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Cedar-Apple Rust

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Introduction

One of the most spectacular diseases to appear in spring is cedar-apple rust. This disease is caused by the fungus *Gymnosporangium juniperi-virginianae* and requires both cedar and apple trees to survive each year. It is mainly a problem in the eastern portion of North America and is most important on apple or crabapple (*Malus sp*), but can also affect quince and hawthorn.

Symptoms

The chief damage by this disease occurs on apple trees, causing early leaf drop and poor quality fruit. This can be a significant problem to commercial apple growers but also harms the appearance of ornamental crabapples in the home landscape. On apple, symptoms first appear as small green-yellow leaf or fruit spots that gradually enlarge to become a yellow-orange color (**Figures 1 and 2**). On the upper leaf surface of these spots, the fungus produces specialized fruiting bodies called spermagonia. On the lower leaf surface (and sometimes on fruit), raised hair-like fruiting bodies called aecia (**Figure 3**) appear as microscopic cup-shaped structures. Wet, rainy weather conditions favor severe infection of the apple. The fungus forms large galls on cedar trees in the spring (see next section), but these structures do not greatly harm

Figure 2. Cedar-apple rust on crabapple foliage.

Figure 1. Cedar-apple rust (leaf spot) on apple (*courtesy J. Clemons*).

Figure 3. Aecia of cedar-apple rust on crabapple leaves.

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native redcedar and ornamental cedar, although some twig dieback may occur.

Disease Cycle

The fungus has a rather complex life cycle. It overwinters on cedar trees. In Arkansas, infection on redcedar typically takes place during the late spring and early summer months. Aeciospores, which are produced on the apple, will infect needles and buds of the cedar. Small leaf swellings develop and enlarge by fall. By the next spring and during moist weather, the galls produce orange-colored jelly-like "horns" (**Figure 4**). On cedar, baseball-sized galls may form over large portions of the tree (**Figure 5**), creating a dramatic effect. Twig galls on the cedar may eventually die, but they often remain attached for one to two years. The jelly-like horns represent the telial stage of the fungus. The telial horns swell considerably and produce basidiospores that can be air or water borne for a distance of several miles; however, most infections usually occur within a few hundred yards. Basidiospores infect young apple leaves, fruit and twigs causing disease symptoms mentioned in the previous section. The life cycle of the fungus typically takes about two years to complete.

Figure 4. Jelly-like telial "horns" of galls.

Figure 5. Severe infection of Eastern redcedar.

Management

Resistant varieties of apple and crabapple are the best method of control. A list of apple varieties can be found in **Table 1**. Because it is impractical to keep enough distance between native cedar trees and cultivated apples or crabapples in the state, fungicides can be used to protect apples against infection. Early spring fungicide applications work best as they will protect very young apple leaves from infection. Consult Extension publication MP154, *Arkansas Plant Disease Control Products Guide*, for a list of effective fungicides. Fungicide control on the cedar is not recommended since the damage to cedar is not considered significant and it would not help anyway, unless all cedars in the area could be sprayed.

Early detection and identification are important for effective disease management strategies. For further information about cedar-apple rust and other rust diseases of plants, contact your local county Extension office or the Plant Health Clinic.

Table 1. Apple cultivar susceptibility to the cedar-apple rust fungus.

Apple cultivar	Cedar-apple rust susceptibility rating[z]	Apple cultivar	Cedar-apple rust susceptibility rating[z]
Arkansas Black	R	Maiden Blush	R
Arlet	HS	McIntosh	VR
Baldwin	VR	Milton	VR
Barry	R	Mollies Delicious	VR
Beacon	S	Monroe	S
Ben Davis	S	Mutsu	S
Braeburn	HS	Niagara	R
Britemac	R	Northern Spy	S
Burgundy	S	Northwestern Greening	S
Cameo	HS	Paulared	R
Carroll	R	Prima	HS
Cortland	S	Priscilla	R
Dayton	R	Pristine	S
Delicious	VR	Puritan	R
Early McIntosh	R	Quinte	S
Empire	R	Raritan	S
Enterprise	VR	Redfree	VR
Fuji	HS	Rhode Island Greening	S
Gala	HS	Rome Beauty	HS
Ginger Gold	HS	Scotia	R
Gloster	S	Spartan	R
Golden Delicious	HS	Spigold	HS
Goldrush	HS	Spijon	S
Granny Smith	R	Stark Bounty	S
Gravenstein Holly	VR	Stark Splendor	S
Grimes Golden	R	Starkspur Earliblaze	R
Honeycrisp	S	Stayman	S
Idared	S	Summerred	HS
Jamba	S	Twenty Ounce	HS
Jerseymac	VR	Viking	R
Jonafree	S	Wayne	S
Jonagold	S	Wealthy	HS
Jonamac	R	Williams Pride	S
Jonathan	HS	Winesap	R
Julyred	S	Winter Banana	HS
Liberty	VR	Wellington	R
Lodi	HS	Yellow Transparent	R
Macoun	R	York Imperial	HS

[z]VR = very resistant. No control needed. (Very few cultivars in this category for any disease.)
R = resistant. Control only needed under high disease pressure.
S = susceptible. Control usually needed where disease is prevalent.
HS = highly susceptible. Control always needed where disease is prevalent. These cultivars should receive first priority when control is called for.

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