

What's Bugging You?

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Extension Educator



UMASS
AMHERST



Integrated Pest Management



Disease

Quality

Weeds

Insects

Modeling

Nematodes

Resistant Varieties

Monitoring

Weather Prediction

Ground Cover Management

Fertility

Mating Disruption

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.”

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'



Monday, April 29, 13



half-inch green



pink



bloom



petal fall

apple



Phenology - Bud Stage

pink

bloom

peach

**Fruit set -
shuck split**

Phenology - Bud Stage



bud swell



pink

bloom

peach

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Phenology - Bud Stage



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WEEDS



Mulch?

weeds

- 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



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Voles



Voles

VOLES!

Voles

VOLES!



Voles



VOLES!





Pine vole
damage

Pine vole damage





Meadow vole
damage



Meadow vole damage



Mouse guards
are good



**Spiral plastic
mouse guards
are BAD!**





Monday, April 29, 13

Dogwood BORER



ideal dogwood borer habitat





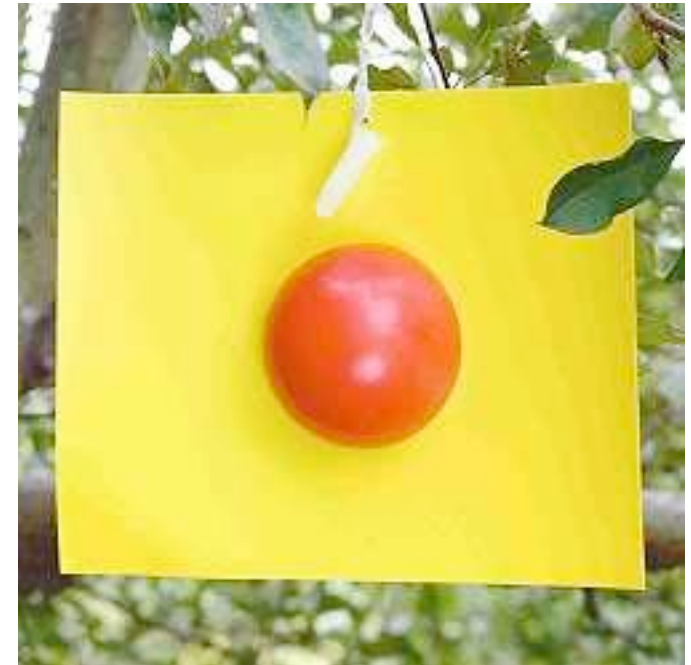
Apple maggot fly damage

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**



- 4" dark red sphere
- Tangle Trap[®]



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- **Tangle Trap[®]**
- **Odor lure**



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- **Tangle Trap®**
- **Odor lure**
- **Placed early July**



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- **Tangle Trap®**
- **Odor lure**
- **Placed early July**
- **Cleaned weekly**



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





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- ~~Esfenvalerate (Ortho Bug B Gone Garden & Landscape[®]) good control, may increase other problems~~



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- Esfenvalerate (~~Ortho Bug B Gone Garden & Landscape[®]~~) ~~good control, may increase other problems~~
- Carbaryl (Sevin[®], Complete Insect Killer[®])
fair control



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- 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

