Basic knowledge of insect life cycle is important for control..... additionally, Learn your plant material & their most common pests....Scout the landscape
Common Insect Pests in Virginia

- Aphids
- Hemlock Woolly Adelgid
- Spider Mites
- Lacebugs
- Scale Insects
- Japanese Beetle
- Boxwood leafminer
- Bagworms
- Eastern Tent Caterpillar
- Borers
- Fire Ants
- Exotic introductions
Types of Insect Damage

- **Plant sucking insects**
  - Aphids, spider mites, lacebugs, scales
    - Stippling of leaves

- **Leaf chewing insects**
  - Caterpillars, Beetles
    - Webworms, Eastern tent Caterpillar, Japanese Beetle

- **Wood boring insects**
  - Beetles, moths
  - EAB, ALB
Aphids

- "Plant lice" infest almost any plant
- Piercing-sucking mouthparts for sucking plant juices
- Transmit viral diseases
- Largest numbers occur in spring, but are found throughout the year
- Monitor new plant growth for curling, distorted leaves
- Honeydew and sooty mold
Aphid Management

- Do not spray when plants are flowering and honeybees are active.
- Be aware of lady beetles, aphids lions, syrphid larvae, and other populations.
- Use less toxic and less hazardous materials in public areas, around homes, and where plants are to be moved or transplanted.
Hemlock Woolly Adelgid
- Feed at base of needles, causing dessication & needle loss
- Native to China and Japan
- Hemlocks have little or no resistance
- Wind, birds, deer, humans help spread HWA
- Tree mortality w/ 4 years of infestation
Hemlock Woolly Adelgid

- Biocontrol agents - insect and fungal.
- Horticultural oils work very well but need good coverage and while plant is dormant.
- Imidacloprids (Merit) are effective as basal trunk spray
Biological Control of HWA

- Research has been done on lady beetle predators in China and Japan - *Sasajiscymnus tsugae*
- *Laricobius nigrinus* (Coleoptera) program at Virginia Tech – native to the Pacific northwest
- Rearing done in VA Tech lab
Spider Mites

- "Stippling" on leaf surfaces
- Check undersides of leaves or middle of plant
- "tap test" - use white surface, tap leaf, if 10 or more mites dislodged, spray is recommended.
- Multiple life stages from April to November, so apply treatments as needed spring thru fall.
Lacebugs

- Feed on underside of leaves
- Sucking insects – limit photosynthesis and destroy appearance
- Azalea lacebugs overwinter as eggs and hatch in spring, usually after danger of frost is over
- Several generations – need to monitor first to prevent most damage
Scale Insects

- Large or tiny, white or brown “bumps” are found on leaves, twigs, bark or fruit
- Scale insects are also “sap suckers” and cause loss of vigor and even death
- Over 3000 species in North America
- Hard-shelled and soft scales
- Common scales in this area:
  - Euonymus scale, camellia scale, obscure scale
  - White peach scale, wax scale
Euonymus Scale

Females

Males
white peach scale

Obscure scale

tea scale
Cottony Camellia Scale

P. Shrewsbury

Cottony maple leaf scale ovisacs on dogwood in late April (too early to spray).
Wax Scale
Control of scale insects

- Females lay eggs or give birth to living young called crawlers
- Crawler stage is vulnerable to insecticides
- Generally crawl in May & June, then again in August & September, if more than one generation
- Many natural predators
- Horticultural oil in general, malathion for crawlers
### NURSERY CROPS: Insects

<table>
<thead>
<tr>
<th>Pest</th>
<th>Control</th>
<th>Timing of Treatment</th>
<th>Remarks</th>
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<tbody>
<tr>
<td>SCALE INSECTS (All scales)</td>
<td>dinotefuran</td>
<td>Treat with horticultural oil in late March or early April before new growth develops, and when temperatures are not likely to go below 40°F (5°C) for 12- to 24-hours. Oils can also be used as summer sprays when indicated on the label.</td>
<td>Do not spray oil-sensitive plants listed under precautions on the label. Be sure to follow the dosage rates given on the label for the various scale species. Thiomethoxam is labeled for softscales.</td>
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<tr>
<td></td>
<td>horticultural oil</td>
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<td></td>
<td>imidacloprid</td>
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<td>lambda-cyhalothrin</td>
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<td>thiomethoxam</td>
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<td>Azalea bark scale</td>
<td>carbaryl</td>
<td>Crawlers: June 5-25. Treat June 10-30.</td>
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<td>diazinon</td>
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<td>insecticidal soap</td>
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<td>lambda-cyhalothrin</td>
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<td>malathion</td>
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<tr>
<td>brown soft scale</td>
<td>bifenthrin</td>
<td>Treat when scale insects appear. Treat 2-3 times at 10-day intervals.</td>
<td>This scale insect does not winter out-of-doors in colder plant zones of Virginia.</td>
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<tr>
<td></td>
<td>buprofezin</td>
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<td>carbaryl</td>
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<td>fenoxycarb</td>
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Defoliators
Bagworm
Bagworm

- Females are wingless and never leave the bag
- Winter is spent as eggs inside bag
- Hatch in May and June, larvae disperse on silken threads that are “ballooned” by wind
- In August, larva is fully matured and in late August, Sept. after pupation, males leave bags and mate, females lay eggs and die
Bagworm larvae

Apply treatments when bags are less than 1/2 inch. Late May in coastal Virginia, early to mid-June elsewhere. Controls less effective in mid-late summer. DD-600

Lightly misting the foliage is sufficient. Mist blower treatments are effective. Do not use the more toxic or hazardous materials in public areas or around homes. Carbaryl and permethrin may lead to mite increases. Light infestations can be handpicked and destroyed. Dimethoate and bendiocarb are being phased out.

