

Fruit Diseases

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Note: the diseases described here also are found on ornamental plants. The recommendations presented in this publication are only for fruit intended for human consumption. For more information on treating these diseases in ornamental or landscape plants, see Purdue Extension publication BP-137-W, *Diseases of Landscape Plants: Cedar Apple and Related Rusts on Landscape Plants*, www.ces.purdue.edu/extmedia/BP/BP-137-W.pdf.

Cedar Apple and Related Rusts on Apples in the Home Landscape

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The rust diseases that infect Eastern red, common, and many species of juniper (*Juniperus 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 disease is caused by the rust fungus *Gymnosporangium juniperi-virginianae*, and requires two hosts to complete its life cycle. The fungus infects both the leaves and fruit of apple or crabapple in the spring, then an alternate host, primarily 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*, and alternates between junipers and hawthorn, crabapple, apple, and several other members of the rose family. This disease rarely infects the fruit of apple, but commonly infects the foliage.

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. On apple, cedar-quince rust usually infects the fruit at the calyx end, and rarely infects the leaves. This fungus produces a flat, gelatinous mass on the twigs of the juniper host.

Symptoms and Signs

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.

Apple and crabapple symptoms initially appear on the upper leaf surface as small, yellow spots that later enlarge and turn orange (Figure 2). With cedar-quince rust, lesions develop on the blossom, or calyx end of the fruit (Figure 3), often deforming the calyx to the core of the apple.



Photos by Janna Beckerman

Figure 1. The orange horns shown in these images are signs of rust on eastern red cedar (*Juniperus virginiana*). Each rust produces specific symptoms and signs on red-cedar. These horns produce spores that can then infect apples and other members of the Rose family. (From left) cedar-apple rust, cedar-quince rust, and cedar-hawthorn rust.



Photo by Janna Beckerman

Figure 2. This apple leaf is infected with cedar-apple rust.



Photo by Janna Beckerman

Figure 3. The whisker-like structures (called aecial columns) of cedar-quince rust produce spores that infect the calyx-end of the fruit as shown here.



Photo by Janna Beckerman

Figure 4. The aecial columns of cedar-apple rust on the underside of an apple leaf.

Regardless of the site of infection, the fungus develops yellow to orange or brown lesions on the undersides of leaves or on the fruit and form small, whisker-like structures that contain rust-colored spores (Figure 4). 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.

In addition to damaging fruit, defoliation of apple trees can result from severe infection during wet springs. 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 susceptible apples. If susceptible cedar or juniper varieties are already planted near the susceptible apples, 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. It is important to note that some apple cultivars that are resistant to cedar-apple rust — such as RedFree, McIntosh, and Red Delicious — are susceptible to quince rust. Conversely, some cultivars — such as Jonathan, Lodi, or Ben Davis — are resistant to quince rust but are susceptible

to cedar-apple rust. Some varieties are susceptible or fairly resistant to both.

For more information, see Purdue Extension publication BP-132-W, *Disease Susceptibility of Common Apple Cultivars*, www.ces.purdue.edu/extmedia/BP/BP-132-W.pdf.

Chemical Management

Fungicides labeled for cedar rust control on fruit trees include:

Chemical Class: Common Name	Trade Name ¹
DMI: triadimefon	Bayleton [®]
DMI: myclobutanil	Nova, [®] Immunox[®]
Carboximide: thiophanate methyl	Topsin-M, [®] Cleary's 3336[®]
multisite: mancozeb	Mancozeb[®] , Penncozeb [®]
Multisite:captan	Captan[®]

¹ Fungicides set in **bold** are labeled for homeowner use.

For additional information about timing, application, and integrated pest management (IPM) of fruit trees, see Purdue Extension publication ID-168, *Indiana Commercial Tree Fruit Spray Guide* (search by title at www.ces.purdue.edu/new).

References

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