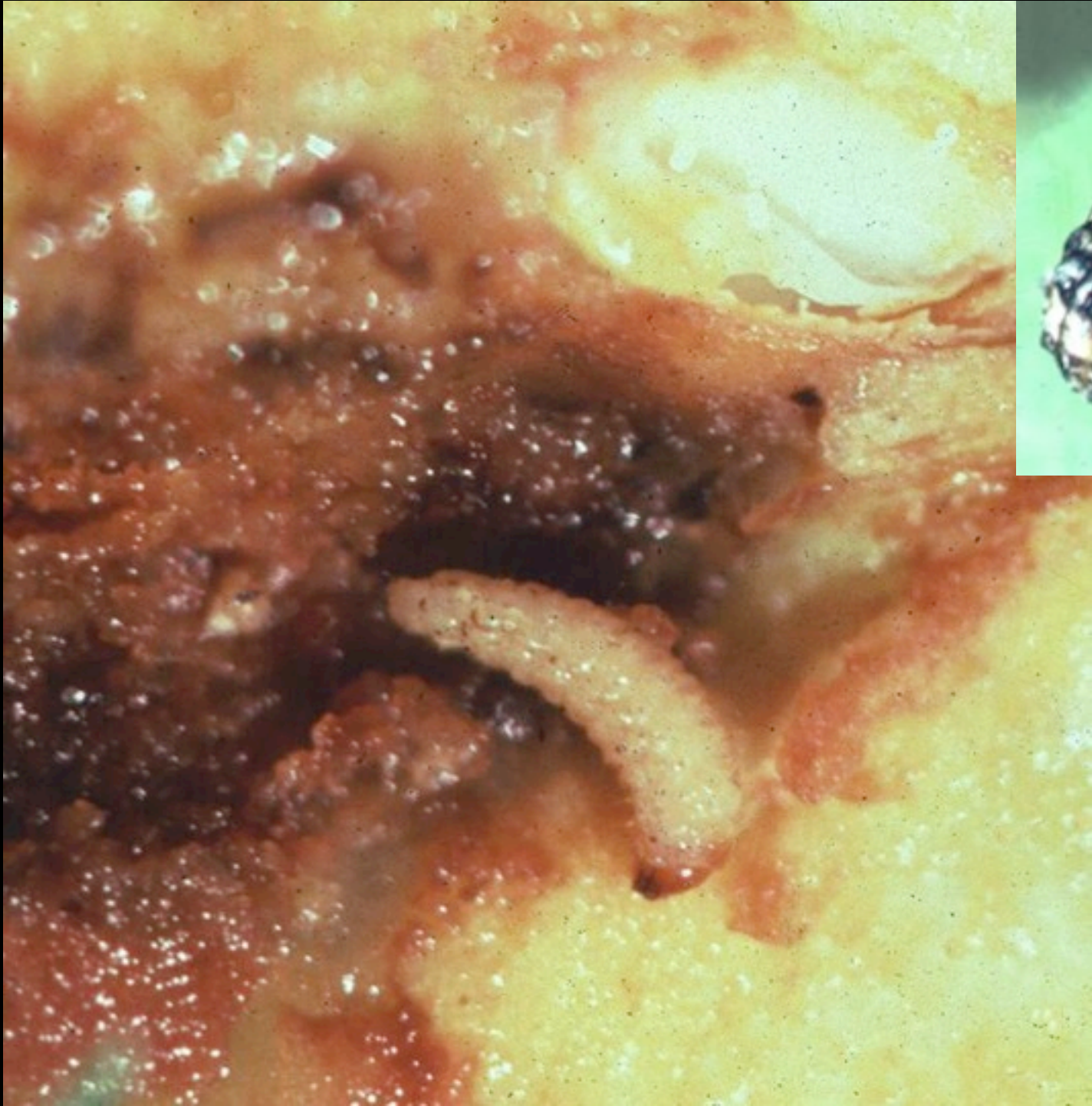


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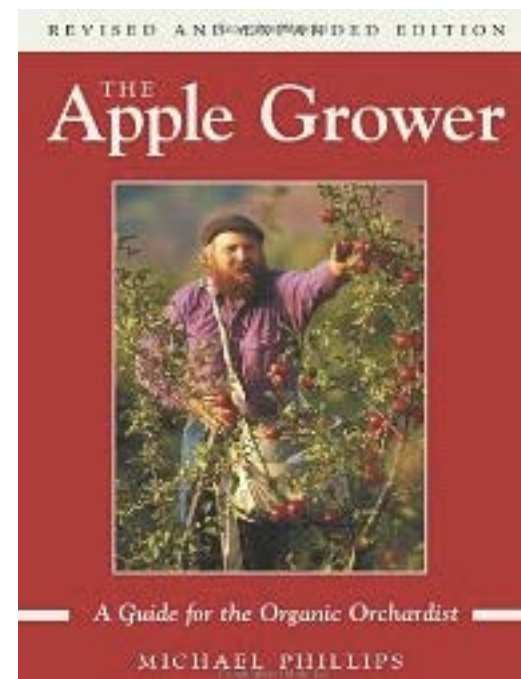


plum curculio

- 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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fall.**



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SURROUND®





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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



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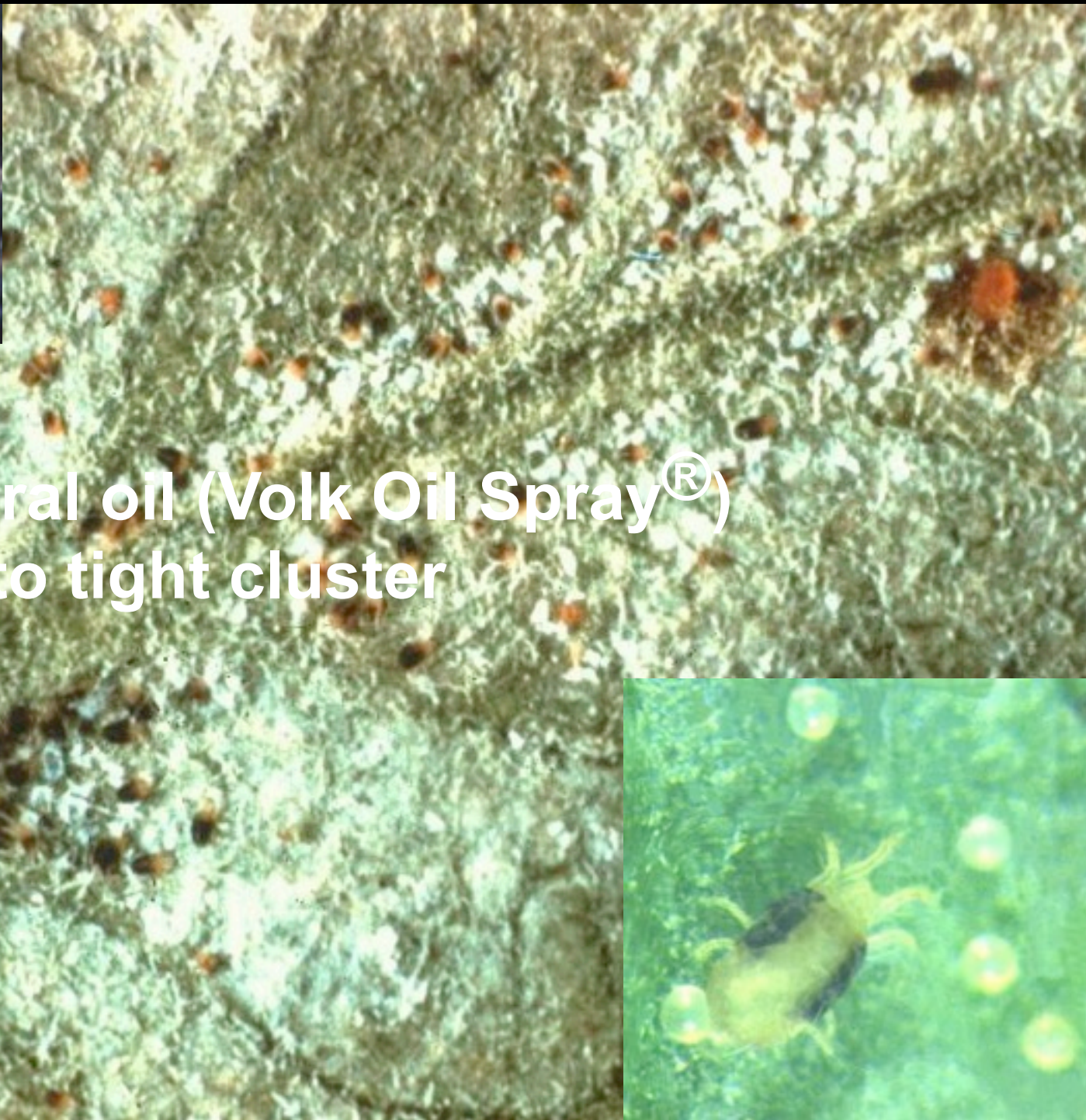
oblique-banded leafroller

