Overview of Local Plant Pests their Prevention and Control

Yakima Master Gardeners

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Common Pests may include:

- **Vertebrate Pests – cats, dogs (esp. puppies), birds, reptiles, other mammals**
- **Invertebrate pests**

  insects **mites and spiders (arthropods)**

  mollusks **nematodes**

- **Plant Diseases**
  - **leaf blights - fire, early, and late; powdery mildews, leaf curl**
  - **fruit symptoms – blossom end rot, bitterpit**
  - **multiple symptoms - anthracnose**

Weeds

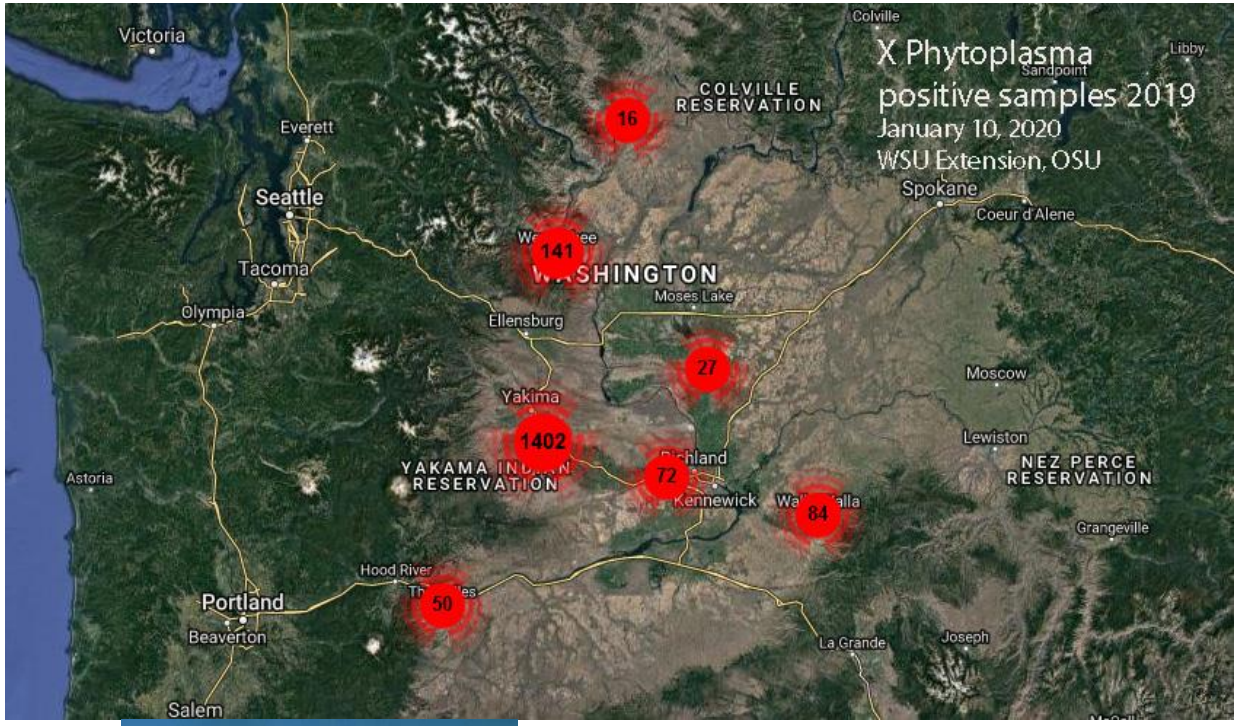
broadleaf **grasses**

sedges **aquatic**

parasitic – dodder or mistletoe

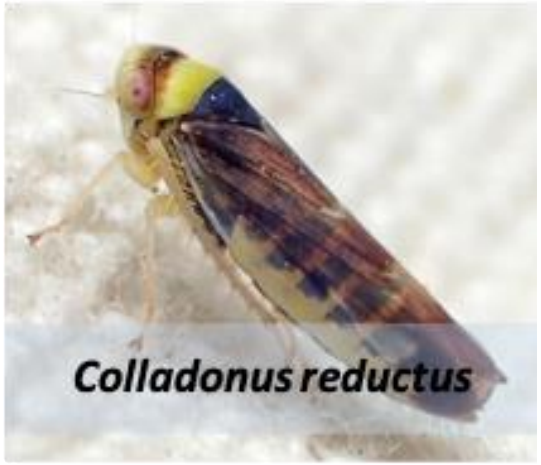
Phytoplasma X

- Phytoplasma X disease is not a virus
- Affected cherries are small size, poor color and flavor, Not marketable
- First identified in WA cherry trees in 1946
- Infection
  - 30 day incubation period
  - 1 to 2 years for infection to progress in phloem tissues.
  - Trees infected in 2-3 years
  - Dieback and reduced yields in 3-4 years
- At epidemic levels in Yakima, Benton, and Franklin counties; Columbia Basin



