Reduced-Risk Insecticide Options - At-Plant Treatments

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Factors Influencing Insect Pest Management
‘Environmental Concerns’

– With increasing affluence reaching the developing world, there will be increasing concerns about pesticide usage and perceived environmental effects.

– This will accelerate the shift to “softer” products and technologies.
Factors Influencing Insect Pest Management

‘Food Safety’

– 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 insecticides & bio-pesticides.
Diazinon AG600 WBC

Re-Registration Eligibility Decisions (2012-13)

- Organophosphate insecticide currently labeled on ginseng used as a broadcast application against early season target pests.

- Re-registration Eligibility Decisions (RED) concerning diazinon, restrictions were placed on all indoor and outdoor residential uses (2004). Pending reviews for this active ingredient opened in 2008 (http://www.epa.gov/oppsrerd1/registration_review)

- Projected RED registration review timeline resolved by 2012-13 under section 4(g)(2)(A) of FIFRA.

- Concerns (RED) based on ecological risk studies widespread presence of organophosphate residues in agricultural and urban dominated waterways.
Section 24c Special Local Needs
(SLN WI – 110003, 2012-17)

- 13.5 lbs/acre (cutworms, white grubs, rootworms, and wireworms

- 365 day PHI and a single application / season
  - Broadcast surface application within 14 days of bed forming / seeding
  - Bed-directed application prior to seeding
  - Post-emergence, bed-directed application

- May only apply 7 acres / day
Varied Ginseng Insect Pests

Key Pests
- Wireworms
- White Grubs
- Cutworms - armyworms

Intermittent Pests
- Spittlebugs
- Scale
- Leaf-tier (celery)
- Garden fleahopper

Sporadic Pests
- Four-lined plant bugs
- Leaf rollers
- Aphids
- Millipedes

Celery Leaftier (*Udea rubigalis*)
- Garden fleahopper

- *Halticus bractatus* (Hemiptera: Miridae)
  - Foliar-feeding, polyphagous pest
    (bean, beet, cabbage, celery, cucumber, eggplant, lettuce, pepper, potato, pumpkin, squash, tomato, and numerous weeds)
  - 2-3 generations / year (WI and IN)
  - overwinters as eggs (forage crops) and can develop large populations in forages
Garden fleahopper

- Damage is whitish and yellow speckling plus frass (black spots)

- **Possible explanations for occurrence:**
  - rarely considered a problem in commercial vegetable production
  - suppression with insecticides is easily accomplished
  - reductions in broad-spectrum insecticide use in mint and adjoining forage legumes may be partially responsible
Mint Insect Control: Variegated & Black Cutworm

- Early season leaf damage / stand loss
- Mid to later season leaf damage / localized
Cutworm & Looper Control

Established Thresholds: Undetermined (2-3 larvae ft²)

Early Season:

Diazinon AG600 WBC (0.75 – 1.0 pt / ac)

Existing / Candidate Options:

Bifenture EC (0.08 – 0.1 lb ai/ac)
Mustang MAX (0.01 – 0.025 lb ai/ac)
Radiant SC (0.03-0.09 lb ai/ac) (2008)
Coragen (0.046 – 0.065 lb ai/ac) (2010)

Benevia 20SC (0.02 – 0.055 lb ai/ac)
Avaunt 30 WDG (0.065 – 0.11 lb ai/ac)
Wireworms & White Grubs

White grub (June beetle)
- 2-3 year life cycle
- Adults lay eggs in grass
- Larvae feed on tubers 2-3 years

Wireworm (click beetle)
- 4-5 year life cycle
- Adults lay eggs on grass
- Larvae feed 3-5 years on tubers
Wireworm traps

- Dig 6x6” hole
- Fill with corn/wheat seed
- Cover with plastic bags
- Wait 1 week
Wireworm traps

- Populations low in 2011 (mean < 0.02/ trap)
- Not a significant pest in sampled ginseng fields
- Grower participation in future trials
**Seed corn maggot, *Delia platura* - Life cycle**

**Adult**
- Small grey/black fly
- Similar to housefly

**Eggs**
- Small, white
- Laid in soil at base of plants

**Larvae**
- White, legless maggots
- 4 instars; up to 1/4”
- 3-4 weeks per generation
- 3-5 generations per year

**Pupa**
- Brown, oval shaped
- In soil
Seed corn maggot: Seedling damage

**Occurrence**
- Overwinter in soil as pupa
- Adults emerge in spring
- 4-5 generations/year. 2nd adult peak in May/June is usually most serious