Treat larvae in mid to late June
- Bt

http://pubs.ext.vt.edu/456/456-017/456-017-04-NurseryCrops.pdf
Eastern Tent Caterpillar
Japanese Beetle
an invasive pest since 1916
JULY  AUG.  SEPT.  OCT.  NOV.  DEC.  JAN.  FEB.  MAR.  APRIL  MAY  JUNE

BEETLES FEED ON FOLIAGE, BLOOM, AND FRUIT.

- July: Grubs in winter cell
- August: Grub changes to pupa, then to adult which emerges from ground
- September: Grub feeds near surface
- October: Grub lays eggs in ground
- November: Grubs go down 3 to 12 in. and make winter cells
- December: Grubs continue to feed and grow
- January: Grubs hatch young grubs feed near surface
- February: Grub forms cell and prepares to pupate
- March: Grub forms cell and prepares to pupate
- April: Grub changes to pupa, then to adult which emerges from ground
- May: Grub changes to pupa, then to adult which emerges from ground
- June: Grub changes to pupa, then to adult which emerges from ground
Parasitic Nematodes: Irrigate turf before and after.

*Bacillus thuringiensis* (Bt): small grubs (mid-summer treatments) *Bacillus thuringiensis* (Bt) is a naturally occurring bacterial disease of insects. Bt insecticides do not have a broad spectrum of activity, so they do not kill beneficial insects.

Milky Spore: need dense larval population and several years to build up spores.

Parasites: for both grubs and adults are being established.

http://www.oardc.ohio-state.edu/biocontrol/j_beetle.htm
Biocontrol Using the Spring Tiphia Wasp

Tiphia vernalis introduced to the northeast US by the USDA in 1925-27. Has become established as a natural enemy in parts of the Japanese beetle's range.
Chemical Control

- Late June or early July after adults have begun to congregate applications of imidiacloprid (Merit) in June and July have sufficient residual activity to kill the new grub populations as they come to the soil surface in late July through August
- Milky spore (*Bacillus popilliae*)
- Careful use of Sevin
Boxwood Leafminer

- Primarily a problem in American Boxwood
- Marathon or Merit recommended chemicals
- Cygon also possibility for summer use
- Pruning
Boxwood Leafminer
Adults (fly)
Boxwood Leaf Miner larval damage
BORERS

Asian Longhorned Beetle (ALB)

Peach Borer

Dogwood twig borer

ALB Exit hole
Borers

- Larvae of beetles or clear-winged moths.
- Adults lay their eggs on bark.
- The larvae bore into the trunk or limb.
- Feeding cuts off the flow of water and nutrients to upper parts of the plant.
- Kills everything above the entry point.
- Chemical control – bifenthrin, permethrin
Prevention:
The best way to control borers

- Attracted to stressed or injured plants.
- Wounds or previous damage invite borers.
- Avoid pruning during the growing season. (except to remove infested branches)
Dogwood Borer

- Clearwing Moth
  (wasp mimic)
- Dogwood, pecan, elm, hickory, and willow
- Moths active May to September
- Search for open wounds
  - resinous smell -
Chemical Control

- Treat trunk & larger branches early May. Repeat at 6 week intervals, 2-3X.
- Bifenthrin, Chlorpyrifos, Endosulfan, Permethrin
- Restricted Use “Danger” Signal Word
- Better to prevent

Dogwood Borer Damage
Asian Ambrosia Beetle

- Entered the U.S. at Charleston, South Carolina in 1974
- Attacks various trees and shrubs
- Adults and larvae bore into twigs, branches or small trunks of woody host plants, excavating a system of tunnels and introducing a symbiotic ambrosial fungus on which they feed. Boring and introduced fungus clog the xylem, ultimately killing all or part of the plant.
Strings of boring dust produced by female beetle
Control of AAB

- Adults active mid-March to April
- Takes about 55 days to complete life cycle
- May have 2 or more generations per year
- Attacked trees attractive to other beetles
- Leave infested trees for 2-3 weeks
- Beetles are feeding on fungus, not tree – systemics ineffective

“toothpick” stage in early May
2005 – later than usual
The Cooperative Agricultural Pest Survey Program is a combined effort by state and federal agricultural agencies to conduct surveillance, detection, and monitoring of exotic plant pests of agricultural and natural plant resources and biological control agents. Survey targets include plant diseases, insects, weeds, nematodes, and other invertebrate organisms.
FIRE ANTS

RIFA workers x 3

RIFA worker
Distribution of fire ants in the US
Identification

- Small reddish-brown ants
- Sizes range from $\frac{1}{16}$ to $\frac{1}{4}$ inch
- Build characteristic mounds
- Extremely aggressive behavior
Identification

- Mound
  - Hard crust
  - Foraging tunnel
  - Tunnels to water table
  - Foraging tunnel entrance/exits
  - Mound galleries and chambers
FIRE ANTS

Bio-Control
Phorid flies

http://fireant.ifas.ufl.edu/media.htm
Typical Mounds in VA
CAPS Bio-Control

- Phorid Fly
If you spot fire ants . . .

- Use caution
- Do not disturb mound
- Contact VDACS at 786-3515 or
- Notify your Extension Agent
- Quarantine implemented summer of 2009 –
  - Counties of James City and York & cities of
    Chesapeake, Newport News, Norfolk, Hampton,
    Poquoson, Portsmouth, Suffolk, VA Beach &
    Williamsburg