White pine blister rust is a deadly disease that affects the branches and trunks of white pine trees. It is especially damaging in the Western U.S., where it kills rare and important pines in fragile mountain habitats.

Photo: USDA Forest Service, Bugwood.org
WHITE PINE BLISTER RUST

Signs and Symptoms

When white pine blister rust infects a branch, it often kills the phloem all the way around it, causing the needles to turn brown and the branch to die.

Close-up of the blisters caused by white pine blister rust (Cronartium ribicola) on a pine branch. These blisters break through the tree’s bark when the fungus is ready to reproduce. The yellow parts in the blisters are the spores of the fungus.

A currant (Ribes spp.) leaf carrying the white pine blister rust fungus appears to be covered in rust!

Close-up of the bottom side of a Ribes leaf infected with the white pine blister rust pathogen. The hair-like orange structures in the picture release spores of the fungus, which can infect white pines.

**White Pine Blister Rust**

**Life Cycle**

- **A.** Blister rust spores land on and infect pine needles. The fungus then grows into the branch that the needles are attached to, and continues to grow down the branch and towards the trunk.

- **B.** Pine infected through needles.

- **C.** One or two years later, canker forms.

- **D.** Springtime - Early symptoms on Ribes.

- **E.** Late summer and fall - Advanced symptoms on Ribes.

- **F.** C. ribicola infects the leaves of Ribes in the spring, which doesn’t really harm the plant. At first, the fungus makes yellow spots on the leaves.

- **G.** In late summer, spores of the fungus are released from orange hair-like structures on the undersides of Ribes leaves, and float through the air until they land on an unsuspecting white pine!

- **H.** When the fungus reaches the trunk, it kills the xylem and phloem, making a canker (an area of dead tissue). At this point, the tree is in big trouble!

- **I.** This is a white pine trunk infected with white pine blister rust (*Cronartium ribicola*). The white bumps on the trunk contain spores of the fungus (yellow dust in close-up), which are released into the air. This is how the fungus gets from pines to the leaves of its alternate host, Ribes.
**White Pine Blister Rust**

**Host Plants**

Cones, seeds, and leaves of eastern white pine (*Pinus strobus*), the only species of pine in the eastern U.S. that suffers from white pine blister rust.

White pine blister rust is a disease of white pines. These trees can easily be identified because they hold their needles in groups of five. Other pines, such as Virginia pine (left), have different numbers of needles per bundle.

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**Western white pines (Pinus monticola)** are majestic trees that were once very important for timber. Almost 90% of them outside of California have been killed by white pine blister rust.

Close-up of the cones and short needles of *Pinus flexilis*. The common name is "limber pine" because the branches are so flexible they can be tied in knots! Unfortunately, this tree is very susceptible to white pine blister rust.
**White Pine Blisters Rust**

**Host Plants**

Leaves and fruit of a gooseberry currant (*Ribes montigenum*), an alternate host of white pine blister rust (*Cronartium ribicola*). The fungus requires this plant or another alternate host to complete its lifecycle, but on *Ribes* it only infects the leaves, which does not harm the plant very much.

Gooseberry currants (*Ribes montigenum*), alternate hosts of white pine blister rust, are small to medium shrubs with red or purplish fruit.

Indian paintbrush (*Castilleja* sp.), a small flowering plant native to the U.S., was recently discovered to be an alternate host for the white pine blister rust fungus.

They might look pretty, but looseworts (*Pedicularis* spp.) were recently discovered to be alternate hosts for the white pine blister rust fungus.
**WHITE PINE BLISTER RUST**

**Damage**

An eastern white pine (*Pinus strobus*) infected with white pine blister rust. Dead tops are common on infected trees because the pathogen can girdle the trunk, cutting off water and nutrients from the portion of the tree above the infection site.

Many of these pines have been killed by white pine blister rust (*Cronartium ribicola*). The reddish-brown, dead needles often caused by this disease can be seen here.

White pine blister rust (*Cronartium ribicola*) has killed most of the pines on this hillside.
**White Pine Blister Rust**

### Impacts

*White pine (Pinus albicaulis) is a very important 'keystone species' in the high mountains of the western U.S. It may not be very abundant, but many animals and plants depend on it for survival. This species is highly threatened by white pine blister rust and mountain pine beetle.*

*Pine trees are very important parts of their ecosystems. They provide food for many different animals, including red squirrels like this one.*

*This is a Clark's nutcracker (Nucifraga columbiana). They depend on seeds from the whitebark pine to survive, and bury large seed stashes in the ground! The pines depend on this special bird to plant their seeds so new trees can grow. Both whitebark pine trees and Clark's nutcrackers are in danger because of white pine blister rust!*”

*In the high mountains of the western U.S., nutritious pine seeds are a very important food for grizzly bears. If white pine blister rust kills all the pine trees, what will the grizzlies eat?*
Why Do Plants Need Heroes?

Every year, plant pests and diseases damage and kill millions of trees, both in our neighborhoods and in natural areas. This damage has a negative impact on vital ecosystem services like air and water purification and costs billions of dollars in cleanup and lost revenue.

Who are the Plant Heroes?

The Plant Heroes are four young adults who share a love of nature and interest in science. A non-governmental organization (NGO) has heard about their passion and invited them to join together as a "super team" to detect and combat bugs and diseases that harm plants and ecosystem health. The Plant Heroes scout for these threats and report suspicious sightings to their county extension or local forester, who contacts officials and provides mission details and scientific supplies in order to defeat the bad bugs and diseases.

How can you be a Plant Hero?

Help neutralize the threat of plant pests and diseases by becoming a part of the Plant Hero team. Take the Plant Hero Pledge and explore the website to learn more about what to look for and how to report suspicious plant pests and diseases. The more you know, the more you can protect the plants in your own yard, neighborhood and community!

Plant Heroes is brought to you by the American Public Gardens Association

Founded in 1940 as the American Association of Botanical Gardens and Arboreta, the American Public Gardens Association adopted its new name in 2006. Over the last seven decades, the Association’s has emerged as the premiere association for public gardens in North America.

Today, the Association’s 500 member institutions are located throughout the United States, the District of Columbia, Canada, and seven other countries. Our vision is "A World Where Public Gardens Are Indispensable" as they provide botanic, conservation, community, education, and economic resources to their community.

The Association is committed to increasing the knowledge of public garden professionals throughout North America—through information sharing, professional development, networking, public awareness, and research—so that they have the tools to effectively serve visitors and members.