

# Diseases of Landscape Plants

B · O · T · A · N · Y



PLANT · PATHOLOGY

[www.btny.purdue.edu](http://www.btny.purdue.edu)



**Note:** these diseases also are found on fruit plants. The recommendations presented in this publication are intended only for ornamental or landscape plants and should never be used on fruit meant for consumption. For more information on treating these diseases in fruit trees, see Purdue Extension publication BP-138-W, *Fruit Diseases: Cedar Apple and Related Rusts on Apples in the Home Landscape*, [www.ces.purdue.edu/extmedia/BP/BP-138-W.pdf](http://www.ces.purdue.edu/extmedia/BP/BP-138-W.pdf).

## Cedar Apple and Related Rusts on Landscape Plants

Janna Beckerman

Department of Botany and Plant Pathology, Purdue University

The cedar rust diseases (*Juniper* spp.) stand out due to their conspicuous nature, and the fact the fungi that cause them complete their life cycles on two plant hosts — the juniper (cedar) and the apple (although pear, hawthorn, quince, serviceberry, and crabapple are other hosts). All potential host plants are commonly planted in the urban landscape, or are native to the Midwest.

In Indiana, there are three common juniper rust diseases:

### Cedar-Apple Rust

This rust is caused by the fungus *Gymnosporangium juniperi-virginianae*, and requires two hosts to complete its life cycle. The fungus must infect apple or crabapple in the spring, then an alternate host, Eastern red cedar (*Juniperus virginiana*) or Rocky Mountain juniper (*J.scopulorum*) in the late summer.

### Cedar-Hawthorn Rust

This disease is caused by the fungus *Gymnosporangium globosum*, which alternates between junipers and hawthorn, crabapple, apple, and several other members of the rose family.

### Cedar-Quince Rust

This rust is caused by the fungus *Gymnosporangium clavipes*, and infects junipers and a wide range of rosaceous hosts, namely hawthorn, but also serviceberry, quince, and pear. This fungus produces a flat, gelatinous mass on the twigs of the juniper host and causes the greatest damage on the fruit and branches of susceptible hawthorns.

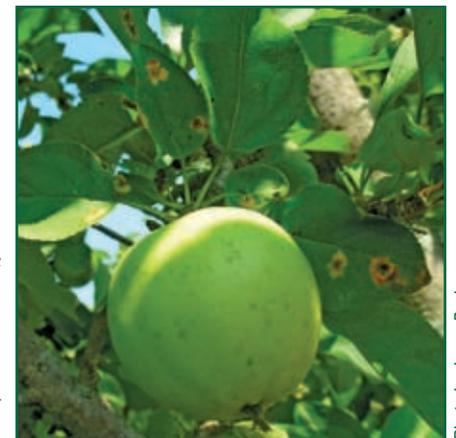
### Symptoms and Signs

Regardless of the disease, these rust fungi have similar life cycles and cause similar symptoms in their hosts. In the spring, orange gelatinous horns develop from gray to brown colored fungal galls on the branches of infected junipers (Figure 1). These horns produce wind-blown spores that can infect apple and crabapple trees. The galls produced by cedar-hawthorn and cedar-quince rusts are much less conspicuous than cedar-apple rust's large, round galls.

Apple and crabapple symptoms initially appear on the upper leaf surface as small, yellow spots that later enlarge and turn orange (Figure 2). As the



**Figure 1.** The orange horns shown here are symptoms of rust on eastern red cedar (*Juniperus virginiana*). These horns produce spores that can then infect apples and other members of the Rose family.



**Figure 2.** The apple leaves shown here are infected with cedar-apple rust. Note that in this case, the fruit is uninfected.

Photo by Janna Beckerman

Photo by Janna Beckerman



Photo by Janna Beckerman

**Figure 3.** The whisker-like structures (called acial columns) of cedar-quince rust produce spores that infect the juniper. Note that only the fruit is infected.

fungus grows, yellow-brown lesions develop on the undersides of leaves or on the fruit and form small, whisker-like structures that contain rust-colored spores (Figure 3). On hawthorn, foliar symptoms can develop, but the disease is most commonly observed on fruit, and young shoots where the whisker-like structures develop. These structures produce spores that are blown to susceptible junipers and continue the infection cycle by producing galls that remain dormant. The following spring, these galls produce orange, gelatinous horns that release spores and continue the infection cycle. Dead galls on cedar and juniper may remain attached to the plants for a year or more.

Table 1 (page 3) compares the similarities and differences between these diseases.

In most cases, these rusts do not seriously damage flowering crabapple and hawthorn trees. However, repeated, severe defoliation can weaken trees, and predispose them to winter injury, insects, and opportunistic pathogens.

### Management

To reduce the severity of rust, avoid planting susceptible cedar and juniper varieties near crabapple or other susceptible plants. If susceptible cedar or juniper varieties are already planted near the susceptible alternate host plant, removing the juniper host may be an effective form of control. However, remember that spores from neighboring trees infected with the disease may be blown from up to two miles away, allowing the disease to continue.

If galls have already formed on cedar or juniper plants, pruning the galls may help reduce the number of spores available for infection next spring.

Another management option is to plant resistant varieties of either host, which will reduce the disease's severity.

### Chemical Management

Preventive fungicide applications may be required where these rusts are a perennial problem on high-value, susceptible plants. The first fungicide application to protect the rosaceous host (do not treat the juniper) should occur when the orange telial spore horns protrude from the juniper host (often during bloom in crabapple), then continue every 10 to 14 days, until the juniper galls become dry and cease to produce spores.