Phytoplasma X

- **<u>Disease only clearly visible two weeks prior to harvest</u>**
- Affects most *Prunus* species, chokecherry and goat heads.
- Transmitted by all types of grafting
  - Replanting Infected trees, root grafting
- Vector- Leafhoppers, many species
    - Carried in salivary glands
- Control?
  - Late season leafhopper sprays
  - Tree removal
    - Spray vectors before removing
    - Glyphosate – adjoining trees, roots
  - **If 20% symptomatic – remove orchard**
  - Replant certified trees.



Little Cherry Virus

LCV1 and LCV2

- Affects mostly stone fruit (Prunus sp.)
  - Sweet/sour cherries, choke cherry, bitter cherry, peaches, nectarines, almonds, clover and dandelions.
- Casual factors
  - LCV1 virus, LCV2 virus or Phytoplasma-X
- Transmission
  - Grafting - including top-working and root-grafting between neighboring trees.
  - Apple and grape mealybugs transmit LCV-2
  - LCV-1 - No known vector, less known

LCV1 and LCV2 : What to look for…

- **Infection in sweet cherries reduces fruit size and quality.**
  - **reduced sugar content**
  - **may taste bland or insipid.**
  - **Not marketable**
- **Severity of the disease differs between cultivars**
  - **Lambert and Bing highly susceptible**
- **Control**
  - **Identify and control mealybug populations**
  - **Remove infected trees**
    - **Scout last 2 weeks before harvest**

Little Cherry Disease in Sweethearts

Vertebrate and Invertebrate Pests

- Pests of homes, structures, people, and pets
  - Household pests that sting, bite, destroy wood
  - also Birds, pets, moles, gophers.
- Pests in gardens and landscapes
  - Flowers, shrubs and trees
  - Fruit, nuts, berries and grapes
  - Vegetables and melons
  - Lawns and turf

Voles

Parasitic wasps - beneficial

Whiteflies

Invertebrate Pests – insects, spiders, and mites, *…oh my*

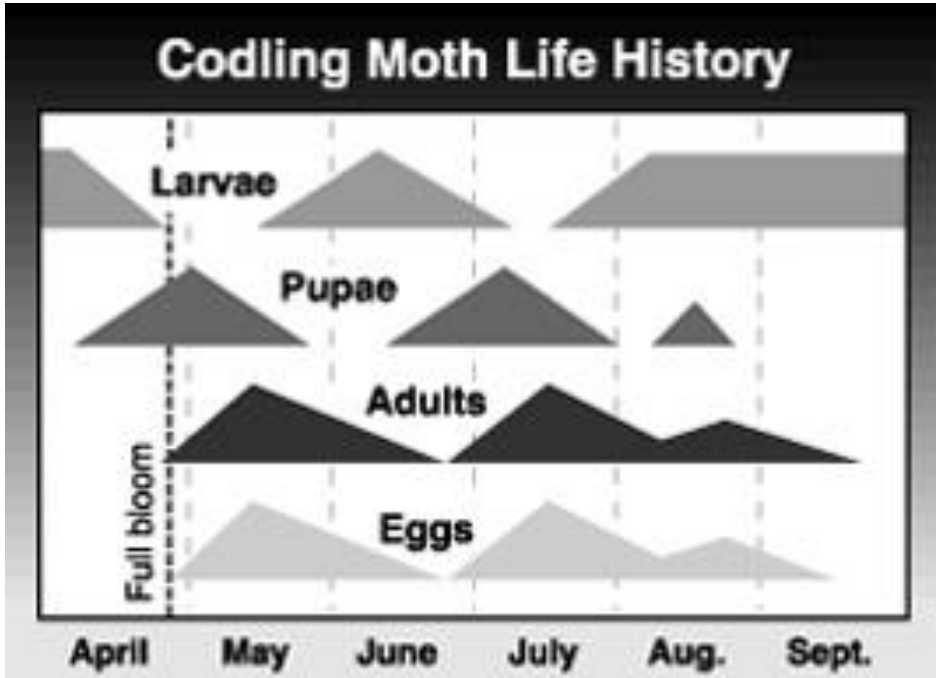
- Invertebrates include arachnids (spiders), millipedes, centipedes.
- Varied lifecycles
  - Simple/Complete metamorphosis
    - Egg →larvae →egg →adult
- Simple/gradual metamorphosis
  - Little change through development
    - Egg → nymph → adult
- Importance
  - When damage occurs
  - Vulnerable stages to control
  - Managing chemical resistance

