Cucurbit Insect Management and Aphid Outbreaks

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Key insect pests in cucurbits

- Striped and spotted cucumber beetle
- Squash bugs
- Squash vine borer

Sporadic pests: **aphids, mites, whiteflies, seedcorn maggot, wireworms**
Striped and spotted cucumber beetles

- Overwinter as adults
- Carry and transmit the pathogen that causes bacterial wilt (most damaging to cucumbers and muskmelons)
- 1-2 generations/year
- Control by insecticides, exclusion, and trap crops
Squash bug

- Adults overwinter and become active in early to mid-summer; feed and lay egg masses on squash and pumpkins
- Removal of plant fluids is main cause of damage
- Transmit yellow-vine disease ... not common here
Yellow vine disease
Squash vine borer

- Pupae overwinter; adults become active in early summer
- Day-flying “clearwinged moths” lay eggs at the base of vines; larvae tunnel within vines
Aphids

- Secondary pests, usually controlled by natural enemies
- Outbreaks are usually the result of too many insecticide applications killing natural enemies
Insecticides and miticides labeled for use on one or more vine crops

- **Organophosphates**
  - Malathion

- **Carbamates**
  - Sevin, Lannate

- **Pyrethroids**
  - Asana, Baythroid, Brigade, Danitol, Hero, Mustang-Maxx, Permethrin, Warrior

- **Neonicotinoids**
  - Actara/Platinum, Admire Pro, Assail, thiamethoxam as FarMore seed treatment

- **Avermectins**
  - Agri-Mek, Epi-mek

- **Spinosyns and similar**
  - SpinTor / Entrust, Radiant

- **Others:**
  - Acramite, Beleaf, Besiege, Coragen, Exirel, Fulfill, Knack, Oberon, Portal, Synapse, Voliam Flexi, Zeal
Microbials / Botanicals / Organics

- Bacillus thuringiensis
- Neem
- Rotenone
- Pyrethrins
- Kaolin (Surround)
- Soaps (M-Pede)
- Entrust
- Cryolite / Kryocide
- Diatomaceous earth

Azera is a pre-mix of neem and plant-derived pyrethrins.
Insecticides with a broad range of effectiveness

- **Sevin (carbaryl)**
  - Effective against striped and spotted cucumber beetles and squash vine borer.
  - Highly toxic to bees / Sevin XLR Plus is less likely to kill bees.
  - Not effective against aphids, squash bug, or mites
  - Wettable powder formulations are especially toxic to bees
Insecticides with a broad range of effectiveness

- Pyrethroids
  - Effective against cucumber beetles, squash vine borer, and leafhoppers
  - Highly toxic to bees
  - Brigade, Warrior, Mustang Maxx, and Baythroid are best against squash bug, Brigade is also somewhat effective against aphids and mites.
For aphid control

- **Endosulfan (Thiodan)** (was labeled for pumpkins and winter squash only … label expired July 31, 2015)
- Dimethoate (for melons only)
- Actara … do not apply near or during bloom
- Beleaf and Fulfill
- Brigade
- Malathion
- Insecticidal soaps or neem

Insecticide applications that kill natural enemies of aphids but not the aphids trigger outbreaks.

- **Aphid control will not prevent virus outbreaks; aphid control is rarely necessary in cucumbers or summer squash**
For mite control

- Acramite
- Oberon
- Portal
- Zeal
- Agri-Mek
- Brigade
- Danitol
- Dimethoate
- Insecticidal soaps
Cucumber Beetle Control

- Systemics to control cucumber beetles
  - Admire Pro: 7-10.5 fl oz per acre
  - Platinum: 5 – 8 oz per acre
  - FarMore seed treatment – thiamethoxam

- Foliar sprays
  - Typically Sevin XLR or pyrethroids

Do not apply these after transplant stage.
Systemics for cucumber beetle control

Applied at planting or on seed for systemic uptake to control insects feeding on seedlings.
FarMore DI400

- Registered for cucurbits
- Three fungicides
  - Apron
  - Maxim
  - Dynasty
- One insecticide
  - Thiamethoxam
Systemics for cucumber beetle control
Systemics – in furrow or as seed treatments – for cucumber beetle control

- 2 to 3 weeks of control of cucumber beetles; greater control of beetles feeding on cotyledons than later leaves.
- Cotyledons appear to remain toxic to beetles longer than later new leaves.
- “Reactivation” of control from soil applications possible with rainfall following drought.
Ohio conclusions (Celeste Welty, OSU)

