

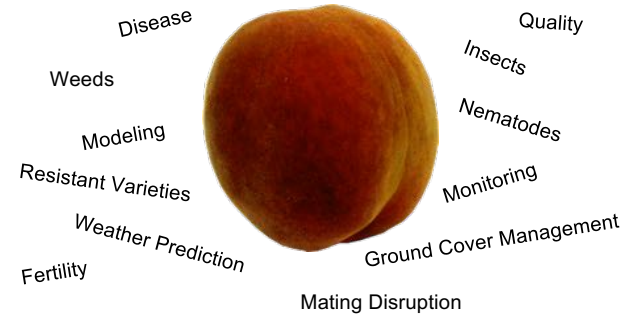
What's Bugging You?

Jon Clements
Extension Educator



Mass Aggie, 8-April, 2017 @ Dowse Orchard

Integrated Pest Management



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’



half-inch green

pink

bloom

petal fall

apple

Phenology - Bud Stage

bud swell

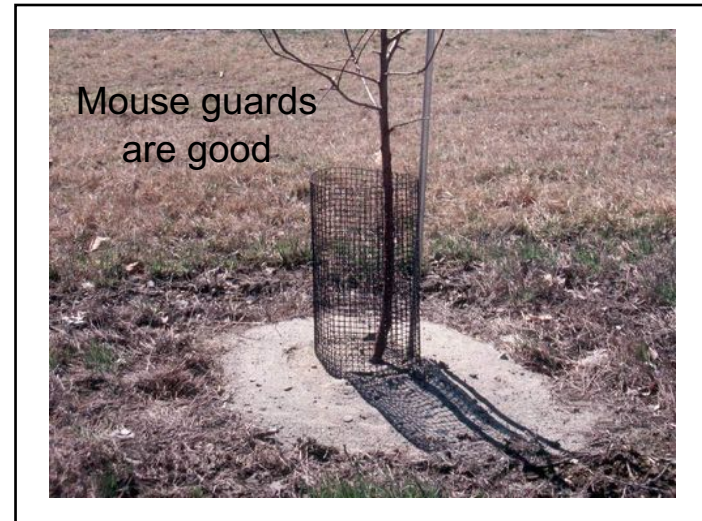
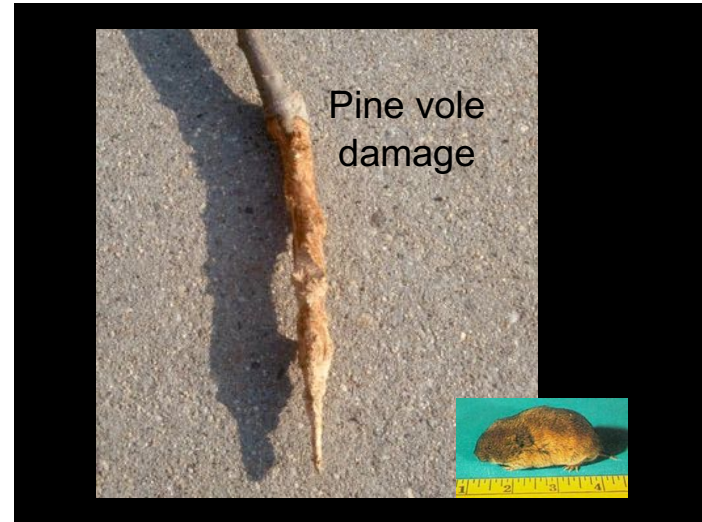
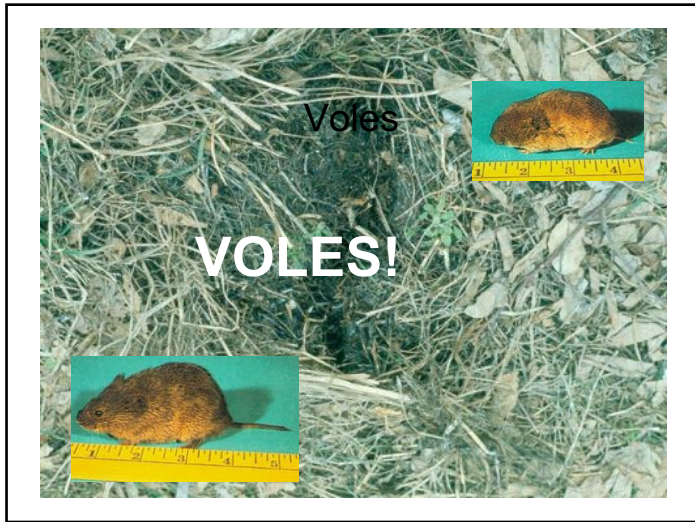
pink

