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The challenge of Cherry IPM

The Problem with Prunus

Outline

- Diseases
  - Blossom brown rot
  - Bacterial canker
- Insects
  - Cherry Bark Tortrix
  - Fall webworm
  - Tent caterpillar

Disease Pests of Prunus

Blossom Brown Rot

Monilinia fructicola and *M. laxa*

- Fungi survive year to year on infected twigs, branches, old flower parts, or mummified fruit.
- Conidia are produced on infected plant debris in the tree when the temperature is above 40°F, and wind and rain blow spores (conidia and ascospores) to healthy blossoms in spring to begin the infection process during wet weather.

George Sundin, Michigan State University Extension, Department of Plant, Soil, and Microbial Sciences

Blossom Brown Rot
Monilinia fructicola and *M. laxa*

- Flowers can be blighted any time floral tissue is exposed but are most susceptible at full bloom. More spores can be produced on this tissue, initiating several more disease cycles during the spring. Under severe conditions, non-flowering shoots or leaves can be infected directly.

Blossom Brown Rot
Monilinia fructicola and *M. laxa*

Symptoms

- Infected flower parts turn light brown and may develop areas of buff-color (*M. fructicola*) or gray (*M. laxa*) spores. Infected petals may look water soaked, which can be mistaken for frost injury. Flowers generally collapse as the fungus invades through the pedicel. Infected flowers often adhere to twigs and spurs through harvest or even winter

Blossom Brown Rot *Monilinia fructicola* and *M. laxa*

Symptoms

- Depending on the fungus and plant infected, the disease may continue into twigs or spurs. Lesions may remain discrete or girdle the twig, causing all distal portions to die. Profuse gumming also may occur in these areas. Again, buff or gray spores (in sporodochia) may develop on these necrotic twigs.

Blossom Brown Rot
Monilinia fructicola and *M. laxa*

- **Cultural control**

These must be supplemented by chemical control methods especially in the wettest areas such as west of the Cascade Range.

- Remove and destroy infected twigs and branches in summer.*
- Remove and destroy all mummified fruit in and around the tree. Cultivating or burying old fruit before the growing season will not reduce the risk of this disease. However, removing fallen fruit (due to thinning or lack of pollination) and infested tissue can significantly reduce the amount of rot.
- Use moderate amounts of nitrogen fertilizer.

* The timing of Prunus pruning will be discussed shortly.

Blossom Brown Rot
Monilinia fructicola and *M. laxa*

Chemical control

- Apply fungicides during the bloom period at early popcorn (red bud, pink bud, or green tip, depending on crop), full bloom, and/or petal fall to control the blossom blight phase.
- This can be very difficult to time if you have a wide variety of cherry cultivars. Focus on earlier blooming varieties. These tend to be the most susceptible, as they are flowering during the rainiest part of the year, when temperatures hover around the ideal spore production range.

Blossom Brown Rot
Monilinia fructicola and *M. laxa*

Chemical control

- https://pnwhandbooks.org/plantdisease/host-disease/cherry-prunus-spp-brown-rot-blossom-blight-fruit-rot
- This website lists many fungicides that *may* be used in our area.
- Always check the label for applicability use restrictions.

Blossom Brown Rot
Monilinia fructicola and *M. laxa*

Chemical control

- To reduce the possibility of resistant fungal strains, alternate or tank-mix fungicides from different groups that have different modes of action. Also, limit applications from any particular group to two (2) or fewer per year.
- The pnwhandbooks.org website does list the fungicide group, but more in depth descriptions can be found at FRAC (Fungicide Resistance Action Committee)

Blossom Brown Rot
Monilinia fructicola and *M. laxa*

Chemical control

- FRAC (Fungicide Resistance Action Committee)
- Provides lists of chemicals, their mode of action and risk of resistance.