Fungicides labeled for cedar rust control include:

Chemical Class: Common Name	Trade Name <sup>1</sup>
strobilurin: azoxystrobin <sup>2</sup> , trifloxystrobin, pyraclostrobin,	Heritage <sup>®</sup> , Compass <sup>®</sup> , Insignia <sup>®</sup>
DMI: propiconazole	Banner <sup>®</sup> , Propiconazole <sup>®</sup>
DMI: triadimefon	<b>Bayleton<sup>®</sup></b> , Strike <sup>®</sup>
DMI: myclobutanil	Eagle <sup>®</sup> , <b>Immunox<sup>®</sup></b> , Systhane <sup>®</sup>
multisite: chlorothalonil	<b>Daconil<sup>®</sup></b> , PathGuard <sup>®</sup>
multisite: mancozeb	<b>Mancozeb<sup>®</sup></b> , Penncozeb <sup>®</sup>
multisite: thiophanate methyl + mancozeb	Duosan <sup>®</sup> , Zyban <sup>®</sup>
multisite: mancozeb+ mycobutanil	Manhandle <sup>®</sup>

<sup>1</sup> Fungicides set in bold are available for home use.

<sup>2</sup> Azoxystrobin may be phytotoxic to some crabapple varieties. The Heritage<sup>®</sup> label lists common crabapples that can be treated with azoxystrobin without problem.



Photo by Janna Beckerman

**Figure 4.** This hawthorn fruit is infected with cedar-quince rust. The spores have fallen, but are not infecting the adjacent leaf

**Table 1. Symptoms, Hosts, and Resistant Species**

This table shows the various hosts for each of the cedar rust fungi, lists the symptoms each fungus causes, and provides a list of cultivars resistant to the disease.

	<b>Cedar-Apple</b> <i>Gymnosporangium juniperi-virginianae</i>	<b>Cedar-Hawthorn</b> <i>Gymnosporangium globosum</i>	<b>Cedar-Quince</b> <i>Gymnosporangium clavipes</i>
<b>Rosaceous Hosts</b>	apple, crabapple, flowering crabapple	hawthorn, apple, crabapple, flowering crabapple, pear, quince, serviceberry	apple, crabapple, flowering crabapple, Aronia, cotoneaster, chokecherry, quince, mountain-ash, hawthorn, flowering-quince, serviceberry.
<b>Symptoms</b>	Bright yellow-orange spots on upper leaf surfaces, followed several weeks later by light-colored, whiskered, cup-shaped structures on leaf undersides. Severe defoliation possible. Calyx end of apple fruit may be infected.	Bright yellow-orange spots on upper leaf surfaces, followed several weeks later by light-colored, whiskered, cup-shaped structures on leaf undersides. Severe defoliation possible. Fungus occasionally deforms green twigs. Infection of apple or crabapple fruit is rare.	Infects fruit, but not leaves, of most apple cultivars. Infects both leaves and fruit of hawthorn. Conspicuous fruit infection causes extensive damage. Twigs swell and distort.
<b>Resistant Commercial Apple Cultivars</b>	See Purdue Extension Publication BP-132-W, <i>Fruit Diseases: Disease Susceptibility of Common Apple Cultivars</i> , <a href="http://www.ces.purdue.edu/extmedia/BP/BP-132-W.pdf">http://www.ces.purdue.edu/extmedia/BP/BP-132-W.pdf</a>		
<b>Resistant Ornamental Species and Cultivars</b>	Most commercially available crabapples have fairly good resistance. Avoid the following cultivars: ‘Hopa,’ ‘Radiant,’ ‘Vanguard,’ ‘Klehm’s Bechtold Select.’	<i>Craetagus crus-galli</i> var. <i>inermis</i> , <i>C. intricate</i> , <i>C. laevigata</i> ‘Autumn Glory,’ <i>C. phaenopyrum</i> , <i>C. pruinosa</i> , <i>C. ‘Winter King’</i>	There are no known resistant hawthorn varieties.
<b>Juniper Hosts</b>	Eastern red cedar, Rocky Mountain juniper ( <i>Juniperus scopulorum</i> ), creeping juniper ( <i>Juniperus horizontalis</i> ), common juniper ( <i>Juniperus communis</i> )	Eastern red cedar, Rocky Mountain juniper, prostrate juniper, common juniper,	Eastern red cedar, common juniper, prostrate juniper, Rocky Mountain juniper, savin juniper
<b>Symptoms</b>	Brownish, round fungal galls most of the year; orange gelatinous masses form in early spring	Smaller galls than cedar-apple rust disease; more elaborate “pom-pom” or “Kooshball” telial spore horns.	Elongate, almost inconspicuous galls, few spore horns.
<b>Resistant species</b>	<i>J. ashei</i> , <i>J. chinensis</i> , <i>J. conferta</i> , <i>J. rigida</i> , <i>J. sabina</i> , <i>J. squamata</i>		There is no available data regarding cedar-quince rust resistance.

### References

Aldwinckle HS (1990) Rust diseases. Compendium of Apple and Pear Diseases, pp. 10–14. American Phytopathological Society, St. Paul (US).

Jones, R.K., and Benson, D. M. 2001. Juniper Diseases. In ‘Diseases of Woody Ornamentals and Trees in Nurseries,’ APS Press.

Sinclair, W. Lyon, H.H. and Johnson W.T. 2005. Diseases of Trees and Shrubs. Comstock Publishing, Pp. 240-249.

Singh, P. and Carew G.C. 1980 Quince rust of common juniper in Newfoundland Canadian Plant Disease Survey 60:21-2.