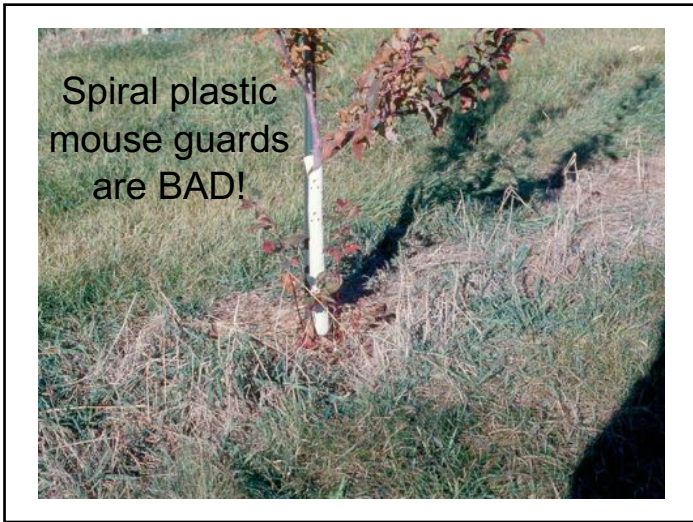
bloom

peach

Fruit set
shuck split










apple maggot fly

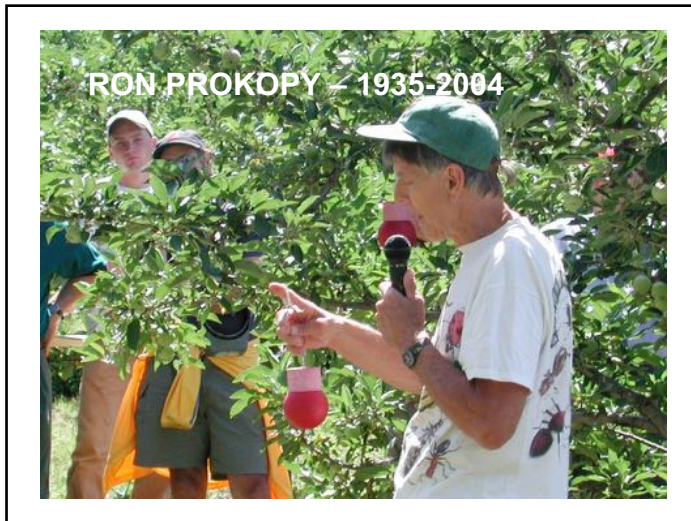
- over-winters in soil beneath apple trees outside a 'drop-maintained' orchard
- adults emerge in June-July, females start laying eggs 7-14 days later (180 eggs/female)
- Ladd traps are effective at eliminating pesticide sprays for apple maggot fly



- 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



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)
 - farm worker + consumer + ecological