MOA	TARGET SITE AND CODE	GROUP NAME	CHEMICAL GROUP	COMMON NAME	COMMENTS	FRAC CODE
G: sterol biosynthesis in membranes	**G1** C14- demethylase in sterol biosynthesis *(erg11/cyp51)*	**DMI**-fungicides (**DeM**ethylation **I**nhibitors) (SBI: Class I)	piperazines	triforine	There are big differences in the activity spectra of DMI fungicides. Resistance is known in various fungal species. Several resistance mechanisms are known incl. target site mutations in cyp51 (erg 11) gene, e.g. V136A, Y137F, A379G, I381V; cyp51 promotor; ABC transporters and others. Generally wise to accept that cross resistance is present between DMI fungicides active against the same fungus. DMI fungicides are Sterol Biosynthesis Inhibitors (SBIs), but show no cross resistance to other SBI classes. **Medium risk.** **See FRAC SBI Guidelines for resistance management.**	3
			pyridines	pyrifenox pyrisoxazole		
			pyrimidines	fenarimol nuarimol		
			imidazoles	imazalil oxpoconazole pefurazoate prochloraz triflumizole		
			triazoles	azaconazole bitertanol bromuconazole cyproconazole difenoconazole diniconazole epoxiconazole etaconazole fenbuconazole fluquinconazole flusilazole flutriafol hexaconazole imibenconazole ipconazole metconazole myclobutanil penconazole propiconazole simeconazole tebuconazole tetraconazole triadimefon triadimenol triticonazole		
			triazolinthiones	prothioconazole		
	G2 Δ^{14}-reductase and $\Delta^{8}\rightarrow\Delta^{7}$-isomerase in sterol biosynthesis *(erg24, erg2)*	amines ("morpholines") (SBI: Class II)	morpholines	aldimorph dodemorph fenpropimorph tridemorph	Decreased sensitivity for powdery mildews. Cross resistance within the group generally found but not to other SBI classes. **Low to medium risk. See FRAC SBI Guidelines for resistance management.**	5
			piperidines	fenpropidin piperalin		
			spiroketal-amines	spiroxamine		
	G3 3-keto reduc-tase, C4- de-methylation *(erg27)*	(SBI: Class III)	hydroxyanilides	fenhexamid	Low to medium risk. Resistance management required.	17
			amino-pyrazolinone	fenpyrazamine		

Resistance to brown rot

- Susceptible cultivars that seem difficult to treat include *Prunus subhirtella* 'autumnalis', Pendula Plna Rosea
- Cultivars that seem resistant include *P. sargentii* 'Columnar', *P. serrulata* 'Mt. Fugi', and *P*. x *yedoensis* 'Akebono'

BLOOM ORDER

Late April	Prunus sargentii
	P. subhirtella*
	P. tomentosa
	P. yedoensis
Early May	P. avium
	P. hortulana (plum)
	P. padus**
	P. pensylvanica
	P. serrulata
Mid May	P. cerasus
	P. virginiana
	P. serrulata (depends on varieties)
Late May	P. serotina

*Variey 'Autumnalis' (Autumn flowering cherry) may bloom during a warm fall, however, if cold, will not flower untill spring. Variety 'Yea-Shidare-Higan' the flowers last longer than the other varities.

**Variety 'Commutata' may bloom several week before the others.

Other fungal diseases of Prunus

Decay fungi

- Ganoderma appiantum
- Indicates the presence of internal decay.
- Tree should be evaluated for safety.

Bacterial Canker

- Bacterial canker is a disease of the stems and leaves of *Prunus*, especially plums and cherries, but also apricots, peaches and ornamental *Prunus* species. It causes sunken patches of dead bark and small holes in leaves, called ‘shothole’.

Bacterial Canker

- **Symptoms**
- You may see the following symptoms:
- **On stems and spurs:** Sunken, dead areas of bark develop in spring and early summer, often accompanied by a gummy ooze. If the infection spreads all round the branch it will die rapidly. However, it should be noted that gum production (gummosis) from the bark of *Prunus* species is actually quite common, and in the absence of dead, sunken bark is likely to have resulted from causes other than bacterial canker, for example physical damage or environmental stresses.
- Very similar symptoms to Blossom Brown Rot. Bacterial canker will not produce spores or have persistent dead flowers.

