PURDUE UNIVERSITY

PURDUE EXTENSION

Insect Management in Pumpkins and Other Vine Crops

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Pumpkin Pests

Pest	Frequency	Severity
Squash bug	Annual	Moderate/Severe
Cucumber beetles	Annual	Moderate
Squash vine borer	Annual	Moderate
Whiteflies	Rare	Low/Moderate
Aphids	Periodic	Low/Moderate
Mites	Periodic	Moderate

Squash Bug

- Damaging as adult and nymphs
- Suck plant juices from vines, leaves, or fruit
- May also vector a disease, yellow vine decline
- In Indiana, not usually a problem on watermelon, muskmelon, or cucumbers
- Hubbard and some other winter squash more severely damaged than other squash or pumpkins

Squash Bug

Yellow Vine

Avoiding Squash Bug Problems

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

Squash Bug Sampling

- Direct observation for adults during seedling stage
- Direct observation for egg masses just before and during flowering

Squash Bug Thresholds

- At seedling stage, treat if wilting is observed (and squash bugs)
- At flowering, treat if > 1 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
- Pyrethroids: Brigade, Mustang Max, Warrior and Baythroid are better than Asana, Pounce, and Ammo

Striped Cucumber Beetle

- Overwinters as adults
- One generation per year
- Feeds on leaves, stems, fruit
- Transmits bacterial wilt

Spotted Cucumber Beetle

- Arrives later in summer
- Less likely to transmit bacterial wilt
- Very numerous in 2010

Cucumber Beetle Damage

Not striped cucumber beetles

Striped Cucumber Beetles
vs.
Western Corn Rootworms

Striped Cucumber Beetle

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

Western Corn Rootworm

- Feed primarily on pollen
- Do not transmit bacterial wilt pathogen
- Arrive in July

Bacterial Wilt of Cucurbits

- Pumpkins may be susceptible when plants are very small

Cucumber Beetle Threshold Direct Counts

- Seedling pumpkin plants – 1 beetle per plant

Cucumber Beetle Management Options

- Seed-furrow or transplant applications of Admire or Platinum may give 2-4 weeks of control
- Seed treatments will give 2 weeks control

New Seed Treatments

- Over the last 15 years there has been increased use of seed treatments with systemic insecticides, primarily neonicotinoids, for various crops
- Thanks to Celeste Welty from Ohio State

Neonicotinoids on Vegetables

Active Ingredient	Soil	Foliar	Seed Treatment
Imidacloprid	Admire	Provado	Gaucho; Concur
Thiamethoxam	Platinum	Actara	Cruiser; FarMore
Acetamiprid		Assail	
Thiacloprid		Calypso	
Clothianidin		Clutch	Poncho
Dinotefuran	Venom	Venom	

Systemic Activity of Neonicotinoids

- Soil applied move from roots to shoots and last about 4 weeks
- Foliar applied only move into the tissue sprayed and not to the roots; only last 7-10 days

FarMore DI400

- Registered for cucurbits
- Three fungicides
  - Apron
  - Maxim
  - Dynasty
- One insecticide
  - Thiamethoxam

Ohio Conclusions

- 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 Management Options

- Seed-furrow or transplant applications of Admire or Platinum may give 2-4 weeks of control
- Seed treatments will give 2 weeks control
- Sevin XLR
- Pyrethroids: Brigade, Hero, Mustang Max, Baythroid, Asana, Pounce, or Ammo

Recent Developments with Striped Cucumber Beetles

- In the northeast, there have been recent reports of early season virus problems in pumpkins
- Vector of these virus diseases has been confirmed to be striped cucumber beetles
- Have any of you had early season virus problems that could have been caused by striped cucumber beetles?

