

Plant Disease Diagnostic Clinic

Plant Pathology and Plant-Microbe Biology Section
329 Plant Science Building Ithaca, NY 14853‐5904

**Coleosporium Needle Rust of Pine:** *Coleosporium asterum*

**Introduction**

Over 20 species of Coleosporium cause rust diseases on pine in the United States. *Coleosporium asterum* is the best known of the group and infects 2- and 3-needle pines including Austrian, red, and Scots. This fungus may be found across the continental United States. Alternate hosts for the rust include aster, goldenrod, and some other *Compositae* spp. These needle rusts complete their life cycles in about one year. Although we rarely find much of this pathogen in New York State, it may occasionally become severe. As with many rusts, the life cycle is complicated and entails the work of several kinds of spores, hosts, and fruiting bodies.

**Symptoms and Signs**

In early spring, the spermagonial stage starts to become visible on the infected pines in the form of orange droplets coming from lesions on the pine needles. By late spring or early summer, small, white tongue-like structures (aecia) form on the needles which can rupture and release orange-colored aeciospores. These spores are dispersed by the wind and go on to infect the alternate hosts. On the infected alternate hosts, orange, cushion-like masses (uredinial pustules) will develop from the underside of infected leaves throughout the summer months.

General symptoms of Coleosporium needle rust include: premature needle drop, yellowing and browning of needles, and orange or red rust spores on needles. In very unhealthy trees, rust can reduce growth and cause significant defoliation, but this is disease is typically only lethal in young seedlings.



Figure 1: Aecia on needles of Austrian pine (a primary host).



Figure 2: Uredinial pustules on goldenrod (an alternate host).

**Disease Cycle**

The disease cycle of a rust fungus may be very complicated. For Coleosporium, let’s call pine our primary host and begin with a susceptible pine in late summer or early Autumn. At that time, a susceptible pine may become infected by basidiospores produced on the alternate host. The fungus grows into and overwinters in the needles, and yellow spots develop on them the following spring. Fruiting bodies called pycnia (or spermagonia) develop beneath these spots initially, and they produce pycniospores. The pycniospores later give rise another stage known as aecia, and aecia of this fungus on pine resemble tiny white “tongues”. When mature, aecia burst and release bright orange spores that are dispersed by the wind and that go on to infect the alternate host.

On the alternate host, pustules develop containing Uredinia that produce urediniospores that can reinfect that alternate host. Several generations of this stage may be produced during the summer months. As this cycle repeats, the level of fungal inoculum increases on the infected plant and may spread to other nearby alternate host plants. By late summer, yet another stage, telia, begin to develop from the uredinial pustules. Telia produce first teliospores, and then the teliospores germinate to produce basidiospores that can reinfect pine needles.

A few species of Coleosporium will survive for more than one year as mycelium in the living tissue of the pine host. *C. asterum* is one such rust sometimes producing aecia for 2-3 summers. However, because this pathogen has the maximum number of spores stages (five) and requires two separate host species to complete its life cycle, it is designated as a macrocyclic heteroecious rust. Many rust pathogens fall into this category. Alternatively, rust fungi that survive on one host are known as autoecious, and those that produce three or fewer spore stages are known as microcyclic.

**Management Strategies**

Pine needle rust is considered a minor stress on mature trees. As such, management is not required in many cases. Maintaining the overall health and vigor of the tree can help prevent the disease from stressing the tree further. Some methods of preventing this disease are to plant trees on slopes, leave adequate space between trees when planting, and keep weeds under control all to encourage good air circulation around the base of the trees, even at maturity. Another option is to control the alternate hosts by mowing before August each year or eradicating them with herbicides. A fungicide may also be used to manage this disease where it has become a problem.

**Reference:**

Sinclair, Wayne A. and Howard H. Lyon. 2005. Diseases of Trees and Shrubs, 2nd ed. 660 pages Comstock Pub. Associates.

**Prepared by** Clinic staff;Updated by SLJ2 and LG658, December 2024

**READ THE LABEL BEFORE APPLYING ANY PESTICIDE!** Changes in pesticide regulations occur constantly. All pesticides distributed, sold, and/or applied in New York State must be registered with the New York State Department of Environmental Conservation (DEC). Questions concerning the legality and/or registration status for pesticide use in New York State should be directed to the appropriate Cornell Cooperative Extension Specialist or your regional DEC office.

**The Cornell Plant Disease Diagnostic Clinic**

Phone: 607‐255‐7850; Fax: 607‐255‐4471

Email: Cornellplantdiseaseclinic@cornell.edu

Web: [plantclinic.cornell.edu](file:///C%3A%5CUsers%5Cslj2%5CDesktop%5C2024%20Web%20site%20fact%20sheets%20etc%5C2024%20Fact%20sheets%20in%20WORD%5Cplantclinic.cornell.edu)