Bacterial Canker

- **Symptoms**:
- **On leaves:** Small brown spots appear which are often round and fall out later to leave holes – as if the leaf had been hit by shotgun pellets, leading to the popular name of 'shothole'

Bacterial Canker



Bacterial Canker

- Cut out all cankered areas, pruning back to healthy wood and paint promptly with a wound. Burn or landfill the prunings.
- Sanitize pruners between cuts to avoid reinfection.
- Pruning timing will be discussed shortly.

Insect Pests of Prunus

Cherry bark tortrix
Enarmonia formosana

CBT is a pest of most woody ornamental trees and shrubs in the family Rosaceae.

CBT attacks Prunus (cherry, plum, and peach), Malus (apple, crabapple), Pyrus (pear), Crataegus (hawthorn), Sorbus (mountain ash), Cydonia (quince), Pyracantha (firethorn), and Photinia.

- First instar larvae feed on the bark and outer sapwood while the 2nd through 5th instars make tunnels between the bark and cambium, but do not penetrate the hard wood.
- Infestations usually occur upward from the base of the tree. Infestations are easily recognized by red dishorange colored frass accumulations or frass tubes near gallery entrances.

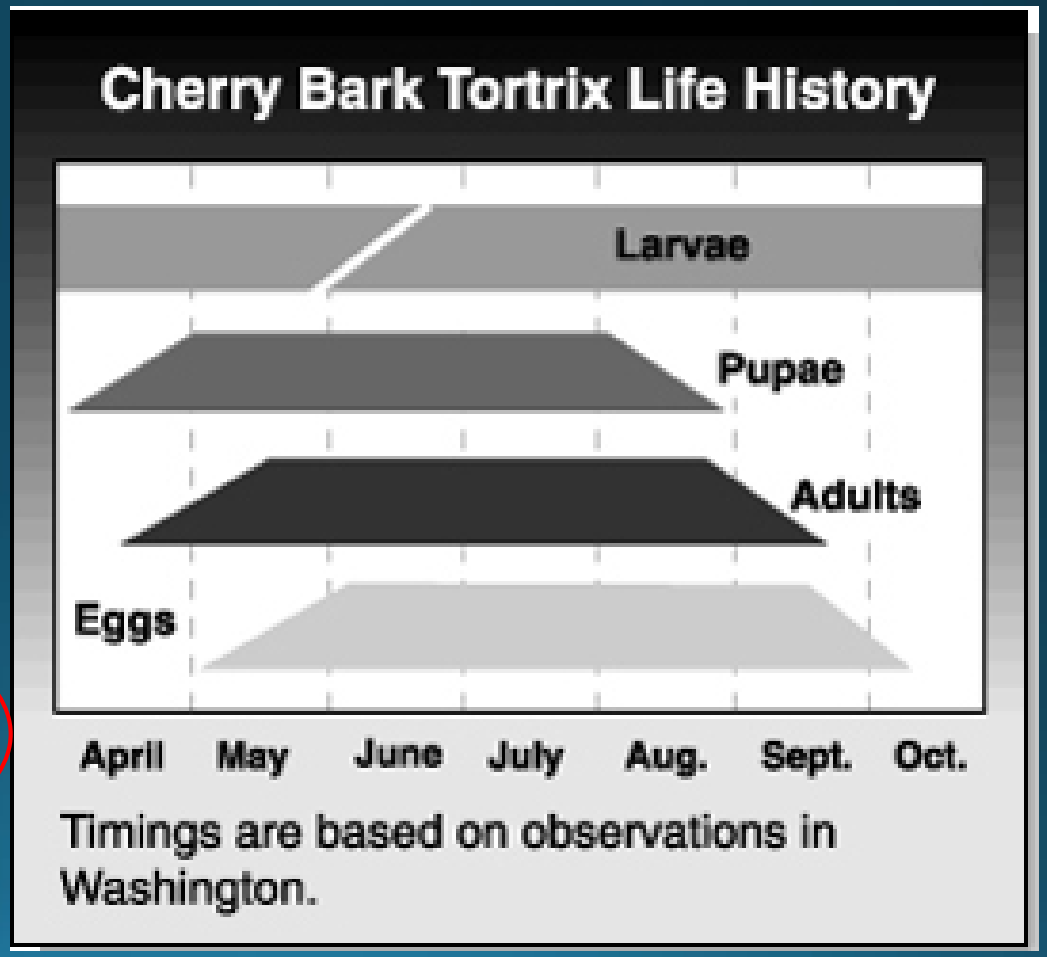
Cherry bark tortrix *Enarmonia formosana*

