

## Cedar-apple rust

The fungus *Gymnosporangium juniperi-virginianae* causes cedar-apple rust.

### **Host Plants:**

The fungus spends part of its annual life cycle in apple and crabapple (*Malus* species) and part of it on juniper, which are primarily eastern red cedar (*Juniperus virginiana*) and Rocky Mountain juniper (*Juniperus scopulorum*). Nevertheless, several other *Juniperus* species are also susceptible to infection.

### **Description:**

The most frequently noted symptoms are bright red-orange-yellow spots on apple leaves in the summer.



**Leaf spots on apple**



**Gelatinous fruiting structures on juniper in spring**

Photos: (left) A. S. Windham and (right) N. A. Tisserat, *Diseases of Woody Ornamentals and Trees*. APS Press.

Junipers susceptible to cedar-apple rust develop pea-sized to 2-inch diameter spherical growths (galls) on infected needles and twigs. During prolonged wet periods in the spring, the juniper galls secrete orange-brown gelatinous horns (tendrils).

### **Disease Cycle:**

In the spring, gelatinous tendrils erupt out of mature galls on infected junipers. Essentially, non-infectious spores (teliospores) coat the tendrils. The teliospores germinate in place on the tendrils and release infectious spores (basidiospores). The basidiospores drift through the air chiefly at night and early morning. If they land on apple leaves and fruit that remain wet for 4-6 hour periods, the basidiospores infect them. After several weeks, yellow spots develop on the infected apple leaves and fruit. By mid-summer the spots appear slightly raised and light-colored “bristles” (actually fungal fruiting structures called aecia) are visible on the underside of the leaf spots. Aecia release spores (aeciospores) and the wind carries them to nearby juniper (cedar) trees. Infected juniper needles and twigs show no symptoms of infection initially. Inspect them closely the spring following infection for small, green swellings (immature galls). The galls reach full size by the end of the next growing season but do not mature and develop gelatinous tendrils until the following spring (20<sup>+</sup> months after infection).

### **Management Strategies:**

If possible, avoid growing susceptible junipers close to crabapples and apples. Most basidiospores infect apple trees within a few hundred yards of the juniper host, however basidiospores infect a fair number of apples as far as a mile away. If replacement is an option, grow cedar-apple rust resistant varieties of *Malus*. Resistant to very resistant varieties of apples include: Delicious (red), Empire, Keepsake, Liberty, McIntosh, Milton, Niagara, Paulared, Regent, Spartan, and Viking. In addition, there are a number of resistant crabapples such as Adams, Candied Apple, Chestnut, Dolgo, Kelsey, Sargent, Snowdrift, and Thunderchild. Apply fungicides to

susceptible, high value apples during the period when juniper galls are producing tendrils. Specifically, begin spraying when buds just start to break open and repeat the sprays at labeled intervals until a week after petal fall, or dry conditions prevail. Chemical control on juniper is not recommended because cedar-apple rust rarely causes significant damage to this host. Prune dormant galls from juniper during the fall, winter, and early spring before orange tendrils begin to erupt from galls.

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