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

Squash Vine Borer

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 Treatment

- No specific thresholds are available
- Two sprays 5-7 days apart after damage is first noticed or after vines start to run will usually provide satisfactory control
- Pyrethroids offer effective and economical control

Aphids

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

Aphids

Natural Enemies

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

Virus Transmission

- Winged aphids determine the suitability of a host plant by landing and taste testing
- Aphids pick up virus particles on their mouthparts by feeding on infected plants – crops or weeds
- When aphids carrying a virus feed on an uninfected plant, transmission occurs in seconds
- Even if the aphid dies shortly after beginning to feed, the disease is already transmitted and the plant is infected

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
  - Assail
  - Fulfill
  - Platinum
  - Venom
- General Insecticides
- Organic Insecticides

Aphid Insecticides

- Specific Insecticides
- General Insecticides
  - Dimethoate
  - Endosulfan
    - Cucumbers, melons, summer squash – 7/31/12
    - Pumpkins, winter squash – 7/31/15
  - Malathion
  - Lannate
- Organic Insecticides

Aphid Insecticides

- Specific Insecticides
- General Insecticides
- 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

Whitefly Management

- Usually not a problem this far north
- Escapes from greenhouses may be source of infestations
- Effective insecticides include Actara, Admire, Assail, Brigade, Danitol, Fulfill and Oberon
- Neem and insecticidal soap are organic alternatives

Melon Pests

Pest	Frequency	Severity
Seedcorn maggots	Periodic	Low/Severe
Wireworms	Periodic	Low/Moderate
Cucumber beetles	Annual	Moderate/Severe
Mites	Periodic	Moderate
Aphids	Periodic	Low/Moderate

Seedcorn Maggots

Seedcorn Maggot

- Worse on early-planted cucurbits during cool, wet weather and/or high organic matter
- Several generations per year but only first is important
- Eggs hatch in 2-3 days; larvae complete development in 7-10 days
- Nothing can be done after plants are infested – except replant
- Best to avoid the problem

Seedcorn Maggots Study SWPAC 2008

- Muskmelons planted on April 25
- 5 soil treatments (at plant), 1 foliar treatment (weekly), control
- Control and soil treatments received no foliar treatments until May 29
- Counts of dead plants started on May 2
- Yields taken through August 15

Insecticides

- Brigadier = bifenthrin (Brigade) + imidacloprid (Admire or Provado) - not labeled
- Hero = bifenthrin + zeta cypermethrin (Mustang Max)
- Capture and Brigade labeled for use on cucurbits, but not for seedcorn maggots

Percentage Dead Muskmelon Plants
Vincennes, IN 2008

Treatment	Rate	May 2	May 16	May 29
Untreated	-----	52.1	58.3 abc	64.6 abc
Admire	16 fl. oz./A	64.6	77.1 a	85.4 a
Admire	24 fl. oz./A	41.7	62.5 abc	68.7 abc
Platinum	5 fl. oz./A	58.3	70.8 ab	77.1 ab
Platinum	8 fl. oz./A	50.0	41.7 bcd	47.9 bcd
Brigadier*	6 fl. oz./A	25.0	16.7 d	25.0 d
Hero	5 fl. oz/A foliar (weekly)	25.0	35.4 cd	41.7 cd

