What’s Bugging You?

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Integrated Pest Management

types of ‘pests’

- foliar/indirect invertebrates
  - leafminer, leafhopper, mites, etc.
- fruit/direct invertebrates
  - plum curculio, apple maggot, codling moth, etc.
- infectious diseases/pathogens
  - apple scab, brown rot, fireblight
- vertebrates
  - deer, voles, rabbits
- physical/mechanical
  - bruising, limb rubs, hail
- nutritional/physiological
  - bitter pit, Mg deficiency, Honeycrisp ‘yellows’

definition of IPM

“IPM is a sustainable approach to managing pests by combining biological, cultural, physical and chemical tools in a way that minimizes economic, health, and environmental risks.”
Phenology - Bud Stage

**Peach**
- Bud swell
- Pink
- Bloom
- Fruit set
- Shuck split

**Apple**
- Half-inch green
- Pink
- Bloom
- Petal fall

**Weeds**
Mulch?

- effective ground cover management equals good vole management
- dwarf apple rootstocks and peach trees do not tolerate weed competition well
- glyphosate (Roundup) a good option for controlling weeds at base of tree
- mulch is another good option but beware voles
- at a minimum, base of tree should be weed-free, ideally extending 2-4 feet from trunk

VOLES!
Meadow vole damage

Mouse guards are good

Spiral plastic mouse guards are BAD!
Dogwood Borer

Ideal dogwood borer habitat

Apple maggot fly damage

Apple maggot fly

- over-winters in soil beneath apple trees outside a ‘drop-maintained’ orchard
- adults emerge in June-July, females start laying eggs 7-14 days later (180 eggs/female)
- Ladd traps are effective at eliminating pesticide sprays for apple maggot fly
• 4" dark red sphere
• Tangle Trap®
• Odor lure
• Placed early July
• Cleaned weekly

Begin treatment in early August
for mid-season & later varieties.

• Esfenvalerate (Ortho Bug-B-Gone Garden &
  Landscape®) good control, may increase
  other problems
• Carbaryl (Sevin®, Complete Insect Killer®)
  fair control
• Malathion (Malathion Concentrate®, in
  Bonide Fruit Tree Spray®, Malathion Plus®)
  fair control

RON PROKOPY—
1935-2004

botanical (organic)
insecticides
• rotenone
  – powerful fish poison, kills birds, respiratory
    inhibitor
  – contact and stomach poison for insects
    with chewing mouth parts
  – modest activity against curculio and apple
    maggot
  – use caution when using
  – Environmental Impact Quotient 33
  – (Imidan 24)
botanical (organic) insecticides

- Pyrethrum
  - moderately toxic to mammals, do not appear to be harmful to bees
  - paralytic nerve poison to aphids, leafhoppers, ladybugs, and other beneficials
  - homemade spray with pyrethrum daisies in alcohol
  - EIQ = 18

botanical (organic) insecticides

- Neem oil
  - Azadirachtin (‘Trilogy’)
  - broad spectrum repellent and insect growth regulator
  - interferes with larvae development
  - modest activity at best as a repellent though
  - oil formulations may provide some disease suppression
  - EIQ = 13

elemental fungicides

- Copper
  - broad spectrum biocide
  - fire blight
  - apple scab
  - PHYTO-TOXICITY
  - Bordeaux Mixture
    - copper plus hydrated lime
  - EIQ = 34 - 48; 68 (Captan 16)

elemental fungicides

- Sulfur
  - an effective, protectant, fungicide
  - short activity span
  - liquid forms easier to use than powder/dry formulations
  - must be applied before a scab infection period
  - required fungicide for apple scab control on susceptible varieties
  - EIQ = 46
plum curculio

- perhaps most challenging pest
- move into orchard at pink
- fruit most susceptible at 7-15 mm
- warm, showery weather @ dusk conducive to 'attack'
- ‘limb tapping’ an effective way to monitor
- Imidan very effective control
“Organic growers need to be satisfied with knocking the *screaming roar* of plum curculio down to a *dull murmur.*”

*Michael Phillips in ‘The Apple Grower’*

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**Treatment begins at petal fall.**