**Damage**
- Larvae hatch and tunnel germinating seeds
- Larvae feed in seed and developing plant and prevent emergence or severely distort plant.
- Moderate feeding may injure 1st leaves only giving crop a ragged appearance
- Cool weather, which delays plant emergence increases severity of damage
Seed corn maggot population (N=3)
2011

SCM/ Sticky card

Planting Window
Target pest: Millipedes

**Occurrence**
- Active at night
- Populations high in wet conditions
- Most common in late summer/fall

**Damage**
- Cut stems
- Chewed roots
Millipede population (N=3) 2011

Millipedes/Pitfall trap

Planting Window
Ginseng IPM; At-Plant Seed and Broadcast Trials, Ginseng 2011
Ginseng seed collection

- 15 treatments across 3 fields
- Examine 1st year seeds for signs of insect damage
- Collect soil sample from all treatments
Ginseng seed collection

Are there differences by treatment in ginseng plant emergence and seed damage?

Does application method impact seed damage?
Seed damage in ginseng; Field 1
Broadcast applications

- Untreated
- Talstar
- Platinum
- Lorsban 13.5 lb/a
- Lorsban 10 lb/a
- Ferterra
- Diazinon
- Coragen
- Brigade

Proportion damaged seeds

P=0.0512, N=4
Seed damage in ginseng; Field 2

Proportion damaged seeds

- Untreated
- Regent
- Platinum
- Verimark 13.5 oz
- Poncho
- Lorsban advanced
- Verimark 3.84 oz
- Verimark 1.28 oz
- Cruiser

P=0.0811, N=4

Broadcast treatments

Seed treatments

Proportion damaged seeds
Application effects

- Significant, but weak (P=0.04), lower proportion of damaged seeds in seed treatments compared to in-furrow.

- Overall, seed damage was minimized.

<table>
<thead>
<tr>
<th>Seed treatment</th>
<th>Median proportion damaged seeds / sample</th>
<th>Broadcast treatment</th>
<th>Untreated</th>
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</thead>
<tbody>
<tr>
<td></td>
<td>0.03 a</td>
<td>0.07 ab</td>
<td>0.18 b</td>
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Healthy and Damaged seeds
Defoliation low in all treatments

- Measured by weekly count of foliage in all plots
- Below 5% in most treatments
- 83% of plots with Talstar with defoliation <1%
- Few signs of insect damage to plants
Plant emergence

• Some significant differences by treatment \((P > 0.05)\)

• Emergence assessed at plants / sq ft:

June 10 – 15, 2011
Plant emergence; Field 1

Emerged plants

P = 0.0782
Plant emergence; Field 2

Emerged plants

- Untreated: a
- Verimark 13.5 oz: ab
- Verimark 1.28 oz: b
- Verimark 3.84 oz: b
- Cruiser: ab
- Poncho: a
- Platinum: a
- Lorsban advanced: ab
- Regent: ab

P = 0.0309
Continuing research

• Sampling for seed corn maggot and other pests to continue

• Monitoring throughout season

• Effects of mulch cover on pest pressure

• Foliar insect pest suppression trials
Ginseng IPM; Foliar Trials, 2012

- **Radiant™ (spinetoram)**
  - MoA group 5
  - Use rate 6 – 8 fl oz / a
  - Plant bugs, cutworms and Lepidopterans

- **Rimon 0.83 EC (novaluron):**
  - MoA Group 15
  - Use rate 9 – 12 fl oz / ac (foliar)
  - Control of immature insects and eggs

- **Capture 1.5G & Brigade 2SC**
  - MoA Group 3
  - Use rate 5.12 – 6.4 fl oz / ac (foliar)
  - Control of cutworms, plant bugs, millipedes other Leps

**Currently Registered**
Ginseng IPM; Foliar Trials, 2011

- **Coragen™ (rynaxypyr)**
  - Anthranillic diamide (MoA group 28)
  - Use rate 3.5 – 5.0 fl oz / ac
  - DuPont Funded 2011 (USA – 11 – 870)
  - Cutworms, Leafminers and Lepidopterans

- **Verimark (cyazypyr)**
  - Anthranillic diamide (MoA group 28)
  - Use rate 6.5-13.5 fl oz / ac (OD foliar)
  - DuPont Funded 2011 (USA – 11- 758)
  - Cutworms, Leafminers, Leafhoppers, Aphids, and Lepidopterans

* Water soluble, systemically mobile insecticides
* Not currently registered
Acknowledgements

Wisconsin Ginseng Growers

QUESTIONS?