Life history

- In Washington, the adult moth is active from April to September and has one generation a year. It flies mainly in the early morning but also during the day.
- Very small and difficult to see the adults.

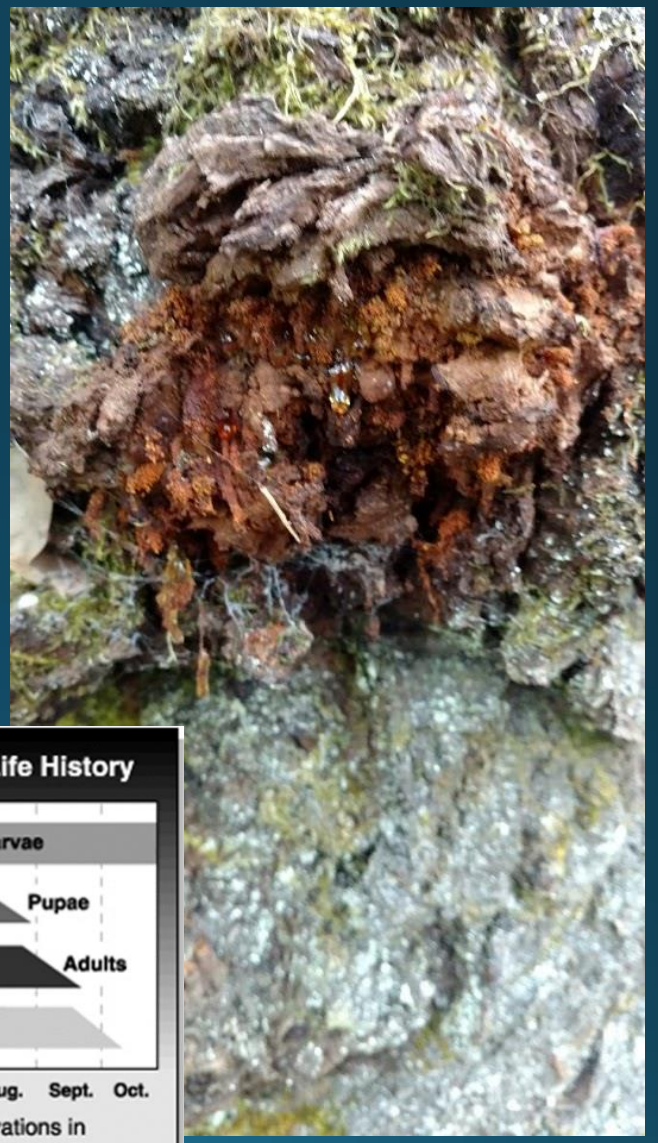
Cherry bark tortrix *Enarmonia formosana*

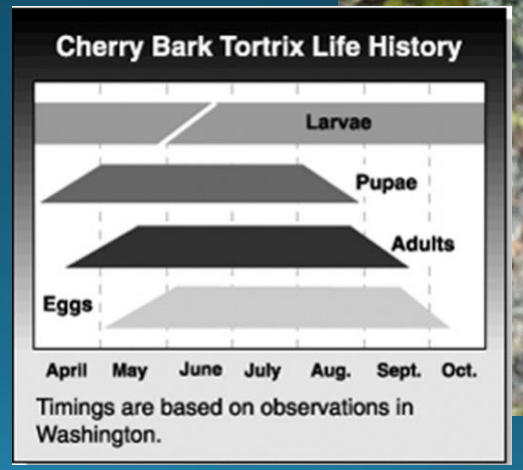
- Due to the asynchronous life cycle of Cherry Bark Tortrix (CBT), it is important to time chemical controls to target the whole population while it is in the same life stage. This occurs only in fall, winter, and early spring.
- The CBT larvae meticulously maintain their frass tubes two times in the season: early fall and spring.



