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
Yellow Vine
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 labeled for use on vine crops

- **Organophosphates**
  - Diazinon, Malathion, Dimethoate

- **Carbamates**
  - Sevin, Lannate

- **Pyrethroids**
  - Asana, Baythroid, Brigade, Danitol, Hero, Mustang-Max, 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, Fulfill, Knack, Oberon, Synapse, Coragen, Voliam Flexi, Voliam Xpress
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 Max, and Baythroid are best against squash bug, Brigade is also somewhat effective against aphids and mites
For aphid control

- Endosulfan (Thiodan) (pumpkins only)
- 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.
For mite control

- Acramite
- Oberon
- Kelthane
- Agri-Mek, Epi-mek
- Brigade

- 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 DI 400

- 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 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

- 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 Rootworms

- 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
Sampling for 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
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
- 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
- Avoid viruses by planting as early as possible
Aphid Insecticides

- Specific Insecticides
  - Actara
  - Admire Pro
  - Assail
  - Beleaf
  - Fulfill
  - Platinum
  - Venom

- General Insecticides
  - Dimethoate (melons only)
  - Endosulfan
    - Cucumbers, melons, summer squash – 7/31/12
  - Pumpkins, winter squash – 7/31/15
  - 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
2014 Midwest Vegetable Production Guide

- Production and pest management information
- Updated annually
- Especially useful for listings of insecticides, fungicides, and herbicides
- [http://www.btny.purdue.edu/Pubs/ID/ID-56/](http://www.btny.purdue.edu/Pubs/ID/ID-56/)
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