RESEARCH LABORATORY TECHNICAL REPORT

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Willow-Conifer Rust

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Willow-conifer rust, caused by the fungus *Melampsora*, is widely distributed throughout North America. The disease causes minimal damage on conifer hosts such as western hemlock, fir (balsam, white, and grand), and larch (alpine and western). However, on willow, severe defoliation can suppress growth 30 percent or more when weather conditions favor disease development.

Symptoms

Symptoms begin to appear on willow in early summer as small, yellow spots that develop on the upper leaf surface (Figure 1). Symptoms usually begin in the lower canopy and progress upward. Bright, lemon-orange pustules (uredinia) form on the lower leaf surface (Figure 2). These pustules contain spores (urediniospores) that are windblown to nearby trees (Figure 3). The urediniospores will cause new infections on susceptible willows under moist conditions. The pustules turn dark brown to black during late summer and early autumn. By this time, the dark pustules contain thick-walled resting spores (teliospores) that overwinter in fallen leaves.

Figure 1: Yellow spots on willow

Symptoms on conifer hosts usually appear as pale yellow spots on the upper surface of the needle. Yellow pustules (aecia) appear on the lower needle surface. Foliar symptoms are usually minimal and restricted to the lower canopy.

Disease Cycle

Rust fungi require two unrelated hosts to complete their life cycle. In the case of willow-conifer rust, aeciospores are produced on the aecial host (conifer) and are windblown to the telial host (willow) during the early spring to produce new infections. *Melampsora* produces urediniospores and teliospores on willow that serve as inoculum for new infections on willow. Basidiospores are eventually produced on willow and serve as inoculum for the conifer host.

Management

Remove fallen leaves and twigs from the site to reduce potential inoculum for the following year. Cultural practices to improve plant vitality including

fertilization based on soil analysis, irrigation during dry periods and pruning as needed to improve light and air penetration, will reduce the impact of the disease.

When disease pressure is high, foliar applications of a registered fungicide will suppress new infections. Treatments should be applied beginning when leaves are expanding in spring and continue at monthly intervals through summer.

Figure 2: Uredinia on willow

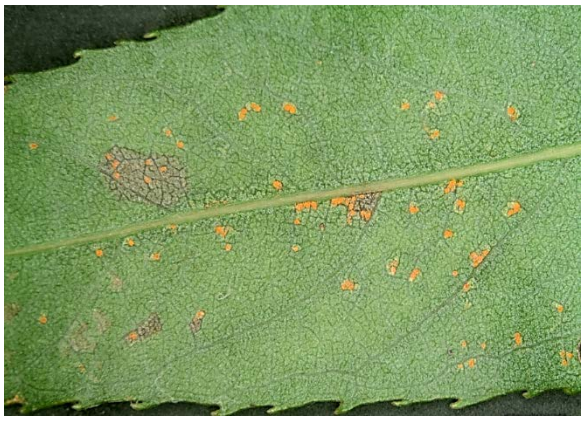

Figure 3: Uredinia and urediniospores on willow

Founded in 1926, The Bartlett Tree Research Laboratories is the research wing of Bartlett Tree Experts. Scientists here develop guidelines for all of the Company's services. The Lab also houses a state-of-the-art plant diagnostic clinic and provides vital technical support to Bartlett arborists and field staff for the benefit of our clients.