Cherry bark tortrix *Enarmonia formosana*

- The most successful timing for pesticide applications have been in early fall. Although spring provides equally good control of larvae, pupation dates are hard to predict. CBT pupae are not susceptible to pesticide treatments. In early fall, all adult flight has ended, eggs have hatched, and all CBT exist as larvae. During this time, temperatures are still conducive for larval activity (frequent visitations to the frass tube).



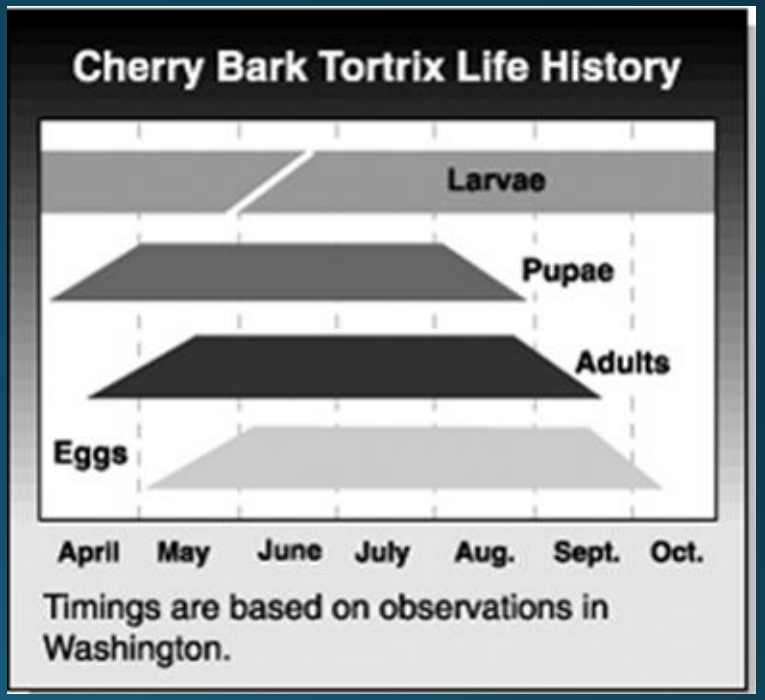


Cherry bark tortrix
Enarmonia formosana

- Control is best when insecticides are applied during the end of September to the beginning of October, when insect flights are finished, temperatures are moderate, and conditions are dry. Only spot-treat areas of the tree trunk, graft union, and large scaffold branches. Do not treat the tree canopy. Apply treatment to areas of frass tubes with low pressure until runoff. Little product is needed for good control.