Codling Moth

- Moths are small, usually gray or brown, their wings have bands or mottled areas.
- Found where most apples in temperate areas
- Moth larvae bore deep into the fruit, making it unmarketable.
- Hosts – apple, but also attacks pear, large- fruited hawthorn and quince
- Monitoring - adult moth pheromone traps, 225 degree models to determine egg hatches mating disruption pheromones

base temperature is 18 °C (64 °F) and the outdoor temperature is constant at 10 °C (50 °F) for one day, this counts at 8 degree days (14 degree days in Fahrenheit).

Coddling Moth

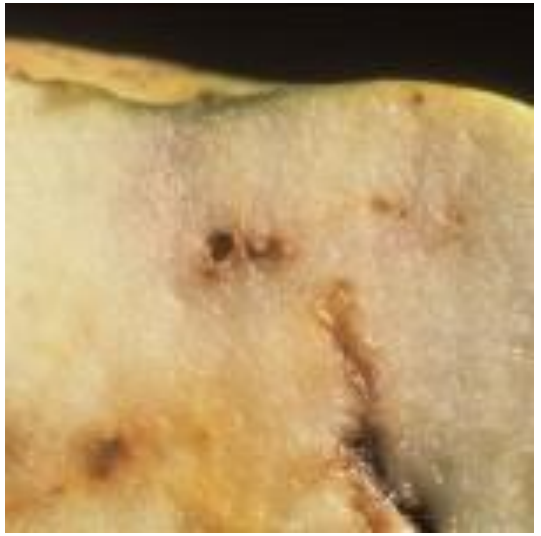


Codling moth usually develops through two generations a year in the Northwest. In warm years, a partial third generation may be produced. Timings are based on observations on Red Delicious apples in Washington.

Codling moth damage in apples

Apple Maggot

- Overwinters in soil as a pupa
- Adults emerge late June to early July through October
- Females lay 300 to 500 eggs just under the skin over 30 days.
- Maggots feed for up to 30 days while tunneling through the fruit flesh.
- Larvae leave the fruit and enter the soil to pupate.
- Apple maggot is a regulated pest
- A quarantined orchard that is considered threatened must be inspected by WSDA before the crop can be sold.



Apple Maggot

Control

- Must be controlled in the adult stage prior to the deposition of eggs.
- Contact insecticides are required 7 to 10 days after adults are predicted to emerge from the soil.
- WSU Decision Aid System predictive model of adult apple maggot emergence is.

Spider Mites

- Found in weeds, field crops, domestic plants, vegetables, forage crops and fruits.
- Damage begins as a fine yellow or bronze stippling or speckling of leave
- Strands or mats of silk webbing may be present on the underside of infested leaves
- Hot, dry conditions and high levels of nitrogen in the leaves favor mite infestations.
- Dust aggravates populations.

Spider Mite Management

Controls

- Predatory mites, ladybird beetles and green lacewings aid in control of mite populations.
- Avoid use of broad-spectrum insecticides which kill beneficials.
- Drought stressed plants are more susceptible.

A Sampling Plan for Twospotted and McDaniel Spider Mites

Sampling Table

No. of leaves with 2 or more mites	% of leaves with 2 or more mites	Average No. mites per leaf
1	4	0.21
2	8	0.35
3	12	0.51
4	16	0.69
5	20	0.87
6	24	1.08
7	28	1.30
8	32	1.55
9	36	1.82
10	40	2.12
11	44	2.44
12	48	2.81
13	52	3.21
14	56	3.67
15	60	4.18
16	64	4.77
17	68	5.45
18	72	6.26
19	76	7.24
20	80	8.51
21	84	10.12

The average number of mites per leaf cannot be estimated accurately when 85 percent or more of the leaves are infested with two or more mites.

