Managing Insect Pests in Cucurbits

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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 FarMoor seed treatment
- Avermectins
  - Agri-Mek, Epi-mek
- Spinosyns and similar
  - SpinTor / Entrust, Radiant
- Others:
  - Acramite, Beleaf, Besiege, Coragen, Exirel, Fullil, 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

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

Alera is a pre-mix of neem and plant-derived pyrethrins.

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

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

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

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 – 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

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 cucumber beetles from western corn rootworms and bean leaf beetles, but easier, less subject to error than counting moving beetles on plants

Cucumber beetle thresholds
- Muskmelons and cucumbers
  - 1 beetle per plant
  - Or fewer
- Watermelon and squash
  - 5 beetles per plant

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 Maxx, 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
  - Beteal
  - 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, Oberon, Portal, and Zeal
- Brigade, Danitol, and Dimethoate (melons 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