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



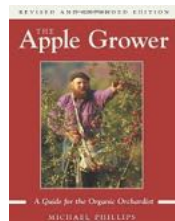


plum curculio

- 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

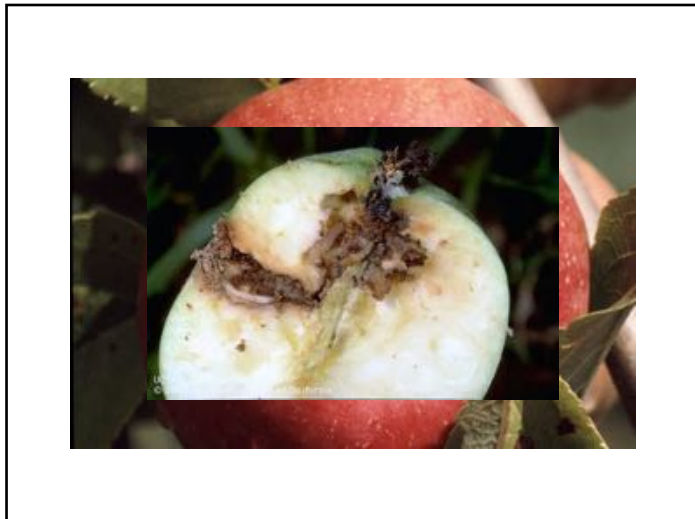
“Organic growers need to be satisfied with knocking the *screaming roar* of plum curculio down to a *dull murmur*.”

Michael Phillips in 'The Apple Grower'



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

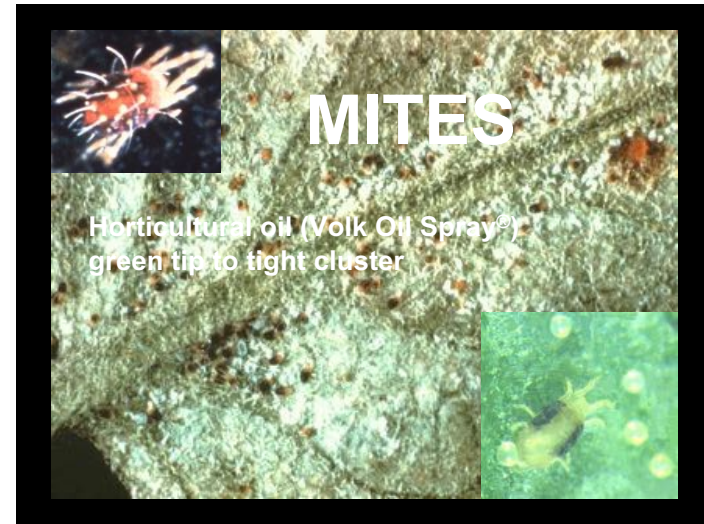
- locally abundant or practically non-existent
- key is to get rid of wild or domestic (unmanaged) hosts
- ryania sprays have worked good, applied based on DD model from first trap catch (243 base 50); 2nd spray at 465 DD; Imidan conventional
- oriental fruit moth, lesser apple worm

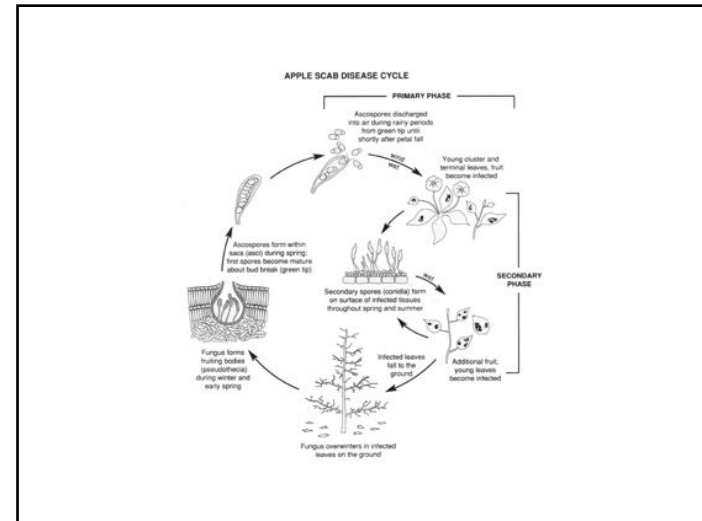
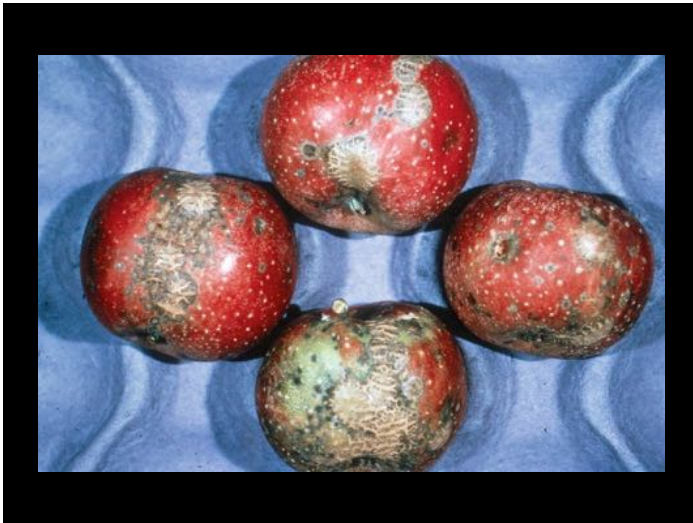