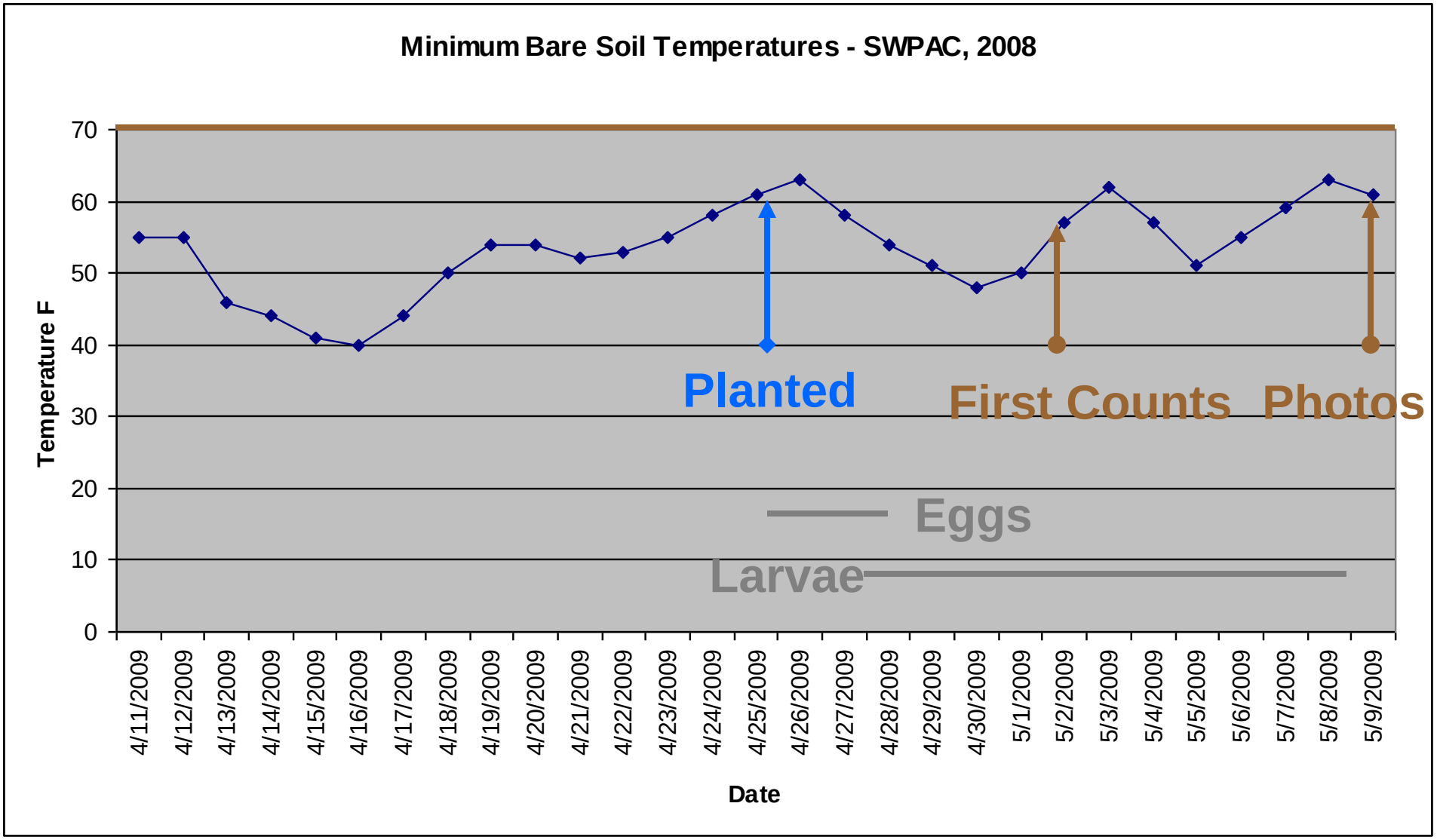
* Not Labeled

Planted April 25

Muskmelon Yield/10 plants
Vincennes, IN 2008

Treatment	Rate	Fruit	Lbs.
Untreated	-----	9.8	76
Admire	16 fl. oz./A	8.5	67
Admire	24 fl. oz./A	12.0	91
Platinum	5 fl. oz./A	8.0	57
Platinum	8 fl. oz./A	15.0	95
Brigadier*	6 fl. oz./A	15.25	108
Hero	5 fl. oz/A foliar (weekly)	18.25	113

* Not Labeled


Minimum Bare Soil Temperatures - SWPAC, 2008
Temperature F
70
60
50
40
30
20
10
0
Planted
First Counts
Photos
Eggs
Larvae
4/11/2009
4/12/2009
4/13/2009
4/14/2009
4/15/2009
4/16/2009
4/17/2009
4/18/2009
4/19/2009
4/20/2009
4/21/2009
4/22/2009
4/23/2009
4/24/2009
4/25/2009
4/26/2009
4/27/2009
4/28/2009
4/29/2009
4/30/2009
5/1/2009
5/2/2009
5/3/2009
5/4/2009
5/5/2009
5/6/2009
5/7/2009
5/8/2009
5/9/2009
Date

Avoiding Seedcorn Maggot Damage

- Plant on well-drained soils if possible
- Limit amount of organic matter
- If planting after cover crop, plow it down 3+ weeks before planting
- Plant when soils have warmed to
  70^{o} F if possible
- Soil insecticides?
- Foliar insecticides?

