Insect Pest Management in Wisconsin Hops

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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)
Factors Influencing Insect Pest Management

‘Food Safety and Environmental Concerns’

– Major food retailers are setting acceptable residue levels below those set by government regulatory agencies.

“No detectable residues” will be a competitive advantage for food retailers.

– Older insecticides that do not meet these requirements are not being re-registered, resulting in increased use of novel insecticides (reduced-risk & bio-pesticides).

- 2008 PMSP Regulatory:
  “Expedite the registration of environmentally friendly products with new modes of action for management of spider mites & hop aphid”.

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Hop Insect IPM – Presentation Format

- Key arthropod pests of hops – new technologies

- Drip-irrigation delivery of selected, RR-insecticides
Hop Insect Control: Variegated Cutworm & Loopers

- Early season leaf damage / stand loss
  - Variegated cutworm larvae
  - Alfalfa looper larvae
- Mid to later season leaf damage / localized
  - Cabbage looper larvae
Established Thresholds: 2-3 larvae ft$^2$

Early to Mid Season:
- bifenthrin (Brigade 2EC, Brigadier)
- cyfluthrin / imidacloprid (Baythroid)
- spinosad (Entrust SC, SpinTor 2SC)

Variegated cutworm: early larvae
Reduced-Risk Foliar Registrations – Worm Pests

- **Delegate®WG** (spinetoram) - registered
  - Macroyclic lactone (MoA group 5)
    - Use rate 4 - 12 oz / ac (Lepidoptera)
  - 10-14 days persistence (improved photostability)
  - Very low impact on beneficials

- **Coragen™ (chlorantraniliprole)**
  - Anthranilic diamide (MoA group 28)
    - Use rate 3.5 - 5 oz (Lepidoptera) +MSO 5% v/v
  - 14+ days persistence
  - Very low impact on beneficials and low toxicity
  - Ovicidal activity
Benevia 10OD (cyantraniliprole)

- Anthranilic diamide (MoA group 28)
  Use rate 6.7 – 13.5 fl oz (Lepidoptera ++) +MSO 5% v/v
- 14+ days persistence
- Very low impact on beneficials and low toxicity
- Ovicidal activity
  Anticipated Approval late 2012, early 2013

- Fruiting vegetables, Cucurbits, Tuberous and Corm vegetables,
  Leafy vegetables, Brassicas, Bulb vegetables, Hops, etc…

- Loopers and cutworms
Two-spotted spider mites, *Tetranychus urticae*

**Occurrence**
- Usually occur in hot dry conditions
- More severe in dusty, road side locations
- Multiple generations on undersurface of leaf

**Damage**
- Adults feed in large numbers on leaf surface causing “silvering”
- Lower surface often covered with webbing
- Late season pest
- Can be ‘flared’ by pyrethroids
Spider mite, Management

Cultural
- Maintain good plant growth, irrigation
- Avoid dusty roads

Biological
- Several effective predators
- Avoid broad-spectrum (pyrethroid) insecticides

Chemical
- Unless necessary, do not use
- ‘Hormoligosis’: boosts egg production
- Agri-Mek, Acramite, and Portal
Reduced-Risk Experimental Acaricides

- Bayer Crop Science (2ee registration): two-spotted spider mite
  - spirodiclofen (Envidor® 2SC): 18-24 fl oz/acre
    * activity against all stages (eggs)
    * lipid biosynthesis inhibitor, MoA Class 23
    * 10-14 days residual activity
    * low toxicity profile
    * soft on beneficials

- Chemtura (3c Registration): two-spotted spider mite
  - bifenazate (Acramite® 50WS): 12-24 fl oz/acre
    * very fast acting
    * carboxylic acid ester, MoA Class 25
    * 10-15 days residual activity
    * safe on beneficials and predatory mites
Reduced-Risk Experimental Acaricides

- **Syngenta (3c Registration):** two-spotted spider mites
  - abamectin (Agri-Mek® 0.15EC, Abba® 0.15EC, Reaper 0.15EC®): 8-12 fl oz/ac
  - abamectin (Agri-Mek 0.7SC): 1.75 – 2.5 fl oz/ac
    * very fast acting
    * chloride channel activator, MoA Class 6
    * 7-10 days residual activity

- **Nichino America (3c Registration 2010):** mint bud mite & two-spotted spider mite
  - fenpyroximate (Fujimite®, Portal®): 2-3 pts/ac
    * METI, MoA Class 21A
    * 10-14 days residual activity
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
- Hop Aphid
- Soybean 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 around the hop yard

- **Minimize the use of synthetic pyrethroids**

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

- **Beneficial Insects**
  - Green lacewings
  - Ladybeetles
  - Parasitic wasps
Aphid Chemical Control

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

- AdmirePro (imidacloprid) – drench / drip
- Platinum (thiamethoxam) – drench / drip

- Endeavor (pymetrozine) - slow kill - but stop feeding
- Agri-Mek (abamectin) - suppression

- *Beauvaria bassiana* (Botanigard)
- *Aza-Direct* (azadiractin)
Aphid Control – Virus Management

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

• AdmirePro (imidacloprid) – drench / drip
• Platinum (thiamethoxam) – drench / drip

• Endeavor (pymetrozine) - slow kill - but stop feeding
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• *Beauvaria bassiana* (*Botanigard*)
• *Aza-Direct* (*azadiractin*)
Factors Influencing Insect Pest Management
‘Water Quantity and Quality’

• Decreasing availability of water for agriculture

  - Agriculture is the overwhelming user of fresh water.
  - Increasing urban demand will drive irrigation efficiency.

• Drip irrigation, micro-sprinklers, hydroponics.

• Targeted application of water increases opportunity to use irrigation as a delivery system.
Pesticide Drift

• Amount of pesticide lost due to drift estimated at 5 to 65%.

• Less than 0.1% of pesticide reaches target insect.

• Consequences of pesticide drift
  – Exposure of humans
  – Exposure of water resources
  – Exposure of wildlife
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
Drip Irrigation of Insecticides
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

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

**Carbamates**
- Vydate

**Durivo**

**Not currently registered**
Thiamethoxam & Imidacloprid

- **Platinum 75SG – Admire Pro**
  - Brassicas, Cucurbitis, 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 application
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, Cucurbits, 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.**
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QUESTIONS