

## 54. Western Gall Rust of Pines

James T. Blodgett and Kelly S. Burns; revised from Glenn W. Peterson and James A. Walla (Riffle and Peterson 1986)

*Peridermium (Endocronartium) harknessii* is a rust pathogen that causes woody swellings (galls) and cankers that deform branches and stems of hard pines (*Pinus* spp.). A less common name for this disease is pine-to-pine rust because unlike many rust diseases, it has no alternate host and therefore spreads directly from pine to pine.

### Hosts and Distribution

The fungus infects many native hard pines including ponderosa (*P. ponderosa*), lodgepole (*P. contorta*), and jack (*P. banksiana*) pines. It also infects the exotic Scots (*P. sylvestris*) and mugo (*P. mugo*) pines. Western gall rust is found throughout pine forests of western and northern North America, in the northern Great Lakes region, and in scattered locations in eastern North America. It is more common in the western Great Plains, but can occur throughout the region. The western gall rust fungus often causes damage in nurseries, plantations, and landscape plantings, and can cause damage in natural stands.

### Symptoms and Signs

Western gall rust is characterized by round or pear-shaped galls on branches (fig. 54-1), and rounded or targetlike cankers on stems (fig. 54-2). Galls are most conspicuous in spring and early summer when the surface ruptures, exposing bright yellow-orange spores (fig. 54-3). Witches'-brooms (bushy masses of branches) sometimes develop in affected trees (fig. 54-4).

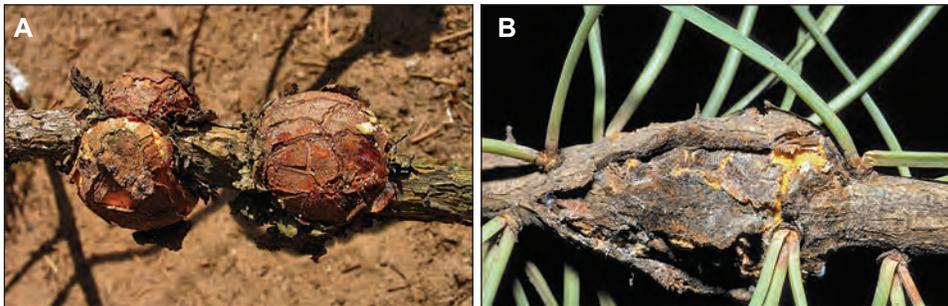


Figure 54-1—Branch galls of western gall rust: (A) Round, and (B) Pear shaped (Joseph O'Brien, U.S. Forest Service, Bugwood.org (left) and U.S. Forest Service, Bugwood.org).



Figure 54-2—Cankers caused by western gall rust: (A) Swollen stem cankers in ponderosa pine, and (B) Sunken targetlike canker in lodgepole pine (James T. Blodgett, U.S. Forest Service).



**Figure 54-3**—Branch gall of western gall rust sporulating on lodgepole pine (James T. Blodgett, U.S. Forest Service).



**Figure 54-4**—Witches'-brooms in Scots pine branches caused by western gall rust (Robert L. Anderson, U.S. Forest Service, Bugwood.org).

## Disease Cycle

White to orange pustules (aecia-like<sup>1</sup>) full of yellow-orange spores (aeciospore-like<sup>1</sup>) form on galls or, less commonly, at the edges of stem cankers in late spring or early summer. The aecia-like pustules rupture, releasing spores that disperse by wind in May and June. Spores germinate during moist, cool weather and infect expanding needles and young elongating shoots of pines. Infection rarely occurs through wounds on older branches and stems. Stem cankers are usually initiated by infected side branches or branch galls adjacent to the main stem (fig. 54-5). Mass infections tend to occur in wave years when weather is favorable for infection. Galls form mostly in the summer following the year of infection. Sporulation typically occurs in the second or third year after infection, and can continue for a few years. The rust pathogen stimulates rapid division of host cambial cells, which results in gall formation.

## Damage

Western gall rust affects pines of all ages, causing growth loss, branch death, deformity, and occasionally mortality. Mortality is most common in seedlings and saplings as galls can quickly girdle small stems. Abundant galls on branches may cause tree stunting. Pines in landscape and Christmas tree plantings may lose value owing to

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<sup>1</sup> Aecia-like and aeciospore-like indicate morphology that parallels typical demicyclic heteroecious rusts. The terms aecia and aeciospore do not describe the life stages of typical *Peridermium* species.



**Figure 54-5**—Stem canker that was initiated by a branch gall of western gall rust (James T. Blodgett, U.S. Forest Service).

stunting, witches'-brooms, and branch death. Stem cankers can severely deform larger trees, resulting in wind breakage or reduced merchantable volume, but they seldom girdle large trees. Uninfected trees of the same species are often common near similar-aged trees with many galls or cankers, or both. This is likely due to genetic variation in resistance to the disease in the population.

### **Management**

Management of western gall rust can be difficult given the lag between infection and symptom development. Management options that can reduce disease impacts include sanitation, re-

moval of the infection source, using disease-free planting stock, planting resistant hosts or nonhost species, and fungicide treatments.

Sanitation by removal of all trees with infections and careful inspection of remaining trees is often the only option in established stands. Eradication of the fungus by gall removal is not feasible in mature trees. In areas where western gall rust incidence is high, it may be necessary to replant with resistant species. Trees with stem cankers can be hazardous in recreation areas and should be given priority for removal.

In nurseries, the most effective and economical management method is the removal of nearby sources of infection. Gall-bearing pines within 0.5 mile of nurseries should be pruned free of all galls or felled. Destroy gall-bearing seedlings before sporulation.

Prevention is the best method of management in field plantings. Examine trees for galls before planting and again the following two springs. Obtain planting stock only from a nursery that is free of western gall rust.

The use of resistant hosts or nonhost species can substantially reduce or eliminate damage from western gall rust. Ponderosa pine from different geographic sources display considerable variation in susceptibility to this rust pathogen. Some highly resistant sources have been identified, but commercially certified, resistant stock may be difficult to find. When planting in areas where western gall rust is known to be a problem, use nonhost species that are adapted to the site.

In some states, fungicide treatments can be used for Christmas trees and high-value landscape trees. Consult your state or local extension agent regarding appropriate registered fungicides.

### **Selected References**

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