- 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



MITES



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





MITES

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





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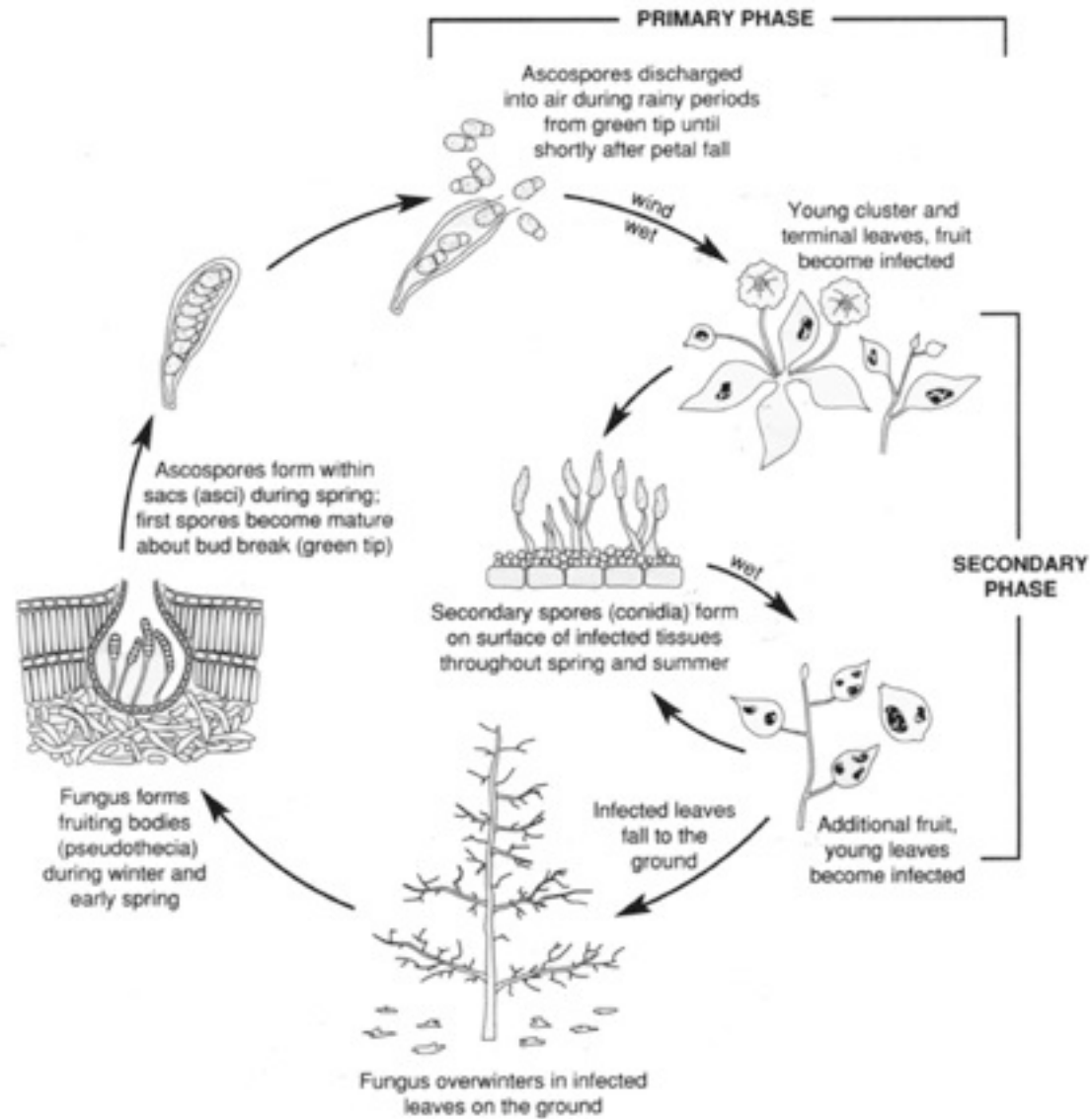
APPLE SCAB







APPLE SCAB DISEASE CYCLE



Apple scab control

- Begins at green-tip
- Continues through primary infection period
- Intensity of infection depends on rain and leaf wetness
- Captan + [Daconil (Chlorothanil)]
- Sulfur
- Scab-resistant cultivars

apple scab control cont.

