

## 39. Quince Rust

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Quince rust, caused by the fungus *Gymnosporangium clavipes*, was an economically important disease in the United States during the nineteenth and early twentieth centuries because of its devastating effects on commercial apple orchards. It can also severely infect *Juniperus* spp. Three rust fungi, *G. clavipes*, *G. juniperi-virginianae*, and *G. globosum*, infect apples and use *Juniperus* spp. as alternate hosts. The latter two *Gymnosporangium* species are discussed in another section of this handbook.

### Hosts and Distribution

*G. clavipes* infects 11 genera of pomaceous hosts, including *Amelanchier* spp., *Amelorsorbus* sp., *Aronia* spp., *Chaenomeles* spp. (flowering-quince), *Crataegomesphilus* sp., *Crataegus* spp. (hawthorn), *Cydonia* spp. (common quince), *Photinia* sp., *Pyrus* spp. (pear), and *Sorbus* spp. Some susceptible cultivars of apple are Delicious, Golden Delicious, Red Delicious, McIntosh, Northern Spy,

Rome, and Winesap. Pycnial and aecial spore stages are developed on the pomaceous host. The telial and basidial spore stages occur on *Juniperus* spp.; no uredial spore stage is known.

Quince rust is not known to occur outside of North America, where it is found from Newfoundland to British Columbia and southward east of the Rocky Mountains to north Florida and Texas and into Mexico.

### Symptoms and Signs

The disease on pomaceous hosts occurs most frequently on fruits, less frequently on twigs and buds, and rarely on leaves (fig. 39-1). Infection of apple leaves produce flecks or abortive lesions. Infected apples fall prematurely, and those that mature are misshapen and have dark green sunken lesions, usually near the blossom end. Unlike apples infected by the cedar apple rust fungus, tissue beneath quince rust lesions is necrotic, often deeply into the fruit.



Figure 39-1. Aecia on fruits and twigs of hawthorn infected by *Gymnosporangium clavipes*. Reddish-orange aeciospores visible when the long white tubes are broken.



Figure 39-2. Dried gelatinous telial canker of *G. clavipes* on a branch of Andorra juniper.

The quince rust fungus infects leaves, twigs, branches, and trunks of junipers. It produces elongate, swollen, often spindle-shaped rough cankers on twigs and branches. Reddish colored, gelatinous masses of teliospores exude from the cankers during rainy periods in the spring about the time apple trees are in bloom (figs. 39-2, 39-3). Five or six exudations are possible, but teliospores usually do not germinate to produce basidiospores during their first appearance. Teliospore and basidiospore masses change from red to yellow during this period.

#### Disease Cycle

The quince rust fungus requires two hosts to complete its disease cycle. Pomaceous hosts are infected by basidiospores discharged from germinated teliospores produced on juniper. Basidiospores are dispersed by wind, and infection occurs during a short period in the spring as flowers and fruit primordia emerge from their buds. After petal drop, fruits of most species are no longer susceptible. Pycnia develop 2 or 3 weeks after infection. Two or 3 weeks later, aecia are formed. The aecia are the most easily recognized of the spore stages (fig. 39-1) because long white tubes are formed that may cover the entire fruit. Aecia rarely form on apple, but are common on fruit of quince and hawthorn. When the tubes rupture at their apex, red masses of aeciospores are evident. Aeciospores are wind blown, and can infect junipers throughout the growing season.

Aeciospores infect leaves, twigs, and branches of juniper. Infected leaves are often overlooked. Twigs can become infected directly, and spindle-shaped swellings covered by flaky, darkened bark are formed. The fungus can remain active for several years as the cankered area continues to expand. Twigs infected during the growing season produce teliospores and basidiospores the following spring and annually thereafter.



Figure 39-3. Gelatinous telial cankers of *G. clavipes* after moisture had been applied.

#### Damage

Pomaceous hosts can be weakened by defoliation when leaves are severely infected. However, the greatest economic loss is caused by infection of fruits.

Twig and branch infection of juniper is limited to phellogen, but may cause some structural weakness. Severely infected trees may be more susceptible to winter injury. Failure to control quince rust on nursery junipers can result in quarantines and loss of revenue.

#### Control

Classical control has been the removal of junipers around apple orchards, and of pomaceous hosts around tree nurseries. Resistant varieties of apple and juniper are available. Pruning telial cankers on juniper can reduce disease potential, but large trees may have extensive trunk cankers that cannot be pruned out. Protective fungicide controls to prevent infection are available for apple (benomyl + mancozeb or zineb) and juniper (Bordeaux mixture or cycloheximide). To be effective, chemicals should be applied to apple in the spring as green tip and cover sprays. Junipers should be protected throughout the summer and fall on a regular basis.

#### Selected References

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