Rust Diseases on Flowering Crabapple and Fruiting Apples

Cedar-apple, cedar-hawthorn, and cedar-quince rust are common diseases of apple and flowering crabapple in Kansas. These rust fungi spend a portion of their life cycle on rosaceous hosts such as apple, flowering crab, and hawthorn, and another portion on species of Juniperus (which includes eastern red cedar). Cedar-apple rust is the most prevalent of the three diseases on apple and flowering crabapple whereas quince rust is more common on hawthorn in Kansas. These rust fungi can result in considerable damage to rosaceous plants by causing premature defoliation and fruit distortion and abortion and twig dieback. The effects of these diseases on junipers are minimal.

On Apple and Crabapple

Symptoms of cedar-apple rust on flowering crabapple and apple are easily identified. In late spring or early summer, bright, yellow-orange spots approximately 1/8 to 1/4 inch in diameter form on the upper surface of leaves. These spots gradually enlarge and turn orange.

Small black fruiting structures (pycnia) of the fungus form in the center of the lesion. Eventually, an orange, cup-like fungal structure (aecium) forms on the bottom surface of the leaf directly beneath the lesion on the upper surface. This structure has small, tube-like projections in which dusty-orange spores of the fungus are produced. Symptoms of cedar-hawthorn rust are similar. Cedar-quince rust does not affect leaves, but does occur on young twigs and fruit.

Leaves with numerous spots drop during the summer. Premature defoliation weakens the tree and reduces fruit set and yield the following year. Cedar-apple and cedar-quince rust may cause fruit lesions. Diseased fruits develop deep pits or become distorted and usually drop before harvest.

On Juniper

Both cedar-apple and cedar-hawthorn rusts produce reddish-brown galls on the twigs of juniper. These woody galls usually are ½ to 2 inches in diameter. In spring (usually April, but varies with weather) galls swell and produce orange, one-inch long, gelatinous tendrils.

The tendrils remain on the galls through May. Trees with numerous galls are easily identified by their bright orange cast during rainy weather. The galls of cedar-apple rust last only one season; the spent galls dry and fall from the tree during the summer months. The galls of cedar-hawthorn may last for several years. The cedar-quince rust produces perennial, cigar-shaped galls on the twigs and branches of juniper. For more details concerning the disease on juniper see the fact sheet at

http://www.ksre.ksu.edu/library/plant2/c711.pdf

Causes

The cedar-apple rust (*Gymnosporangium juniperi-virginianae*), the cedar-hawthorn rust (*Gymnosporangium globosum*), and the cedar-quince rust (*Gymnosporangium clavipes*) overwinter in the galls on juniper.

In spring (usually April), galls expand and release fungal spores that can only infect the alternate rosaceous host. Infection of flowering crab and apples is favored by relatively cool temperatures (50 to 75° F) and prolonged leaf wetness (longer than 4 to 6 hours). Rust lesions begin to develop one to three weeks after infection.

Cup-like fruiting structures (aecia) form on the lower surface of apple leaves in late June and produce dusty-orange spores. These spores, which cannot reinfect the rosaceous host, are released from July through August and are carried by wind currents back to juniper. After infection of juniper, galls develop very slowly. Only small twig swellings may be seen the spring following infection. The galls begin to enlarge during the summer but do not release spores until the following spring. The complete life cycle of cedar-apple rust takes two years. The severity of rust infection on apple in the spring is highly dependent on weather conditions. It is also dependent on the amount of infection that occurred two years previously on juniper, since those infections eventually produce the active galls of the current year that in turn produce the spores which infect apple. A combination of a large number of active galls along with wet spring weather can result in serious infection of apple.

Control on Junipers

Although the presence of galls on twigs may be unsightly, rust diseases generally do not cause serious damage to junipers. Several cultivars of juniper are available with resistance to cedar-apple rust. However, these cultivars may be susceptible to cedar-hawthorn or cedar-quince rust. A complete listing of these junipers is given in the publication on juniper diseases.

Removal of junipers within a ½-to 2-mile radius of apple orchards disrupts the life cycle of the rust fungi and has been suggested as a control measure in some states. Unfortunately in Kansas, eradication of the alternate host becomes an impossible task because of the large native population of eastern red cedar and the wide use of junipers in windbreak and ornamental plantings. Nevertheless, homeowners should avoid planting apples or flowering crabs adjacent to junipers.

Control on flowering crabapples and fruiting apples

1) Resistant varieties (cultivars)

The best means of avoiding rust is to plant resistant cultivars. Several cultivars of flowering crab are available with good resistance to rust and other diseases. Disease resistance, aesthetic quality, and adaptability to Kansas conditions should all be considered before choosing a flowering crab for planting. A long list of flowering crabapple varieties with information on their disease susceptibility is available here:

http://www.ksre.ksu.edu/library/hort2/mf875.pdf

The following websites provide lists of varietal susceptibility of fruiting apples:

"Midwest Tree Fruit Pest Management Handbook":
http://www.ca.uky.edu/agc/pubs/id/id93/ch_1.pdf
(see table 2)

And, "Controlling Diseases and Insects in Home Fruit Plantings": (Ohio State Bulletin 780) see Table 9 here:
http://ohioline.osu.edu/b780/pdf/Table9.pdf

2) Fungicides

Fungicides are available for both flowering crabapples and fruiting apples. Keep in mind that products labeled for flowering crabs may not be labeled for fruiting apples, and vice-versa. If fungicides are used, it is important to use appropriate timing. The most critical spray period is in the spring when the orange galls are active on the junipers. One to two additional applications are usually necessary for adequate control during most springs. Read the labels for information on timing.

Commercial fruit growers should consult the annually-revised *Midwest Tree Fruit Spray Guide* for more information on fungicides. Contact your local K-State Research and Extension office or the K-State Plant Disease Clinic (email clinic@ksu.edu) for ordering information. Or, access the guide at the following website:

http://www.extension.iastate.edu/Publications/PM1282.pdf

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