- sanitation
- mowing
- Mills Table
- focus on primary scab season



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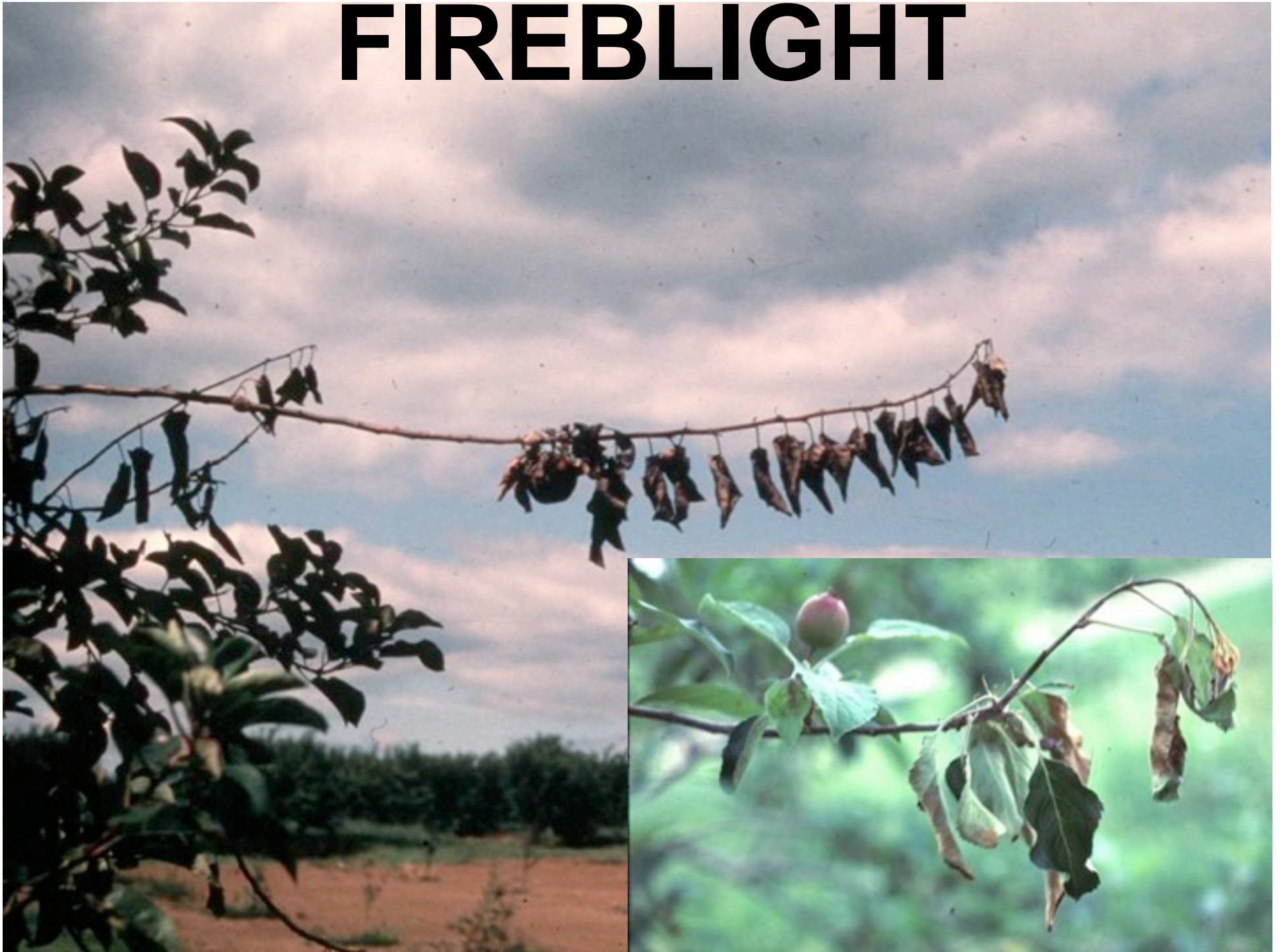