To estimate the average number of mites per leaf, collect 25 leaves from each of 10 trees and count the number that have 2 or more mites (see Sampling section in Part I).

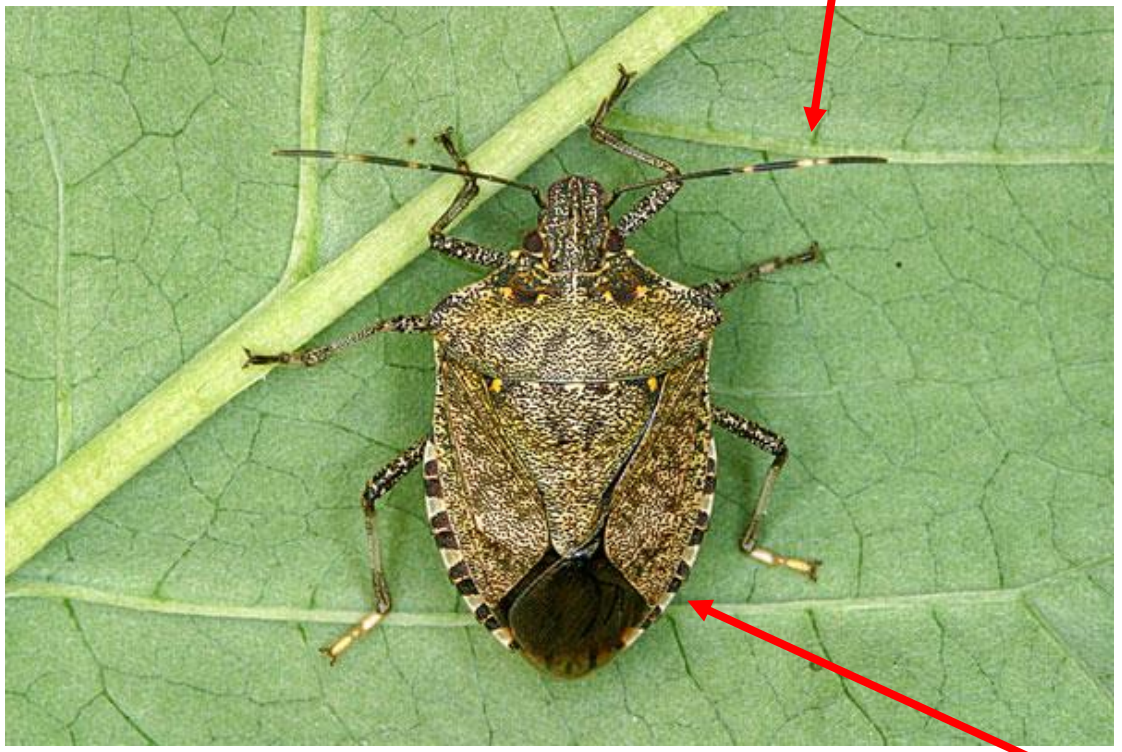
Example: On the first tree 15 of the 25 leaves have 2 or more mites. The second through tenth have 10, 7, 18, 6, 5, 17, 10, 11 and 12 leaves respectively with 2 or more mites. Use the table (left) to estimate the average number of mites per leaf for each tree, then average across the 10 trees, as shown below.

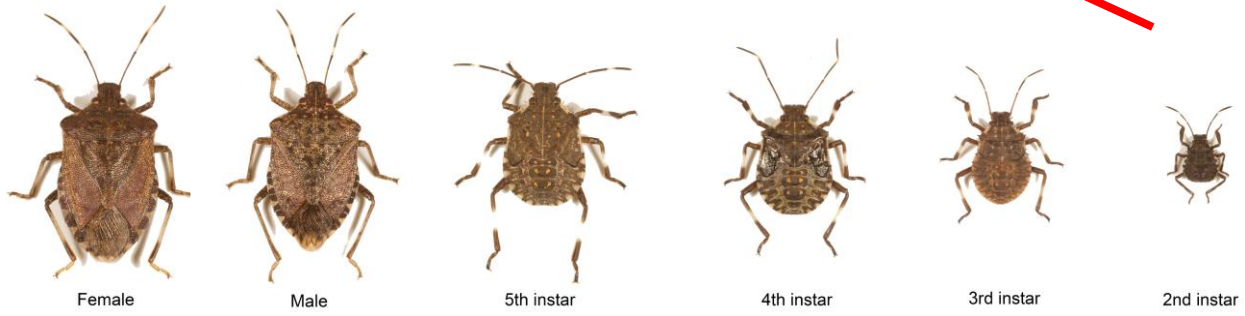
Tree	No. of leaves with 2 or more mites	% of leaves with 2 or more mites	Average no. mites per leaf
1	15	60	4.18
2	10	40	2.12
3	7	28	1.30
4	18	72	6.26
5	6	24	1.08
6	5	20	0.87
7	17	68	5.45
8	10	40	2.12
9	11	44	2.44
10	12	48	2.81
		Average:	2.86