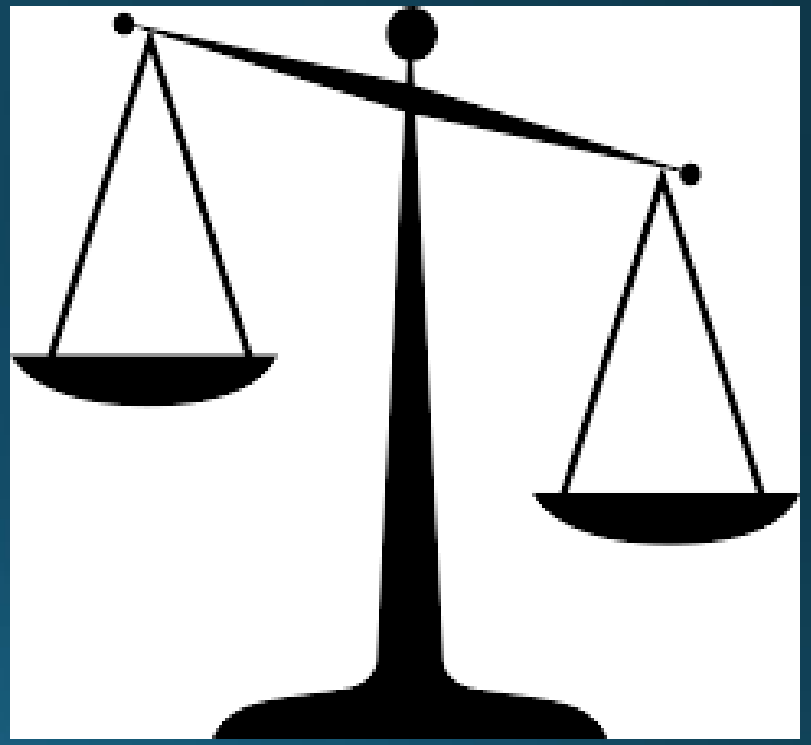
Cherry pruning

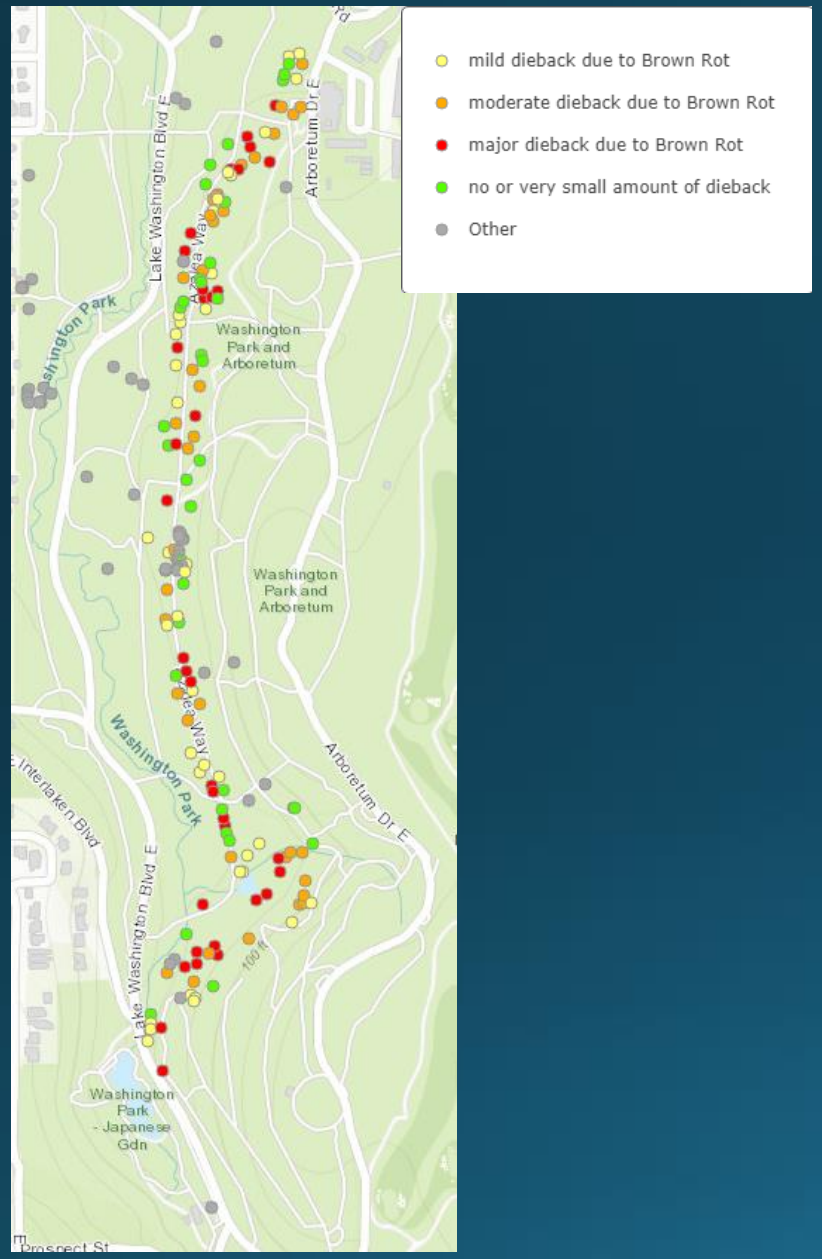
- Wounding of any kind, including pruning, will attract cherry bark tortrix.
- Pruning to remove brown rot, canker, and web forming insects must be done with this in mind.
- Pruning when all adults are not flying (mid September to mid april) is recommended.