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FIREBLIGHT



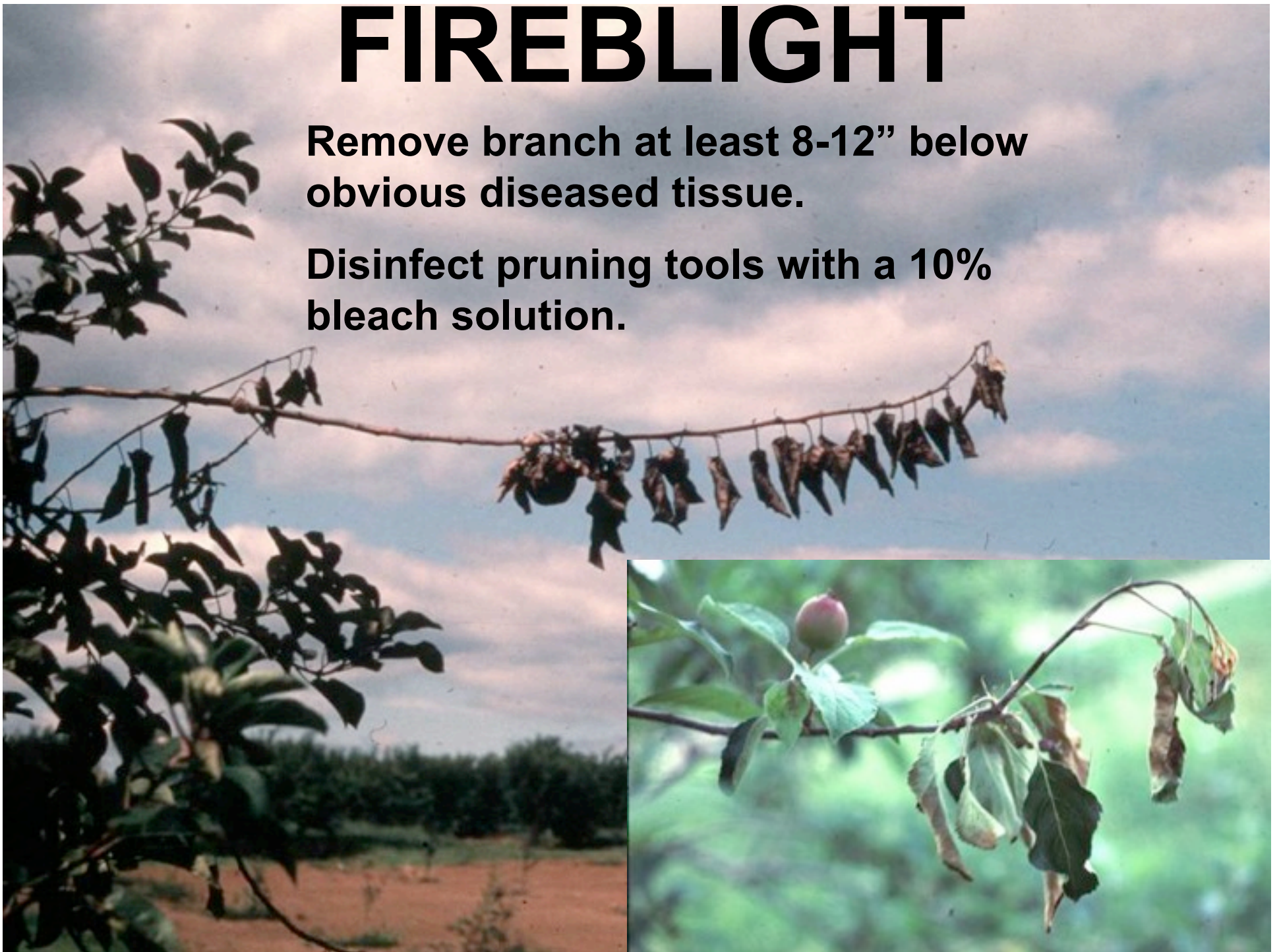
FIREBLIGHT



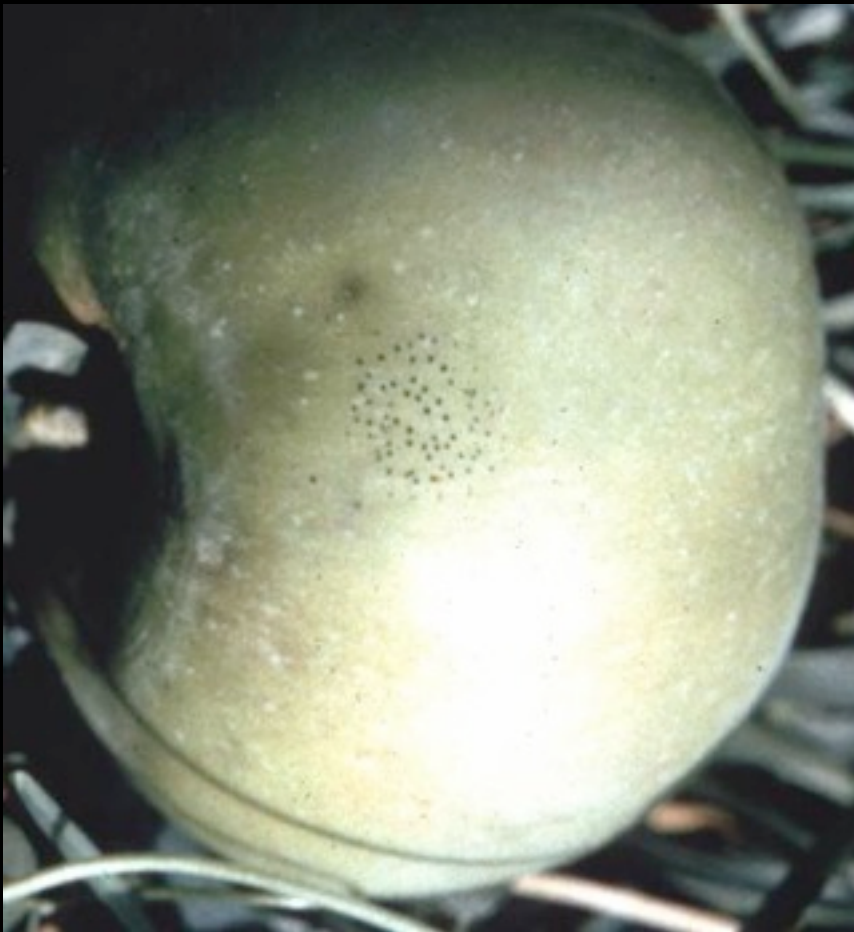
FIREBLIGHT

Remove branch at least 8-12" below obvious diseased tissue.

