



Apple Rust Diseases

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Time of Concern

Tight cluster through 2 weeks after petal fall



tight cluster



petal fall

Damage



Figure 1a. CAR gall on red cedar. Photo: D. Rosenberger



Figure 1b. Active spore production of CAR. Photo: D. Rosenberger

Pest Cycle

Cedar apple rust (CAR) is an apple disease of leaves and fruit caused by a fungus that overwinters in galls (Figures 1a and 1b) found on eastern red cedar trees (*Juniperus virginiana* L.). The spores produced by these galls infect apple but not red cedar; the spores that are formed from infections on apple leaves and fruits infect only red cedar which means it is an alternate host disease. In regions of NY where eastern red cedar is common in the wild or landscape plantings, cedar apple rust can defoliate apple trees and result in poor quality fruit. Spring rains, when temperatures are between 46-75°F, cause the galls to ripen and produce spores which shoot into the air and land on new apple leaves and flowers. Infection occurs if the leaves, blossoms, or fruitlets stay wet for 4 hours after the spores are released and temperatures are >60°F, or 10 hours with temperatures of 43°F. One to two weeks after infection, orange pustules form on the upper surface of leaves (Figure 2) or on fruit (Figure 3). Removing the red cedar alternate host, and planting resistant apple varieties is one way to manage this disease.

Another rust disease, Quince Rust, is a fungus that infects apple fruit of most cultivars but not leaves. It attacks both leaves and fruit of hawthorn in the hedgerows. The initial source for quince rust is the overwintering cankers in cedar trees. The spores are released as with cedar apple rust and infect apple fruitlets from pink to petal fall during rainy weather. These infections then produce spores which re-infect the cedar trees. The rust symptoms appear on apple fruit 2-4 weeks after an infection. Some cultivars that are resistant to CAR are susceptible to quince rust (McIntosh and Delicious); some cultivars susceptible to CAR are resistant to quince rust.

Damage, continued



Figure 2. CAR infections on apple leaves



Figure 3. CAR infection of apple. Photo: D. Rosenberger



Figure 4. Quince rust infection of apples. Photo: D. Rosenberger



Figure 5. Quince rust infection on hawthorn fruits.

IPM Steps for Beginners

1. The key to managing apple rust diseases is prevention.
2. If practical, remove eastern red cedar and identify hawthorn growing in hedgerows.
3. Plant resistant cultivars: refer to the KTFREC - Cedar-apple Rust Susceptibility Table (caf.wvu.edu/kearneysville/tables/carsus.html).
 - a. CAR Resistant cultivars: Delicious, Empire Enterprise, Fortune, Golden Supreme, Liberty, Macoun, McIntosh, Sansa, Zestar.
 - b. CAR Susceptible cultivars: Ambrosia, Braeburn, Cameo, Cortland, Crimson Crisp, Fuji, Gala, Ginger Gold, Golden Delicious, Gold Rush, Honeycrisp, Idared, Jonafree, Jonagold, Northern Spy, Rome Beauty, Williams Pride.
4. To prevent infection if your orchard is in a region where eastern red cedar is prevalent, keep trees covered with fungicide effective against rust diseases from tight cluster through 2 weeks after petal-fall.
5. Spray fungicide before the rain on a 7-10 day interval using a mancozeb product up until 77 days before harvest.
6. Use *Cornell Tree Fruit Guidelines* for alternative fungicides for rust disease.