oblique-banded leafroller

- 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







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



FIREBLIGHT

Remove branch at least 8-12" below obvious diseased tissue.
Disinfect pruning tools with a 10% bleach solution.

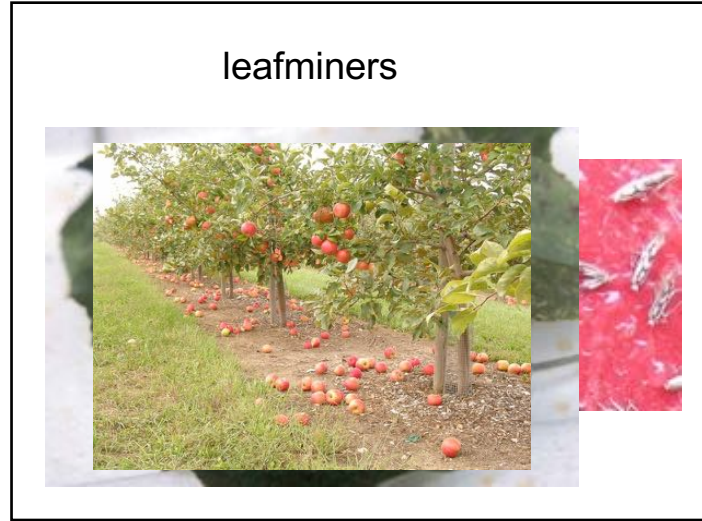
A photograph of a tree branch with brown, dead leaves, illustrating fireblight. An inset image shows a close-up of a branch with a small, dark, shriveled fruit, also affected by fireblight.

FLYSPECK SOOTY BLOTCH

Two side-by-side photographs of apples. The left photo shows a green apple with small, dark spots (flyspeck). The right photo shows a yellow-green apple with large, dark, irregular spots (sooty blotch).



leafminers



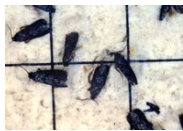
green pug moth

Peach insects -- key pests

- Oriental fruit moth
- Borers
- Plant bugs -- 'catfacing' insects
- Plum curculio
- Scale
- Aphids
- Japanese beetles



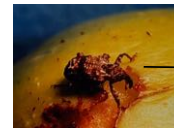
Oriental fruit moth



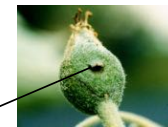
Monitoring:
Trap catch
Flagging
Fruit Infestation