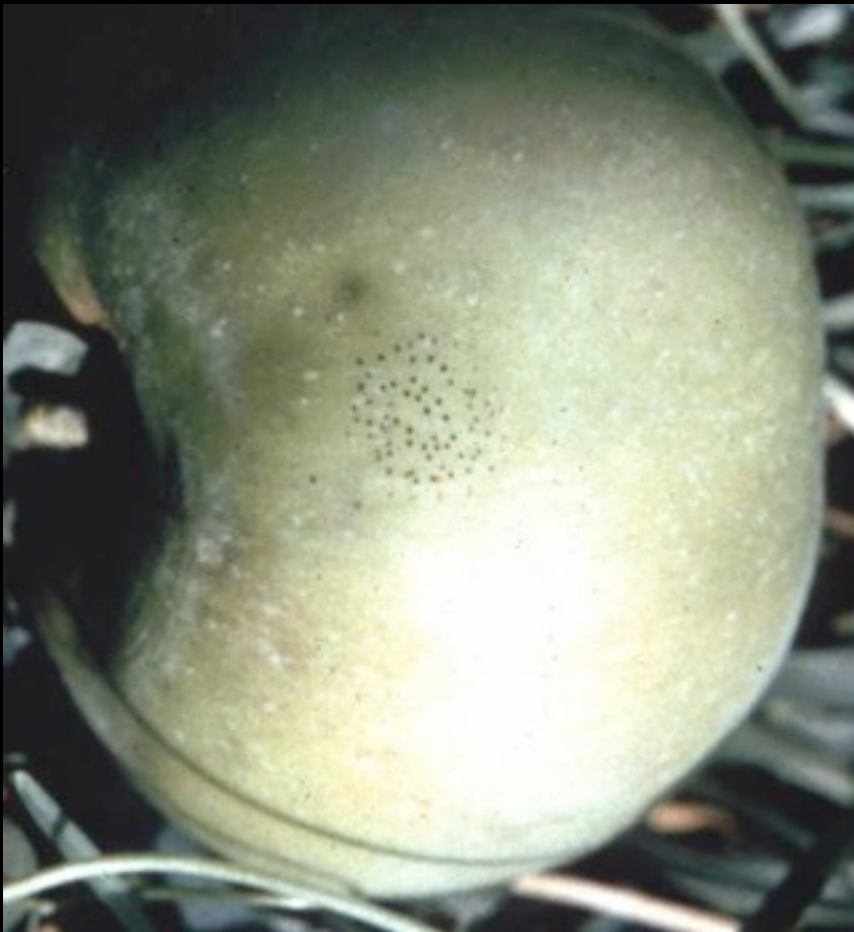
Disinfect pruning tools with a 10% bleach solution.



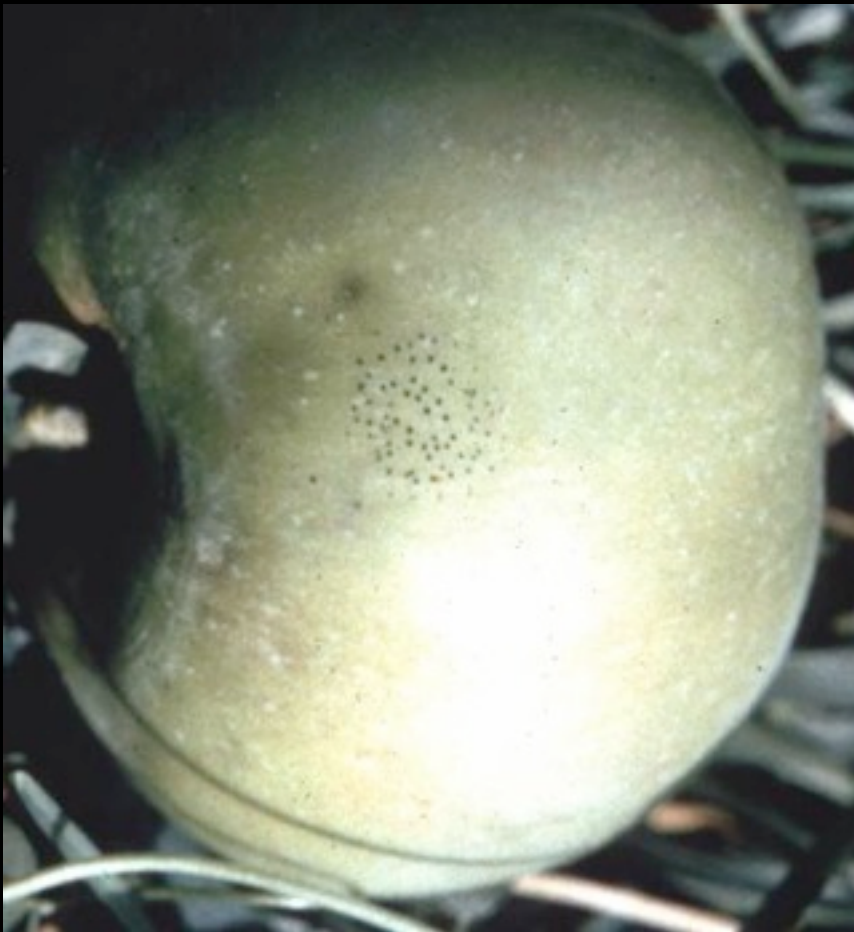




FLYSPECK



FLYSPECK



SOOTY

BLOTCH





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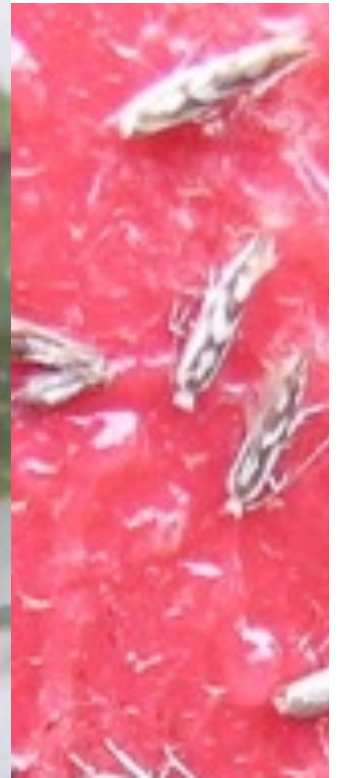


leafminers

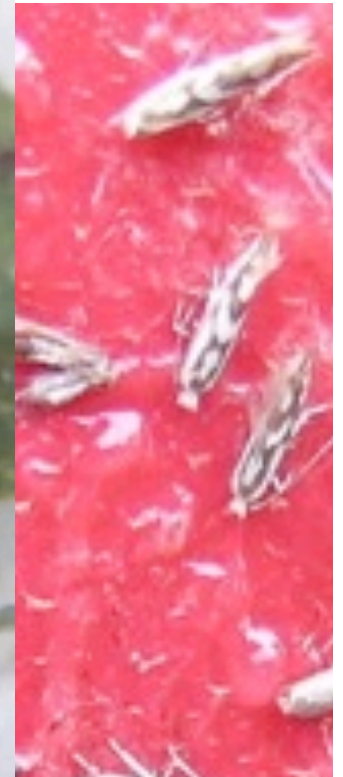
- apple blotch and spotted tentiform
- several generations
- 1st appears at tight-cluster to pink
- indirect pest
- minor problem in the home orchard
- *but...*



leafminers



leafminers



aphids

- green apple aphid
 - natural predators generally take care of
 - use strategies that preserve predators
- **!!!rosy apple aphid!!!**
 - potentially more trouble
 - Cortland, Jonagold, Golden Delicious
 - overwinters on narrow-leaf plantain
 - oil application can be effective