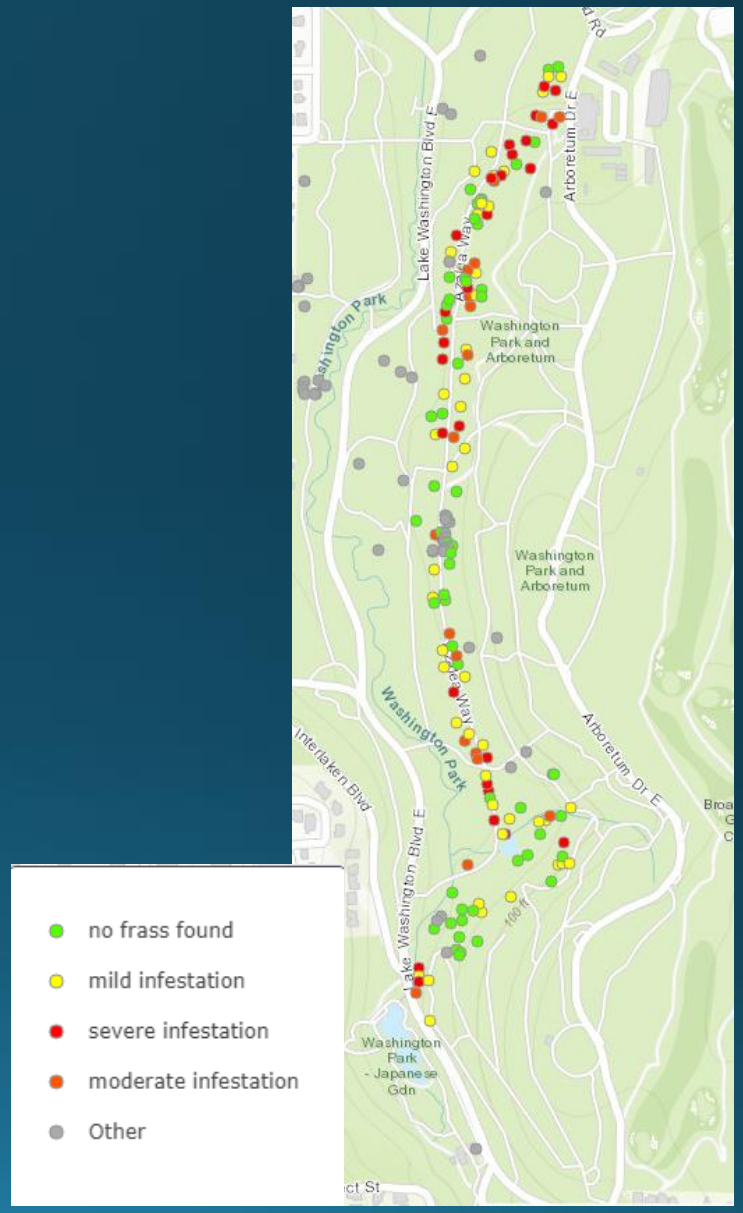
Cherry pruning

- Timing, staffing, and other considerations may require pruning outside this window.
- You must carefully weigh how bad the pruning is required, against how robust your CBT scouting and treatment program is.




mild dieback due to Brown Rot
moderate dieback due to Brown Rot
major dieback due to Brown Rot
no or very small amount of dieback
Other
Lake Washington Blvd E
Arboretum Dr E
Washington Park and Arboretum
Interlaken Blvd
Prospect St

vs.


no frass found
mild infestation
severe infestation
moderate infestation
Other
Lake Washington Blvd E
Arboretum Dr E
Washington Park and Arboretum
Interlaken Blvd

