

Cedar-apple rust and related rust diseases

Quick facts

- Cedar-apple rust and related rust fungi need plants from two plant families to complete their life cycle.
- These fungi rarely cause serious damage to their hosts and do not require management in most cases.
- This disease can cause damage to leaves and fruit of very susceptible apple varieties but is only a minor problem on resistant or partially resistant trees.
- Do not plant eastern red cedar and juniper within a few hundred yards of apples, hawthorns, and other plants from the Rosaceae family.
- Disease-resistant varieties are available for some plants.

How do cedar apple rust and related rust fungi survive and spread?

Rust fungi symptoms depend on the plant infected. Although cedar-apple rust is the most well-known rust fungi, four different rust fungi cause similar diseases on the same types of trees in Minnesota. All four require plants from two different families to complete their life cycles: one plant from the Cupressaceae family (red cedar, juniper) and the other from the Rosaceae family (crabapple, hawthorn, serviceberry, etc.).

These four related rust diseases have very similar life cycles and biology.

- Cedar-apple rust and related rust fungi over-winter in infected branches and galls on juniper and red cedar trees.
- In wet, spring weather, the galls produce orange, gummy, fungal growths that release spores.
- During dry spring weather, the orange, gummy structures shrivel and dry.
- Galls can rehydrate and dry out several times in one season in response to weather conditions.
- Once the weather becomes consistently warm and dry, spores are no longer produced on infected junipers or red cedar trees.
- After one season of spore release, galls of cedar-apple rust and hawthorn rust die and fall off the tree.
- Cankers of quince rust and witches' broom of juniper broom rust go dormant but may survive for multiple years, releasing new spores each spring.
- Spores produced on infected junipers and red cedar trees are carried by wind to susceptible apple, hawthorn or other plants in the Rosaceae family.
- These spores can infect trees over a mile away.
- If leaves and fruit are wet, spores can start new infections.
- Leaf spot and fruit infections grow slowly over the summer.
- Powdery yellow, orange or chestnut-brown spores are released from infected leaves and fruit mid to late summer.
- These spores cannot infect trees in the Rosaceae family. They must be carried by wind to start new infections on young needles and shoots of juniper or red cedar trees.
- It takes up to two years for galls to form on the juniper or red cedar tree.

How to identify rust

These diseases require plants from two different families to complete their life cycles. Symptoms are very different on each type of plant.



Cedar apple rust leaf spots.



Cedar apple rust projections.



Hawthorn rust spots on leaves.

Cedar-apple rust

- Disease is most common on apple and crabapple. It occurs occasionally on hawthorn.
- Leaf spots are first yellow then turn bright orange-red, often with a bright red border.
- Small, raised, black dots form in the center of leaf spots on the upper leaf surface when the leaf spots mature.
- Very short (less than 1/10th inch), finger-like fungal tubes stick out from the lower surface of the leaf, directly below leaf spots.
- The fungal tubes appear fringed when they open at the tip to release yellow to orange, powdery spores.
- Rarely, green to brown irregular spots with black dots form on the fruit surface. Fruit spots do not extend deep into the fruit.

Hawthorn rust

- Disease is most common on hawthorn, apple and crabapple. It occurs occasionally on serviceberry, quince and pear.
- Leaf spots are yellow to orange. Raised, black dots form in the center of the spots on the upper leaf surface as they mature.
- White, finger-like, fungal tubes (up to 1/8th inch long) stick out from the underside of leaf spots.
- When infection is severe on hawthorn, leaves turn completely yellow and fall prematurely.
- Infection of green stems occurs occasionally and can result in thick, deformed growth of stems. This can cause shoot death when severe.
- Rarely found are orange to rust-colored, spore-filled blisters on the fruit surface.

Juniper broom rust

- Disease affects serviceberry, apple and crabapple, hawthorn and mountain ash.
- Leaf spots are small, yellow, slightly raised and may have a red border.
- Raised, gummy, yellow droplets form in the center of leaf spots and eventually turn into raised, black dots.
- In highly susceptible hosts, leaf tissue around the leaf spot dies. The spot then turns brown (with a red border) and expands from the infection point to the leaf edges in a wedge shape.
- Infected leaf veins cause the leaf to curl and become distorted.
- Small, yellow spots with red borders are found on green stems, leaf petioles (leafstalks) and leaf veins.
- Finger-like tubes develop on leaf petioles (leafstalks) and stems and occasionally develop on upper and lower sides of leaf veins.

How to manage cedar apple rust and related rust diseases

Managing rust on apples, hawthorns, and other plants in the Rosaceae family

Cultural control practices

- Tolerate leaf spots and fruit infection on apples, hawthorns, serviceberry and other plants in the Rosaceae family. They do not significantly affect the health of the tree if leaf loss does not occur.
- Do not plant eastern red cedar and juniper plants within a few hundred yards of susceptible Rosaceae plants. This will reduce disease problems but not completely eliminate them.
- Inspect nearby juniper and red cedar trees in late winter or early spring. Prune and remove brown, woody galls found before orange, gelatinous structures form in the spring. This will help reduce the level of infection on nearby Rosaceae plants.
- Prune and remove infected twigs or branches on Rosaceae plants if they occur.

Resistant varieties

Rust-resistant cultivars of hawthorn are difficult to find. Often, a cultivated variety will have resistance to one of the rusts (such as cedar-apple rust), but be highly susceptible to, and very likely to be infected by a different rust (such as hawthorn rust).

Plant disease-resistant varieties of crabapple and apple when possible. Do not plant Beacon and Wealthy apple varieties in areas where cedar apple rust has been a problem. Among apple varieties commonly grown in Minnesota, these are the only two that are likely to be significantly damaged by rust.

Managing rust on juniper and eastern red cedar

- Galls and witches' brooms on eastern red cedar or juniper do little harm to the tree or shrub and do not need to be managed.
- Galls and witches' brooms can be pruned off to improve the look of the tree or shrub.
- Fungicides are not recommended to protect eastern red cedar or juniper from infection.

Fungicides

- Fungicides are not recommended to protect trees from infection with cedar apple rust and related rust fungi. Trees and shrubs often tolerate infection.
- Fungicides are available to protect trees and shrubs that are for ornamental purposes only.
 - Fungicides with the active ingredient Myclobutanil are most effective in preventing rust. Copper and sulfur products can be used as well.
 - Fungicides are only effective if applied before leaf spots or fruit infection appear
 - Spray trees and shrubs when flower buds first emerge until spring weather becomes consistently warm and dry.
 - Monitor any nearby juniper. Fungicides must be applied to crabapple, hawthorn, and other ornamental Rosaceae plants when gelatinous, orange, spore-producing structures appear on galls and branches.

Trees and shrubs in the Rosaceae family are highly attractive to bees, birds, and other wildlife. Avoid using fungicides if possible

CAUTION: Mention of a pesticide or use of a pesticide label is for educational purposes only. Always follow the pesticide label directions attached to the pesticide container you are using. Be sure that the area you wish to treat is listed on the label of the pesticide you intend to use. Remember, the label is the law.



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