AGRICULTURAL

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Cedar Apple Rust

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In Missouri, cedar apple rust can be a destructive apple disease if you don't use adequate controls. It also attacks red cedars, as the name implies, causing unsightly galls, but damage is usually minimal. Understanding of the disease cycle of this rust fungus is necessary for proper identification and control.

Cause

Cedar apple rust, common in North America and in Europe, is caused by the fungus *Gymnosporangium juniperivirginianae.* Other similar rust diseases are quince rust, *G. clavipes,* and hawthorne rust, *G. globosum.* All three fungi spend part of their life cycle on red cedars that are growing near orchards. Since the disease cycles of these rusts are similar, this publication will discuss only cedar apple rust.

Symptoms

On apple: Infections occur on apple leaves, fruit and occasionally on young twigs. However, the brightly colored spots produced on the leaves make it easy to identify. Numerous small, pale yellow spots appear on the upper surfaces of the leaves, usually during late April or May (see Figure 1). These spots gradually enlarge and turn orange (see Figure 2). You can see orange drops of liquid in the spots. Later, black dots (spermatia) appear in the spots on the upper leaf surface.

In late summer, tubelike structures (aecia) develop on the underleaf surface. Leaves might drop prematurely because of infections. Fruit infections are usually near the calyx (blossom) end and are somewhat similar to the leaf lesions.

On cedar: The fungus produces reddish-brown galls from ¼ to 2 inches in diameter. These galls are frequently called "cedar apples." After reaching a diameter of about ½ inch, they show many small circular depressions (like golf balls). In the center of each depression is a small, pimple-like structure (Figure 3). In the spring these structures elongate into orange gelatinous protrusions known as telia horns. These spore-bearing horns swell during rainy periods in April and May (see Figure 4). The wind carries the microscopic spores to infect apple leaves.

Figure 1. Cedar apple rust on a leaf early in the season.

Figure 2. Cedar apple rust on a leaf late in the season (August).

Figure 3. Mature cedar apple rust galls on a cedar in the spring.

Figure 4. During rain, cedar apple rust galls on cedar trees form gelatinous orange spikes (telia horns), which produce spores.

Disease cycle

The disease cycle of cedar apple rust is complex. Two host plants — apple and cedar — are involved, and three fruiting structures are produced by the fungus: aecia, spermatia and telia. The fungus requires two years to complete the cycle (see Figure 5).

In warm, wet springs, each spore horn produces a fantastic number of spores. The wind carries them to apple leaves just about the time when apple buds are in the pink to early blossom stage.

Upon reaching apple leaves, the spores attach themselves, germinate and enter the leaf tissues. They infect within four hours under favorable conditions. Yellow lesions develop in one to three weeks.

In July and August, spores from the apple leaves (aeciospores) are produced. The wind carries them back to cedar trees, completing the cycle. The spores land on cedar needle bases or in cracks or crevices of twigs. There, they germinate and produce small, green-brown swellings about the size of a pea. Galls do not produce spores until the second spring. However, many mature galls usually are available every year.

Control

Control of the cedar apple rust disease involves interruption of the disease cycle.

You should **plant resistant varieties** of apples when cedar trees are nearby. There are definite differences in the susceptibility of apple varieties. Jonathan, Rome Beauty, Wealthy and York Imperial are susceptible. Grimes Golden, Red Delicious, Winesap,

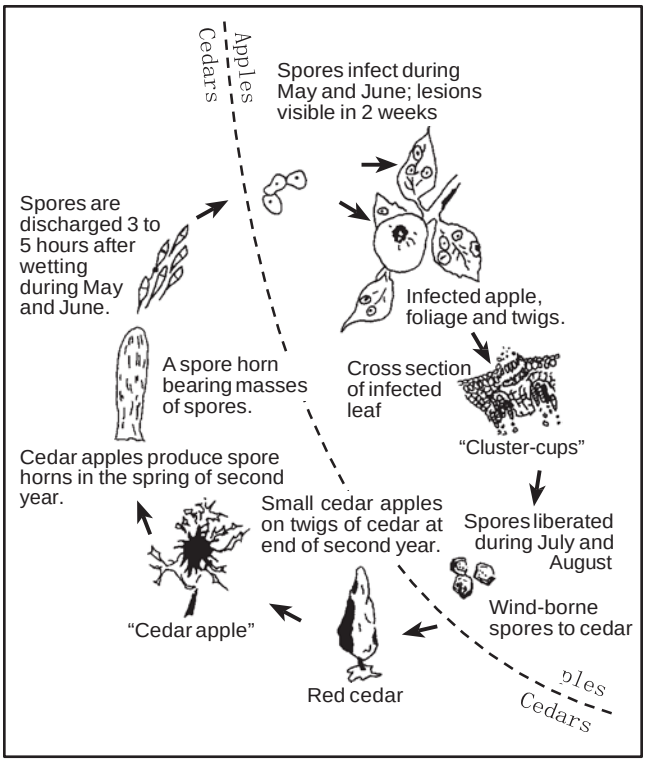

Figure 3. Disease cycle of cedar apple rust (University of Nebraska-Lincoln).

Staymans, Redfree, Jonafree and Priscilla are resistant. For more information, see MU publication XM 1000 (on XPLOR CD-ROM only), *Identification and Control of Common Apple Diseases in Missouri.*

Remove cedars located within a 2-mile radius of an orchard to interrupt the disease cycle. Orchardists usually try to eradicate cedars near their orchards, but homeowners may not be able to exercise this control measure because their neighbors might plant cedars for ornamental purposes.

Fungicide sprays are highly effective against the rust diseases when applied properly. Apply them four times at 7- to 10-day intervals starting at pink bud to early bloom.

Fungicides such as Bayleton or Ferbam will protect the apple leaves from becoming infected. The same fungicides can be used in July and also in August on the cedars to reduce infection, but this is not as important as protecting the apples. Follow label directions.

For more information on fungicides, see MU publications G 6010, *Home Fruit Spray Schedules*, and MP 0651, *Fruit Tree Spray Guide: Missouri.*

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