Soil Insecticides

- Admire and Platinum are labeled for use on cucurbits
- Neither have seedcorn maggots on the label
- High rate of Platinum will provide some control
- Brigadier looks promising for the future

Wireworms

- Feed on roots and stems of young plants
- Worse:
  - In cool, wet soils
  - Following sod or small grains
  - In heavier soils

Wireworms – Biology and Life Cycle

- Wireworms are the larval stage of the click beetle
- Many different species
- Larval stages last 1-5 years depending on species and location
- Females like to lay eggs in grasses
- Fields recently taken out of sod or with grassy weed problems are preferred for egg-laying

Wireworms in Muskmelons

- Wireworms also attack muskmelon fruit
- In 2009, we saw this damage for the first time in Indiana
- We visited recently harvested fields from which damaged melons had been picked but found no damage
- When we visited the packing shed, damaged melons were easy to find
- Damage seems to only occur on melons off the black plastic mulch

Why Are We Seeing This Problem Now?

- May be related to loss of Furadan
- Furadan has been known to be an effective insecticide for wireworm control for many years
- Other soil insecticides, Admire and Platinum, are relatively untested for effectiveness against wireworms in cucurbits

Predicting Your Likelihood of Having a Wireworm Infestation

- If you had a problem last year and plant in the same field again, you are likely to have problems because of long life cycle
- If the field you are planting into was sod recently or had a grassy weed problem, you are more likely to have problems
- Sampling can confirm presence of wireworms

Sampling for Wireworms

- Place a cup of flour or grain in hole about 10-12 inches deep
- Mark with a flag
- Return in 10-14 days and count wireworms
- If you find any, you have a potential problem

Wireworm Management

- Don’t plant cucurbits after small grains or sod
- Later planted melons will have less damage
- Use of plastic mulch to warm soil may reduce problems
- Sample with grain or flour bait stations
- Threshold = 1 wireworm per bait station
- No good recommendations for treatment

Striped Cucumber Beetle

- Overwinters as adults
- One generation per year
- Feeds on leaves, stems, fruit
- Transmits bacterial wilt

Striped Cucumber Beetle Damage

Important Points to Remember

- The only way to avoid bacterial wilt is to prevent beetle feeding

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- Cucumber beetles are not always present
- Cucumber beetles are not efficient vectors of bacteria

Bacterial Wilt of Cucurbits

- Muskmelons are very susceptible
- Cucumbers are somewhat susceptible
- Watermelons and most squashes are not susceptible

Cucumber Beetle Thresholds Direct Counts

- Muskmelons and cucumbers – 1 beetle per plant
- Watermelon and squash– 5 beetles per plant

Cucumber Beetle Management

- Seed-furrow or transplant applications of Admire or Platinum may give 2-4 weeks of control
- Seed treatments will give 2 weeks control (not recommended if using transplants)
- Sevin XLR
- Pyrethroids: Brigade, Mustang Max and Baythroid are better than Asana, Pounce/Ambush, or Ammo
- Spraying too much can reduce yield

Striped Cucumber Beetles/Plant
Vincennes, IN 2008

Treatment	Rate	May 22	May 29
Untreated	-----	0.86	2.39
Admire	16 fl. oz./A	0.00	0.39
Admire	24 fl. oz./A	0.13	1.68
Platinum	5 fl. oz./A	0.38	0.73
Platinum	8 fl. oz./A	0.03	3.55
Brigadier*	6 fl. oz./A	0.10	3.90
Hero	5 fl. oz/A foliar (weekly)	0.04	0.88

* Not Labeled

Planted April 25


Questions?