- 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 thresholds

- Muskmelons and cucumbers
  - 1 beetle per plant
  - Or fewer

- Watermelon and squash
  - 5 beetles per plant
Monitoring cucumber beetles

- Lam et al., Purdue, Vincennes:
  - 20 striped or spotted cucumber beetles per Pherocon AM trap per 48 hours = 1 beetle per plant – the threshold for control in cukes and muskmelons
  - Still necessary to distinguish cuke beetles from western corn rootworms and bean leaf beetles, but easier, less subject to error than counting moving beetles on plants
Cucumber beetle management with foliar sprays

- Sevin XLR
- Pyrethroids: Brigade, Mustang Max, Warrior, or Baythroid or Asana, Pounce/Ambush, or Ammo
- Spraying too much can reduce yield
Striped cucumber beetles vs. western corn rootworm beetles

- Feed on leaves, stems, and fruit
- Carry bacteria that causes bacterial wilt
- Arrive in April/May

- Feed primarily on pollen
- Do not transmit bacterial wilt pathogen
- Arrive in July
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
Avoiding squash vine borer problems

- Destroy crop residue at the completion of harvest to eliminate overwintering sites
Monitoring 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 control

- Make a first spray 5 to 7 days after moths are first observed or as soon as tunneling is detected.
- Make at least one more spray 7 days after the first or weekly for 3 to 5 weeks depending on continued adult activity.
  - Pyrethroids are effective, as is Sevin.
- Mounding dirt at nodes of vines favors adventitious root growth.
Squash bug

- Count egg masses to make control decisions
  - Threshold = 1 to 1.5 egg masses per plant
- Time insecticide applications to target newly hatched and young nymphs
  - Brigade, Mustang Max, Warrior, and Baythroid are more effective than other registered insecticides
  - Azera provides some control for organic growers
Avoiding squash bug problems

- Destroy crop residue at the completion of harvest to eliminate overwintering sites
- Rotate squash and pumpkin plantings; increasing distance from last year’s crop increases effectiveness
Squash bug thresholds

- At seedling stage, treat if wilting is observed (and squash bugs)
- At flowering, treat if > 1-1.5 egg mass is found per plant
- Yellow vine is controlled by controlling the squash bug
Squash bug insecticides

- Work best on small nymphs
- Seed treatments or Admire or Platinum applied at planting or as a side-dress application may give some benefit in later plantings
- Pyrethroids: Brigade, Mustang Max, Warrior, and Baythroid are best
Aphids ... in pumpkins

- Secondary pests, usually controlled by natural enemies
- Outbreaks are usually the result of too many insecticide applications killing natural enemies
Aphids and viruses

- **CMV, WMV, ZYMV**
  - All are aphid-transmitted in a nonpersistent manner
    - Rapid uptake from hosts; transmission in the first few feeding probes on an uninfected plant; loss of virus after only a few feeding probes
  - Wide range of weed hosts
  - “Passers-through” are effective vectors
    - “Aerial plankton”
    - Prior to soybean aphid, vector numbers usually increased to high levels only in late season
    - Introduction of the soybean aphid dramatically increased the volume of “aerial plankton” – and vector numbers
Minimizing losses to viruses

- Use resistant varieties
- Plant early (before immigrant aphid species arrive from the south)
- Separate plantings over available space
- Stagger plantings over a range of dates
- Plant into reflective mulches that reduce aphid landing

Or just take your chances, as many growers do in most years.
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
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
Aphid insecticides

- **Specific Insecticides**
  - Actara
  - Admire Pro at planting or transplanting only
  - Assail
  - Beleaf
  - Fulfill
  - Platinum at planting or transplanting only

- **General Insecticides**
  - Dimethoate
  - Malathion
  - Lannate

- **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, Portal, and Zeal
- Brigade, Danitol, and Dimethoate (melon only) may give some control
2016 Midwest Vegetable Production Guide

- Production and pest management information
- Updated annually
- Especially useful for listings of insecticides, fungicides, and herbicides

Identifying and Managing Cucurbit Pests: Insects, Diseases, and Weeds

- C1392, Published 2004, University of Illinois Extension
  - Babadoost, Weinzierl, and Masiunas
  - 48 pages, more than 100 color photos
    - 1-800-345-6087; 1917 South Wright Street, Champaign, IL 61820
    - $11.00