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green pug moth



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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

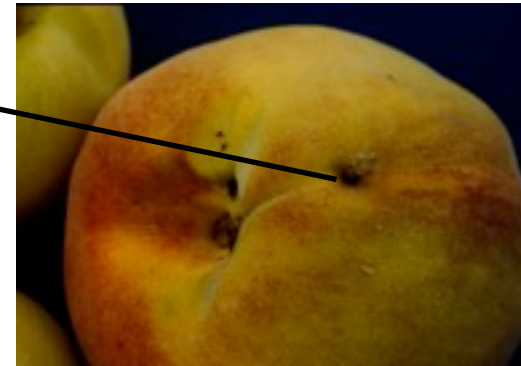


Early Egg Scar

Shuck Feeding



Late Scar & Entry



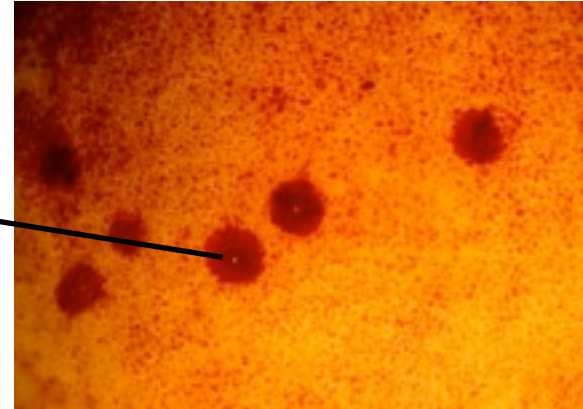
Sampling:
Fruit sampling
Beating trays
Traps?

