

Western X Phytoplasma

Written by: Scott Harper, WSU Plant Pathology; Teah Smith, Zirkle Fruit Company; Rob Curtiss, Washington Tree Fruit Research Commission. February 2019.

Little Cherry Disease is caused by Western X Phytoplasma as well as Little cherry virus 1 (LChV1) and Little cherry virus 2 (LChV2). Diseased trees produce cherries of small size and poor color and flavor making the fruit unmarketable. Western X is at epidemic levels in the Columbia River basin, with high incidence from Yakima, Benton, and Franklin counties, and present in Oregon around Hood River.

Background

Western X is not a new problem. It was first identified in cherry trees of WA State in 1946. In a 1947 survey, about 1% of cherry trees were found to be infected, and it has remained present ever since, fluctuating in frequency.

Symptoms

On sweet cherries infection reduces fruit size and quality. The disease stages are only clearly visible approximately two weeks prior to harvest. In contrast to the effects of Little Cherry virus 2 where fruit often has little flavor, fruit from Western X-infected trees generally have a bitter taste. In addition to fruit symptoms you will see reduced growth and extension of infected limbs, sometimes leading to crowding of leaves into dense clusters (called a rosette). Molecular methods are more accurate for detection when symptoms are not visible, such as in the early stages of infection:

1. Early infection (Year 1), small fruit may be restricted to one branch, or cluster, fruit color may develop normally, or individual off-color fruit may be observed.



2. Middle infection (Years 2-3), systemically infected tree, small fruit observed on multiple or all limbs, and poor color development is pronounced.
3. Late infection (4+ years), cultivar dependent, but characterized by reduced fruit yield. False recovery may occur in less-susceptible cultivars, producing normal-sized fruit that lack flavor.



Causal Organism

Western X is not a virus, but instead is a type of wall-less bacteria known as a phytoplasma. The Western X phytoplasma lives and replicates in the vascular phloem of infected trees, interfering with tree growth and development.

Occurrence

Western X is present across North America, throughout Washington State, and at epidemic levels in the Columbia River basin, with high incidence from Yakima, Benton, and Franklin counties, and present in Oregon around Hood River.



Host Range

Western X: Most *Prunus* species, e.g. cherries, peaches, nectarines, almonds, plums, and choke cherry. Infects weeds: e.g. puncture vine, tumble mustard, and flix weed.

Transmission

Grafting: Western X is readily transmitted by all types of grafting; other means of spread are not known.

Vector: Leafhoppers. Known vectors: *Colladonus montanus*, *Fiebiella florii*, *Scaphytopius acutus*, *Paraphlepsius irroratus*, *Colladonus reductus*, *Colladonus geminatus*.

Photo credits: Mountain leafhopper, *C. reductus*, *C. geminatus* bugguide.net; Privet leafhopper britishbugs.org; Irrorate leafhopper marylandbiodiversity.com.

Life Cycle of Phytoplasma



The Western X phytoplasma replicates in the phloem tissue of the tree. It is believed that the phytoplasma either ceases to replicate or dies in the aerial parts of the tree as the branches go dormant during the winter months, but active, living phytoplasma cells overwinter in the roots. In the spring, the aerial portions of the tree become re-infected as the phytoplasma moves up the phloem of the tree, usually following the same general route as in the previous year. As a result, you may see symptoms in one limb for a year or more, but symptoms will eventually appear in additional limbs. Removing a symptomatic limb does not eliminate the phytoplasma since it is already in the root system before symptoms appear.

Controls

There is no cure and an infected tree will remain infected for the rest of its life. There are no commercial products that have been proven in scientific studies to have an effect on the phytoplasma. Management requires a combination of these three strategies:

1. **Identify and Remove Infected Trees:** Primary control measures rely on identification and removal of infected trees. Remove infected trees following postharvest treatment for leafhoppers. Infected trees spread the pathogen to neighboring trees by insect vectors or via root-grafting from tree to tree. Treat stumps with herbicide immediately after cutting or inject into trees before cutting trees to ensure roots are dead. In an early study, orchards where infected trees were removed as soon as they were observed, the disease incidence remained below 2% and decreased over time.

2. **Spray Vectors:** Leafhoppers may be present as early as February and as late as November, so insecticides must be applied throughout the season, including post-harvest. Most leafhoppers feed on multiple host species so suppression of their populations is critical. Avoid indiscriminate sprays. Target the early and late season. It helps to identify which leafhopper you have present so that you can eliminate one spray if possible.
3. **Manage alternative hosts of the phytoplasma and of the leafhoppers:** clovers, dandelions, curly dock, bitter cherry, chokecherry. Broad leaf weeds are difficult to eliminate from an orchard but by suppressing them, your orchard becomes less attractive to the leafhopper vectors.
4. **Pathogen-Free Planting Sources:** Replacement trees must be obtained from pathogen-free planting stock. Nursery trees can be free of symptoms and still be infected. Manage your risks - if in doubt, have the material tested before you buy or plant.

Finally, control of this disease requires a community-wide effort. What your neighbor does or doesn't do, affects you (and vice versa). The key to ending the current Western X epidemic relies on reducing the amount of pathogen present in the state. This can only be done by removing infected trees because it is from those trees that the leafhoppers are acquiring and spreading the pathogen.

Sampling

See Sampling for Little Cherry Disease Handout for Sampling Information. cpcnw.wsu.edu/lcdtests/

Contact

Dr. Scott Harper
Department of Plant Pathology
Washington State University
509-786-9230 or scott.harper@wsu.edu

References

Jelkmann and Eastwell (2011) Little cherry virus-1 and -2. In: Virus and virus-like diseases of pome and stone fruits. APS Press, Minnesota, MN. Hort. 1058: 121-128.
Bixby-Brosi, AJ, E Beers. 2017. Chemical control of grape mealybug, 2016. Arthropod Management Tests. 42 (1).
Bixby-Brosi, AJ, E Beers. 2015. Chemical control of apple mealybug, 2014. Arthropod Management Tests. 40 (1).

Additional Information

Another bad year for Little Cherry Disease
<http://treefruit.wsu.edu/article/another-bad-year-for-little-cherry-disease/>