Table courtesy of Dr. Vince Jones, Department of Entomology, University of Hawaii, Manoa.

Brown Marmorated Stinkbug (BMSB)

- Adults approximately 5/8 inch long
  - Mottled brownish grey color.
  - 4th instar antennal segment has a white band
  - Abdominal segments protrude from beneath the wings and
  - are alternatively banded with black and white.



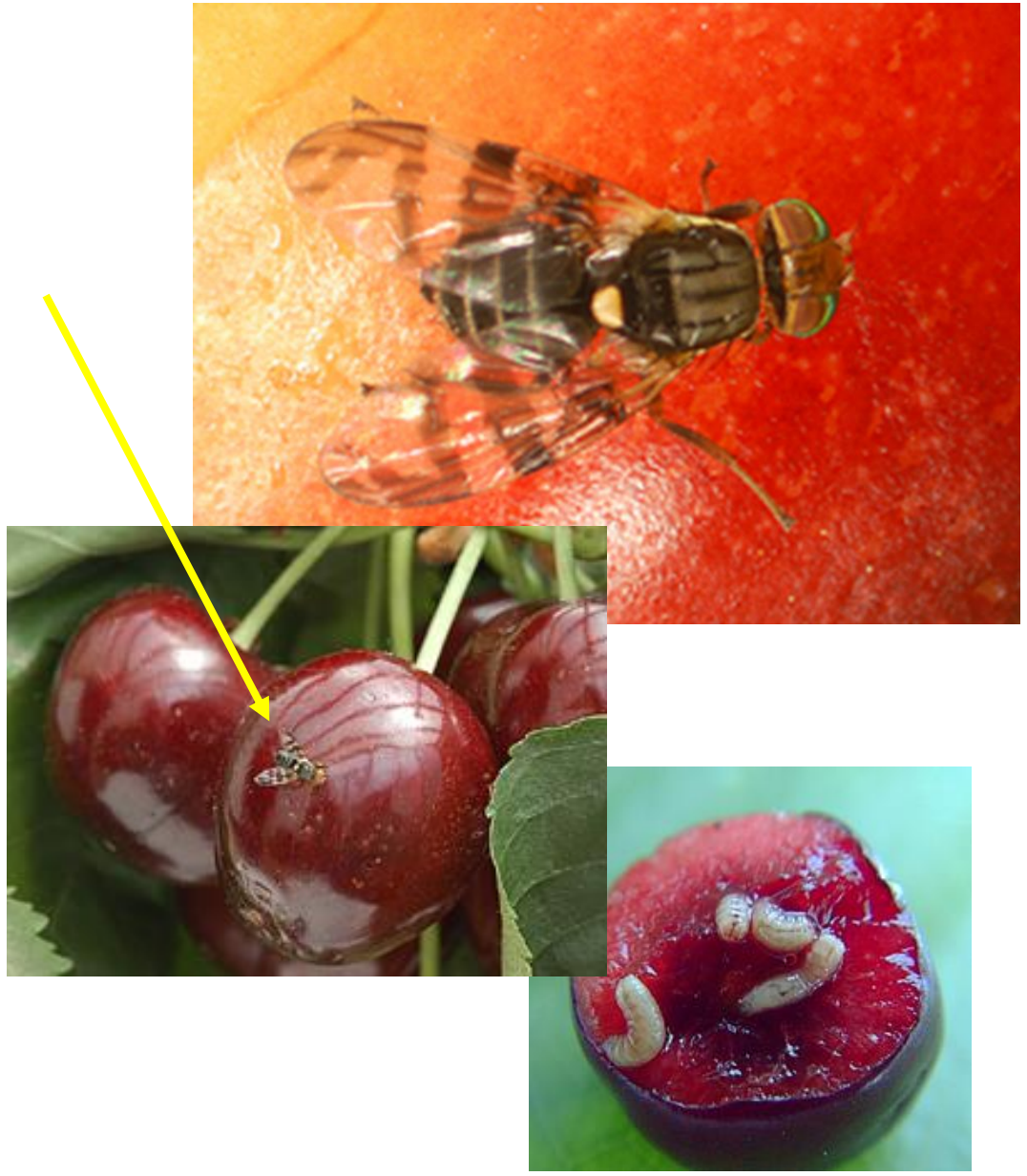


Brown Marmorated Stinkbug (BMSB)