Scale Insects



SJS on old wood

SJS on Peach

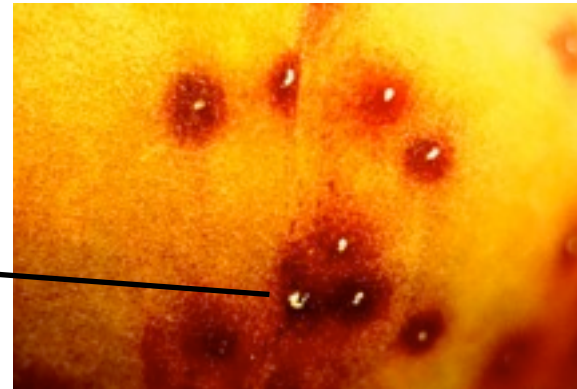


Sampling:
Traps
Plant Sampling
At harvest exams



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



Photo 1-124

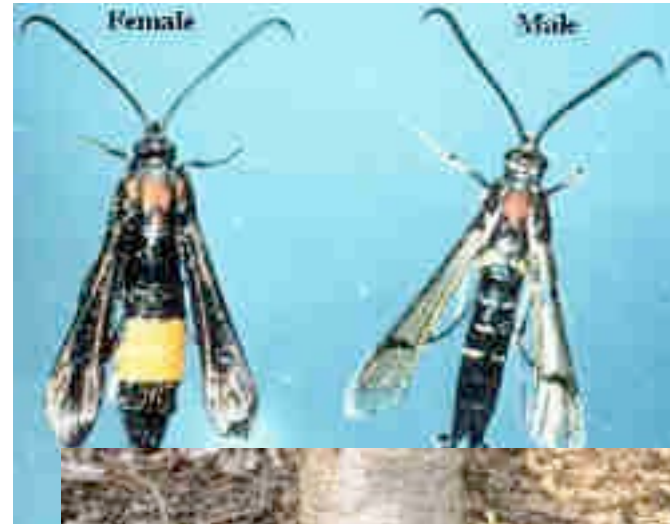


Photo 1-128

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



Fruit phase



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

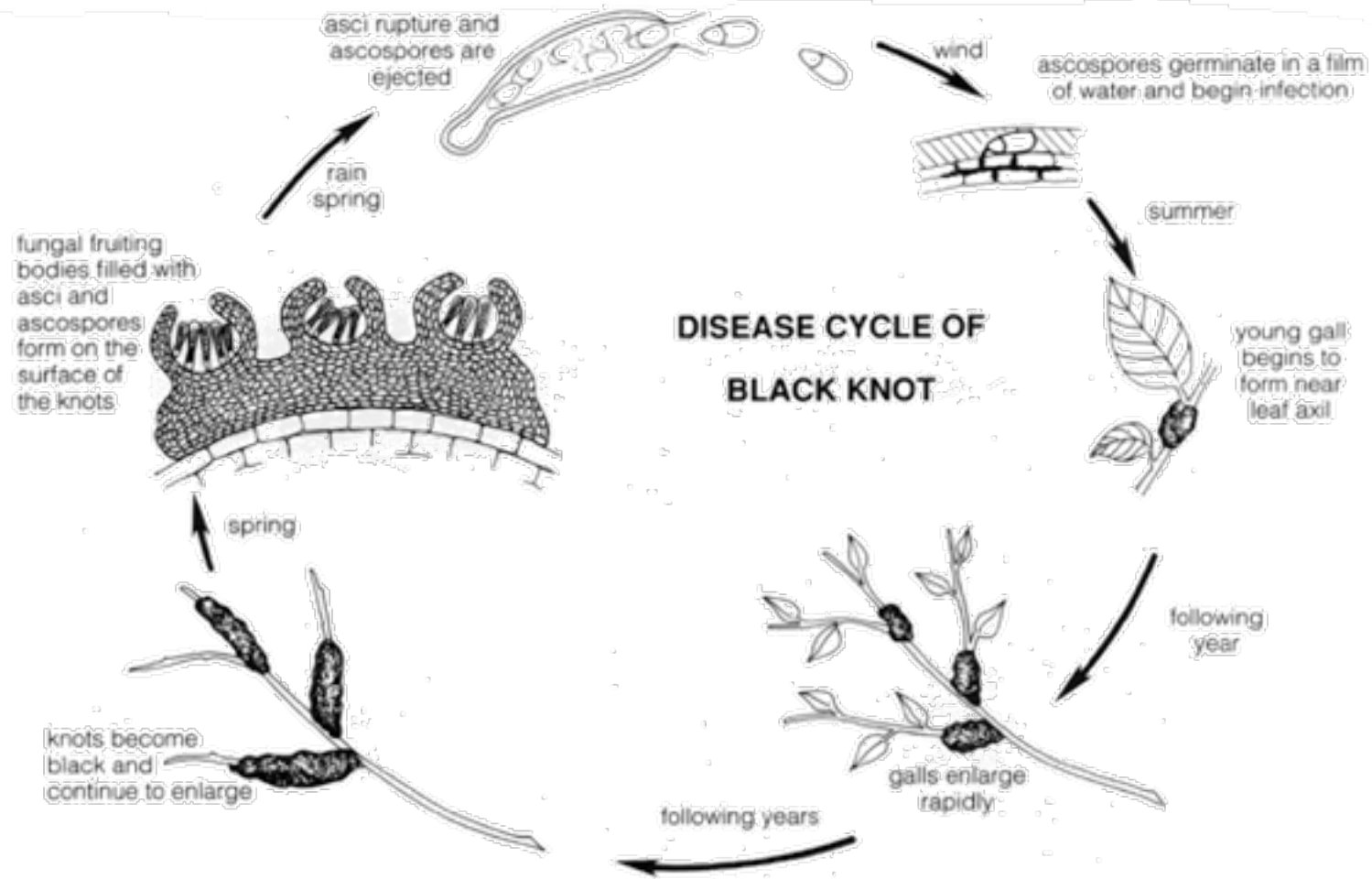


Fruit phase

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.

Bluefre	HS
Bradshaw	S
Damson	HS
Early Italian	S
Fellenburg	S
Formosa	R
Methley	S
President	VR
Santa Rosa	R
Shiro	R
Shropshire	HS
Stanlye	HS

Resources

- NYS IPM Fact Sheets for Tree Fruit
 - <http://www.nysipm.cornell.edu/factsheets/treefruit/default.asp>
- Small Scale Fruit Production
 - <http://ssfruit.cas.psu.edu/>
- Pro New England
 - <http://www.pronewengland.org/>

WVU -- Kearneysville

- Chemical control -- home orchardists
 - <http://www.caf.wvu.edu/kearneysville/vadisbul.pdf>
- Index of Fruit Insect/Disease Pests
 - <http://www.caf.wvu.edu/kearneysville/wvufarm9.html>
 - <http://www.caf.wvu.edu/kearneysville/wvufarm8.html>

Web Resources


- Gardener's Supply Company
 - <http://www.gardeners.com>
- Gemplers
 - <http://www.gemplers.com>
- Great Lakes IPM
 - <http://www.greatlakesipm.com>

UNH Cooperative Extension – Fruit Injury from Vertebrate Pests

http://extension.unh.edu/Agric/AGPMP/Apples/Arthropod.htm alan eaton

Address Book Gmail .Mac Apple PayPal UMail Amazon eBay Orchard Radar News (2195) Apple (304) Fruit =

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Apples

- Arthropod Fruit Injury
- Infectious Disease/Pathogens
- Physical & Mechanical Fruit Injury
- Nutritional & Physiological Fruit Injury
- Fruit Injury from Vertebrate Pests
- Injury to NH Apple Foliage and Twigs
- Beneficial Insects and Mites in NH Apple Trees


Arthropod Fruit Injury

Plum Curculio: I see two forms of PC injury.

1) Typical PC injury is created when the fruit is very young. It is a healed scar, up to one inch (size depends on fruit enlargement) long. It often takes on a D shape, with the flap (under which the egg was laid) still discernible along the straight edge. Sometimes the middle of that straight edge is interrupted by a buldge of grainy tissue (where the egg was). If the egg hatched, the fruit may be gnarled and misshapen, and cutting it open may reveal the (now healed) signs of the tunnel made by the larva. 2) Late PC injury is from newly emerged adults (August); a relatively fresh hole 2-3mm in size, usually oval, with some necrotic edges. Skin has not had time to heal over. Location is usually on shoulder of stem end, or on bottom ridge, toward calyx end.



Tarnished Plant Bug: TPB injury is a dimple with a grainy spot in the center, OR a grainy spot (roughly round) with a dimple in the center. Often much of the TPB injury in an orchard is hidden in the calyx end, where only inquisitive entomologists would look.



European Apple Sawfly: Two Forms: 1) Elongated, curving grainy scar on the fruit surface, which