dinotefuran)
- predacious mites (Amblyseius cucumeris)
- Beauvaria bassiana (Botanigard)
- M-pede (insecticidal soap)
- Azatin (azadiractin)
- Entrust (spinosad)
Order Diptera

- Flies, gnats, mosquitoes, midges
  - Fungus gnats
  - Shore flies

- Only 1 pair of wings – second pair are modified

- Adults have sponging mouthparts

- Larvae have chewing mouthparts and feed on roots, stems, fruit.
Fungus Gnats

- Distinguished by the long, many-segmented antennae.
- Weak flier
- Feed or decaying organic matter in potting mix, decaying plants
Fungus Gnat Damage
Fungus Gnat Monitoring

- Monitor with sticky traps placed horizontally at the crop canopy.
- Place potato wedges on growing medium surface to monitor larval populations.
  - Leave in place for 3-4 days then look for larvae feeding on cut surface.
Advantages of Drip Application of Insecticides

- Reduced risk to environment and farm workers
  - Drift to non-target areas is eliminated
  - Farm workers do not come into contact with residues on exterior of plant
  - Beneficial organisms not directly exposed

- Longer residual activity
  - Not subject to loss from rain and UV light
  - Not subject to plant growth dilution effects

- More cost-effective
What Insecticides Can Be Applied in Drip Irrigation Systems

- Must move systemically through plant.
- Label must specifically state that product can be applied via drip irrigation

**Neonicotinoids**
- Admire
- Platinum
- Venom

**Diamides**
- Coragen
- Synapse
- Verimark**

**Carbamates**
- Vydate

**Durivo**

**Not currently registered**
Thiamethoxam & Imidacloprid

- Platinum 75SG – Admire Pro
  - Brassicas, Cucurbits, Fruiting Veg, Leafy Veg, Potato

- Spectrum of Activity
  - Cucumber beetles, squash bug, flea beetle, seed maggots, & CPB
  - Suppression of aphids, thrips, whiteflies

- Systemic activity
  - Labeled for foliar and drip irrigation
Chlorantraniliprole (Rynaxypyr)

- **Coragen 1.67SC**
  - Brassicas, Cucurbits, Fruiting Veg, Leafy Veg, Potato

- **Spectrum of Activity**
  - Lepidopterans, some beetles (CPB)
  - Whitefly suppression at higher rates

- **Systemic activity**
  - Labeled for foliar and drip irrigation application
Chlorantraniliprole + Thiamethoxam

- **Durivo 1.67SC**
  - 2:1 mixture of thiamethoxam & chlorantraniliprole
  - Brassicas, Cucurbitas, Fruiting Veg, Leafy Veg

- **Spectrum of Activity**
  - Lepidopterans, leafhoppers, cucumber beetle
  - Aphids, Beetles, Plant & Stink Bug, Thrips, Mealybug, Whitefly

- Drip application only, 1 application/year.
## Drip Insecticide Program on Fruiting Vegetables

<table>
<thead>
<tr>
<th>Time</th>
<th>Insecticide (PHI)</th>
<th>Rate/Acre</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pre-plant transplant</td>
<td>AdmirePro (21)</td>
<td>0.44 oz / 10,000 plants</td>
</tr>
<tr>
<td>28 days after planting*</td>
<td>Coragen + Admire Pro <strong>or</strong> Platinum (30)</td>
<td>3.5 - 5 oz/acre</td>
</tr>
<tr>
<td></td>
<td></td>
<td>7 - 10.5 oz/acre</td>
</tr>
<tr>
<td></td>
<td></td>
<td>5 - 11 oz/acre</td>
</tr>
<tr>
<td></td>
<td></td>
<td>10 - 13 oz/acre</td>
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*Application of AdmirePro, Plantinum or Durivo must be timed not to violate PHI.

**Season scouting program to determine need for supplemental insecticide sprays should focus on thrips, mites and possibly stink bugs.
# Drip Insecticide Program on Brassicas

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</thead>
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<tr>
<td>Pre-plant transplant</td>
<td>AdmirePro (21)</td>
<td>0.44 oz / 10,000 plants</td>
</tr>
<tr>
<td>14-21 days after planting</td>
<td>Coragen (14)</td>
<td>3.5 - 5 oz/acre</td>
</tr>
<tr>
<td>30 days after planting*</td>
<td>Coragen + Admire Pro or...</td>
<td>3.5 - 5 oz/acre</td>
</tr>
<tr>
<td></td>
<td>Platinum (30)</td>
<td>7 - 10.5 oz/acre</td>
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**Season scouting program to determine need for supplemental insecticide sprays should focus on thrips, mites and possibly stink bugs.
## Drip Insecticide Program on Cucurbits

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<th>Rate/Acre</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pre-plant transplant</td>
<td>AdmirePro (21)</td>
<td>0.44 oz / 10,000 plants</td>
</tr>
<tr>
<td>14 - 21 days after planting*</td>
<td>Coragen + Admire Pro or… Platinum (30)</td>
<td>3.5 - 5 oz/acre</td>
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<td>5 - 11 oz/acre</td>
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<tr>
<td></td>
<td></td>
<td>10 - 13 oz/acre</td>
</tr>
<tr>
<td>28 - 35 days after planting*</td>
<td>Coragen (14)</td>
<td>3.5 - 5 oz/acre</td>
</tr>
</tbody>
</table>

*Application of AdmirePro, Platinum or Durivo must be timed to not violate PHI.

**Season scouting program to determine need for supplemental insecticide sprays should focus on thrips, mites and possibly stink bugs.
ATCP 29 Rule, Pesticide Use and Control, Revised September 2009. ATCP 29.54 Chemigation.

http://datcp.state.wi.us/cp/consumerinfo/cp/cp_laws/pesticides/pesticide_use.pdf
Example Fertigation – Chemigation Assembly

www.agriculturesolutions.com

www.amiad.com/filters
Example Backflow Prevention

‘Air Gap’

‘Backflow Preventer’
For Best Results with Drip-Applied Insecticides

- Repair all leaks before chemigating.
- Before injection of insecticide begins, system must be fully pressurized.
- Minimum injection time should be time for water to move from injection point to most distant emitter.
- Water solubility and soil texture affects movement in soil, and timing of injection.
  - Low solubility = limited movement
  - High solubility = readily moves in soil
Thank You, Questions, and Always...

Read and Follow Label Directions!

Pesticide Labels Change Frequently!