- **Esfenvalerate (Ortho Bug-B-Gone Garden & Landscape®)** good control, may increase other problems
- **Carbaryl (Sevin®, Complete Insect Killer®)** fair control, possible fruit thinning
- **Malathion (Malathion Concentrate®, in Bonide Fruit Tree Spray®, Malathion Plus®)** fair control
codling moth

- locally abundant or practically non-existent
- key is to get rid of wild or domestic (unmanaged) hosts
- ryania sprays have worked good, applied based on DD model from first trap catch (243 base 50); 2nd spray at 465 DD; Imidan conventional
- oriental fruit moth, lesser apple worm

oblique-banded leafroller

- characteristic ‘flagging’ of leaves weaved together in early summer by larvae
- ‘corking’ damage on fruit from later generations (Cortland particularly susceptible)
- can be monitored with pheromone traps
- Bt applications help (DiPel) as do some other pesticide applications
European APPLE SAWFLY

Horticultural oil (Volk Oil Spray®) green tip to tight cluster

leafminers
Peach insects -- key pests

- Oriental fruit moth
- Borers
- Plant bugs -- ‘catfacing’ insects
- Plum curculio
- Scale
- Aphids
- Japanese beetles
**Oriental fruit moth**

- Monitoring:
  - Trap catch
  - Flagging
  - Fruit Infestation

**Plum Curculio**

- Adult
- Early Egg Scar
- Shuck Feeding
- Late Scar & Entry
- Sampling:
  - Fruit sampling
  - Beating trays
  - Traps?

**Scale Insects**

- SJS on old wood
- SJS on Peach
- Sampling:
  - Traps
  - Plant Sampling
  - At harvest exams
- SJS on young wood
- WPS on peach

**Green Peach Aphid**

- Colony
- Early feeding on nectarine
- Damage on mature nectarines
**Catfacing Insects**

- Tarnished Plant bug
- Stink bugs

Monitoring:
Sweep net samples - groundcover.
Beating tray counts.
Weekly fruit counts - 200/sample.

**What is Not Catfacing Injury**

Injury often associated with cold temperatures during fruit set, marked by internal gumming around pit.

**Peachtree borers**

**Cultural control of borers**

- Maintain tree health, nutrition
- Paint trunks and lower scaffolds white
- Don’t use plastic mouseguards!
- Keep base of tree weed- and debris-free
- Use a wire to kill larvae?
Peach diseases -- key pathogens

- Leaf curl
- Peach scab
- Brown rot (blossom blight)
- Bacterial spot

Brown rot

- Blossom blight with gumming and new canker
- Mummy, a good source of spores

Peach leaf curl

- Fungus
- Over-winters in buds
- Annual control
- Dormant application
- Copper, fungicides

Bacterial spot

- Bacteria
- Cool, rain, wind
- Copper sprays
- Cultivar susceptibility
Bacterial spot monitoring

New lesions from recent rain, irrigation, or dew.

Older lesions, 1-2 weeks old, marked by shot holes. Leaves dropping.

Peach Scab

Overwintering wood lesions

Fruit phase

Plum diseases: Black knot

- Fungus
- Rainfall
- Grows in spring and fall
- Control
  - Remove wild hosts
  - Prune out
  - Cultivar susceptibility
VR = very resistant. No control needed. (Very few cultivars in this category for any disease.)
R = resistant. Control only needed under high disease pressure.
S = susceptible. Control usually needed where disease is prevalent.
HS = highly susceptible. Control always needed where disease is prevalent.

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Resources

- NYS IPM Fact Sheets for Tree Fruit
- Small Scale Fruit Production
  - [http://ssfruit.cas.psu.edu/](http://ssfruit.cas.psu.edu/)
- Pro New England
  - [http://www.pronewengland.org/](http://www.pronewengland.org/)

Web Resources

- Gardener’s Supply Company
  - [http://www.gardeners.com](http://www.gardeners.com)
- Gemplers
  - [http://www.gemplers.com](http://www.gemplers.com)
- Great Lakes IPM
  - [http://www.greatlakesipm.com](http://www.greatlakesipm.com)