Plum Curculio



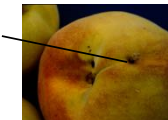
Adult



Early Egg Scar

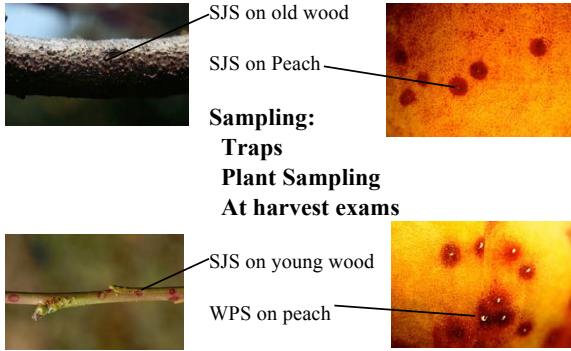


Shuck Feeding



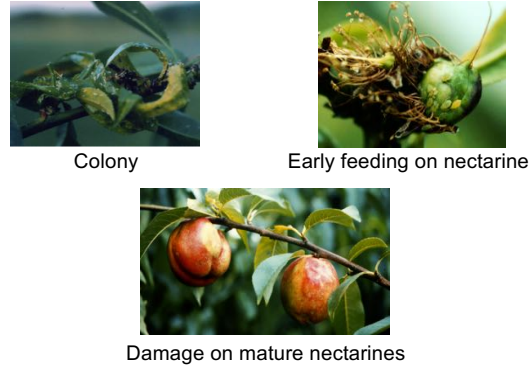
Late Scar & Entry
Sampling:
Fruit sampling
Beating trays
Traps?

Scale Insects



Sampling:
Traps
Plant Sampling
At harvest exams

Green Peach Aphid



Catfacing Insects



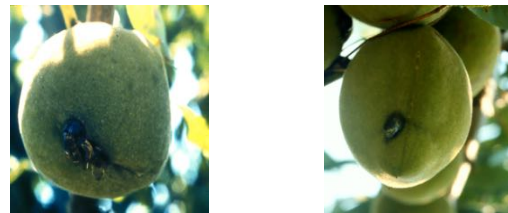
Tarnished Plant bug



Stink bugs

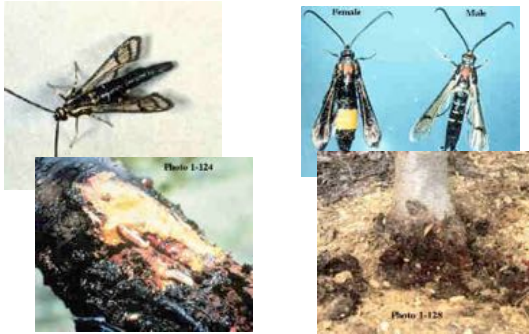
Monitoring:
 Sweep net samples -
 groundcover.
 Beating tray counts.
 Weekly fruit counts -
 200/sample.

What is Not Catfacing Injury



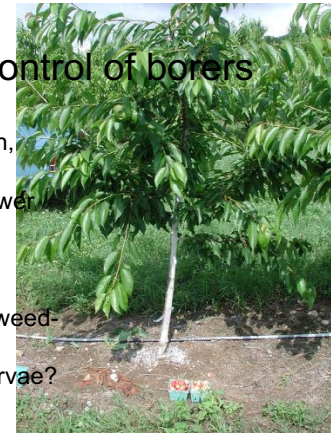
Injury often associated with cold temperatures during fruit set, marked by internal gumming around pit.

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



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



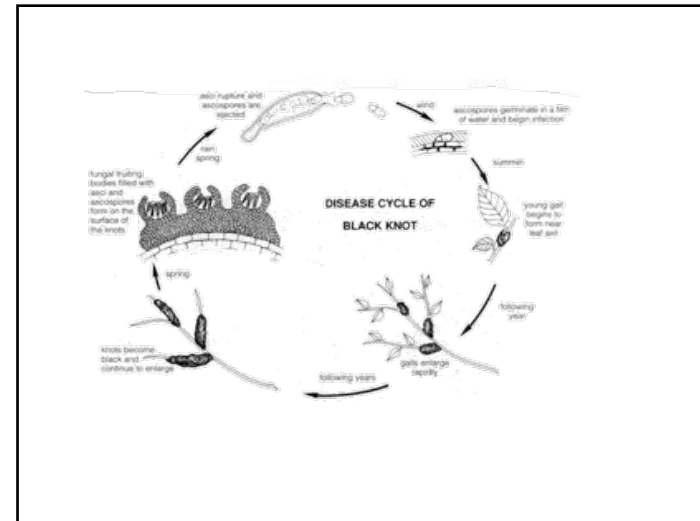
Overwintering wood lesions



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://ssfuit.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>