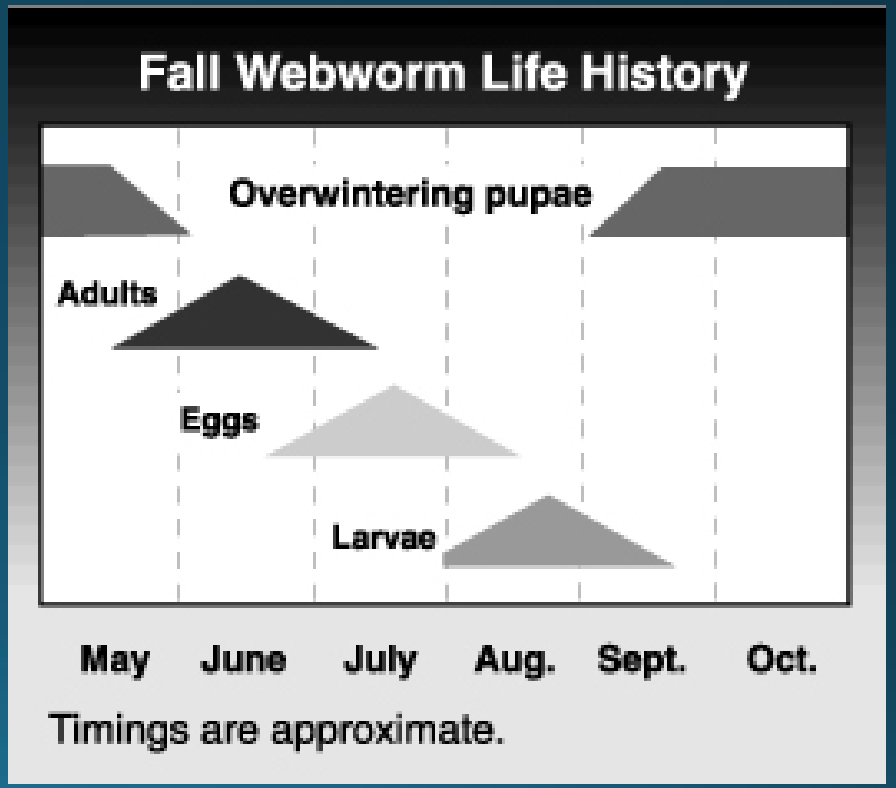
Fall webworm
Hyphantria cunea

- The fall webworm feeds on almost all fruit, forest and shade trees, except conifers.

- The larvae eat foliage and fruit within their webs. They can strip all the foliage off small trees but usually attack only certain limbs or parts of limbs on larger trees.

Fall webworm *Hyphantria cunea*

- Prune small webs out of the tree when they appear and dispose of by burning or freezing. Webs can also be spot treated with a hand gun or backpack sprayer. Fall webworm is susceptible to insecticides used for other fruit pests.
- Not often a problem, and populations fluctuate in a multiyear cycle.
- Easily controlled if found early.



Western tent caterpillar *Malacosoma californicum*

- Hosts include a wide range of tree and shrub species.
- Western tent caterpillar has one generation per year. White silken tents in the branches of host plants provide evidence of western tent caterpillar presence in spring. These are generally visible shortly after bud burst. Larvae live and feed as a colony, enlarging the tent as they grow

Western tent caterpillar *Malacosoma californicum*

- Because western tent caterpillar is more of a nuisance than a damaging pest, infestations normally are allowed to run their course without intervention. A large complex of natural enemy species feeds upon western tent caterpillar and, together with unfavorable weather and foliage depletion, regulates population size. High populations usually collapse within a year or two due to natural controls.
- This advice is not

Western tent caterpillar *Malacosoma californicum*

- When populations are low, the egg masses on small plants can be removed by hand and destroyed between July and the following spring. Hand picking can inflict significant larval mortality. Destruction of occupied tents by hand or with a brush leads to colony collapse.
- Small tents of the western tent caterpillar can be pruned and removed. Spot treatments with insecticides are also a viable option for control.
- Several chemical and biological insecticides are registered for western tent caterpillar control.

Thank you very much!

Questions?

Bonus slide

- Bronze birch borer
- Sorbus sawfly
- Azalea lace bug