- ID is important.
- Often confused with the other brown stink bugs, the Consperse stink bug and predatory stink bugs.
- Nymphs cause considerable damage, especially to high value crops.
- Monitor with pheromone traps and beating tray samples.
- Control
  - Various predators and parasitoids.
  - Recommended control using pyrethroids, neonicotinyls and carbamates.

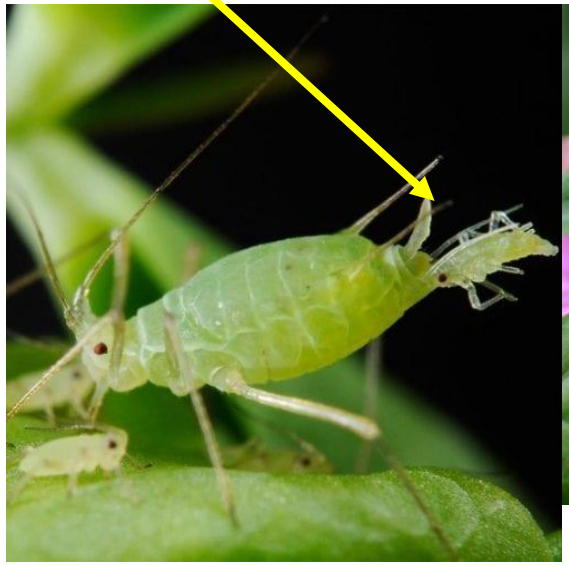
European
Cherry Fruit Fly

- The most serious pest of cherries.
- Damage is caused by larval feeding in the fruit pulp.
- Losses of up to 100% if left uncontrolled.
- May be introduced through the transport of infested fresh cherries, soil, or fruit from host plants.
- Sprays need to target the adults before egg laying begins. Adults should be controlled 5 to 6 days after they emerge.



Aphids

- Many species of aphids attack ornamental plants.
- Female aphids lay eggs that overwinter and hatch in spring.
- Not generally a pest in commercial agriculture.
- Biocontrol with lady beetle, parasitic wasp, and pathogenic fungi
- Horticultural oil or insecticidal soap
    - according to label instructions every five to seven days for three weeks.



Whiteflies

- Outbreaks associated with warm temperatures and susceptible plant material.
- The small football-shaped eggs are laid on the leaf underside with white wax deposits.
- Small, clear-to-beige, flat scales are evidence of immature whiteflies.
- Adults are tiny yellow-bodied insects with white wings that fly when disturbed.
- Biocontrol
  - Ladybugs, parasitic wasps, pathogenic fungi.

- Chemical control – *too numerous to list*

Fungus gnats

- Common pest in moist propagation greenhouses.
- Female adults lay eggs in growing media.
- Larvae feed on the roots and crown of young cuttings and plugs causing root injury and plant wilting.
    - Especially like decaying plant matter
- Vector soilborne plant pathogens:
    - *Thielaviopsis, Phytophthora, Pythium* and *Fusarium*.
- Controls
    - Not overwatering
    - Sticky trap monitoring,
    - Biological controls available
    - Chemical sprays <u>1”deep</u>

Signs of fungus gnat larvae chewing on leaves. Look under the leaves for the larvae.

Mealybugs

- Hosts includes deciduous fruit and nut trees, small fruits many shade trees
- Shorter “tails” on the apple mealybug.
- Predators include lady beetles, lacewings, and predatory bugs.
- Control of grape mealybug works best when sprays are aimed at the crawler stage.
  - Once crawlers settle and cover themselves with wax they are less susceptible to chemicals.
- Vector of little cherry virus (LCV2).

