

# Rust Diseases

## *Gymnosporangium spp.*

### Introduction

Three related cedar rust diseases affect ornamental plants: cedar-apple rust, cedar-hawthorn rust and cedar-quince rust. These rusts are caused by different species of the fungus *Gymnosporangium*, each of which spends a phase of its life cycle on one or more of the plants listed to the right. The other phase of these rust fungi is spent on an alternate host — juniper. Cedar-quince rust causes stem cankers, the most significant damage in the nursery and landscape.

### Host Plants

- Apple
- Juniper
- Crabapple
- Hawthorn
- Mountain ash
- Pear
- Serviceberry

### Pathogen and Disease Cycle

All three fungi have similar life cycles. From dormant galls and swellings, orange gelatinous spore “horns” or spore masses begin to appear in spring, about the time that flowering crabapples are in bloom. These spore horns or spore masses are actually columns of fungal spores (teliospores), each of which can germinate under moist conditions to form a structure called a basidium, which produces four new spores (basidiospores). Basidiospores are then carried to crabapple, hawthorn and other susceptible trees by wind currents, where they can germinate and cause infection during relatively short periods of wetness. The springtime period of infection usually ends about 30 days later when the fungus no longer produces basidiospores on cedars, and the majority of the primary host leaf (e.g., apple), shoot or fruit tissues are less succulent and are no longer susceptible.

Depending on the host, spots may begin forming on the upper leaf surface or on shoot or fruit surfaces about 10 to 14 days after infection. Spores (aeciospores) are produced in tiny “cups” called aecia on the infected tissues several weeks later. Aeciospores produced in summer in the tubular aecia on diseased crabapple, serviceberry or hawthorn tissue are blown to cedar during the summer. They then germinate during moist weather, infect and cause small pea-sized galls or slight swellings to form on the twigs. The fungus overwinters in these galls or twigs, which continue to grow and enlarge during the following year. The fungus survives a second winter within the gall or branch, then begins producing its long, orange spore horns or orange spore masses the next spring, completing the disease cycle that began two years earlier.



**Top:** Aecia from cedar-quince rust on hawthorn fruit

**Above:** Cedar-apple rust spore horn on Juniper at onset of telia growth

# Monitoring

Wetness for five to six hours at 50 to 60 degrees F will lead to moderate levels of infection.

**Cedar-apple rust** – *Gymnosporangium juniper-virginianae* forms reddish or brown galls on infected *Juniperus*. Galls are usually rounded and can be 2 inches in diameter. In the spring following rainy periods, slimy orange tendrils, or “spore horns,” up to 2 inches long swell and protrude from the galls.

**Cedar-hawthorn rust** – Galls produced by cedar-hawthorn rust (*G. globosum*) are similar in appearance but are smaller and more irregular in shape and do not develop the regular arrangement of circular depressions. Spore horns are shorter, generally fewer in number and club shaped.

**Cedar-quince rust** – Cedar-quince rust (*G. clavipes*) does not form round galls but instead forms spindle-shaped swellings on twigs and branches, where a gelatinous, orange-brown mass of spores is borne in the spring.



# Symptoms

Although cedar rusts can cause unsightly growths on *Juniperus*, they do not usually cause serious damage to juniper. Hawthorn and crabapple twigs infected by the cedar-quince fungus can become swollen and die. This reduces quality and increases pruning costs. Rust diseases can cause serious fruit malformation on serviceberry and hawthorn and weaken and kill shoots of crabapples and hawthorns. Infected fruits can drop prematurely or have a reduced visual appeal if they remain on the tree. Leaf infections often result in premature leaf loss, weakening the tree and reducing the bloom the following year.



Acacia developing on a canker caused by cedar-quince rust

# Integrated Pest Management

## CULTURAL CONTROL

In the landscape and nursery, keep junipers and other hosts separate. Use resistant cultivars. Destroy nearby wild, abandoned or worthless apples, crabapples, hawthorns, cedars or junipers. Most infections result from spores produced on infected junipers growing just a few hundred feet away. Prune out and destroy cedar galls found on ornamental junipers and eastern red cedars.

## CHEMICAL CONTROL

Please refer to [http://eppserver.ag.utk.edu/redbook/sections/trees\\_flowers.htm](http://eppserver.ag.utk.edu/redbook/sections/trees_flowers.htm) for the most up-to-date recommendations.

# Resources

Photo credits: Amy Fulcher, University of Tennessee and Ms. Shauna Switzer, University of Kentucky Nursery Scout  
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