Apple and Grape Mealybugs

Apple Mealybug, nymphs below

Scale Insects

- Secondary pest related to aphids and whiteflies.
- Two types of scale insects common in greenhouses:
  - Hard scale - fairly small in size, lie flatter against the stem
  - Soft scale- often very rounded and produce honeydew
- One or multiple generations per year.
- Prune or pinch off heavily infested leaves and shoots. Scales may be wiped, scraped, or rubbed off.
- Insecticidal soaps, horticultural oils

Soft scale

Hard scales

European Earwigs

- Introduced and nocturnal
- Can devastate seedlings, flowers, leaves and fruit.
- Recognized by the hind pinchers
- Can be beneficial by feeding on aphids and other small insects.
- Often worse in dry eastern climates or in dry years.
- Control with insecticidal soaps (DE?)

Beneficial Insects – Take care of your friends

Green Lacewing larvae

WEEDS – Plants out of place

Generally three types of common weed plants.

Annuals - germinate and spread by seed in one year

Winter annuals - germinate in late summer/early fall, go dormant in winter and actively grow during spring. i.e. chickweed

Summer annuals - germinate in spring, grow throughout summer and are gone, such as lambsquarters

Biennial - two year life cycle, germinating and form rosettes the first year producing flowers and seeds their second year.

Examples of these include: bull thistle and garlic mustard.

Perennial – Return every year and normally produce long tap roots and seeds.

Include dandelions, plantain; purple loosestrife, is most difficult to control.

Parasitic – Dodder, mistletoe.

Common Mallow

- Found in waste places, gardens, and cultivated areas.
- Non-Chemical Management
  - Cultivation, hoeing, tilling will effectively eliminate
- Chemical Management
  - Landscape areas – glyphosate
  - Bare ground - glyphosate
  - Turf areas – triclopyr, 2,4,-D + MCPA + dicamba

Russian Thistle

- Habitat
  - Found mainly on dry sites on both cultivated and waste ground
- Non-Chemical Management
  - Provide competition.
  - Cultivation (rototilling or hoeing)
  - Hand-pull
- Chemical Management
  - Landscape areas
    - Glyphosate, dichlobenil, trifluralin,products containing diquat
  - Turf areas
    - 2,4-D + MCPP + dicamba
  - Bare ground areas
    - glyphosate
    - products containing diquat

Purple Loosestrife

- Listed as a class B noxious weed and quarantine species.
- Found in loose saturated soils
- Grows to 10 feet tall and 5 feet wide with
- 30 to 50 herbaceous stems arise from a common rootstock
- Control
  - Adult Root weevils *(Hylobius transversovittatus)*
  - Bud and Adult leaf feeding beatles
  - Chemical – **STATE PERMIT REQUIRED**

Puncturevine - Goat heads

- Non-native summer annual
- Found widely in eWashington.
- Thrive in hot and dry conditions, along roadsides and ditch banks.
- Control
  - Mulches
  - Weevils - *Microlarinus lareynii* and *M. lypriformi* can be purchased
  - Chemical control is generally not necessary for the control

Best Weed Control Tips

- Let sleeping weeds lie
- Mulch, mulch, mulch
- Weed when the weeding is good

  “Pull when wet; hoe when dry”
- Prevent them from seeding!- lop off their heads
- Friendly gaps between plants – reduce plant spacing?
- Water your plants, not your weeds.
- Use your tools - Hoes, hoedads, hori hori, mowers, shovels, your hands

Mulches

- Prevent weed seed germination
- To maintain effectiveness organic mulches should be replenished.
  - Choose a medium-sized mulch (3/4 inch) and maintain it at an adequate depth (3 to 4 inches).
- Natural inorganic mulches
  - (gravel or crushed rock) may be difficult to keep clean.
- Landscape fabrics
  - Effectiveness varies, cover with mulch
  - Porous and long lasting;
- Black plastic
- Not preferred since it can restrict air and water movement and promote root rots.
- http://hortsense.cahnrs.wsu.edu/Home/HortsenseHome.aspx

Chemical Weed Control

- Contact herbicides
  - Examples : diquat, acetic acid (vinegar), potassium salts of fatty acid
  - Multiple applications for some perennials
- Systemic herbicides
  - Preemergence – soil applied before weeds emerge
    - Examples trifluralin
  - Post emergence – foliage of emerged weeds:
    - Examples - 2,4-D*, glyphosate**, triclopyr*,

- *Note: the pesticide label is a federal document, read and follow, all of it.

References: a partial list

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