

Susceptibility of Conifer Shoots to Infection by *Phytophthora ramorum*

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Phytophthora ramorum is the pathogen that causes sudden oak death, which was first detected on tanoak in Marin County, California in 1995. The identification of several conifers as hosts of *P. ramorum* and the increased spread of this pathogen via shipment of ornamental nursery stock has the potential to severely impact the Christmas tree, conifer nursery, and forestry industries if this pathogen spreads into major production areas. Four conifers (Douglas-fir, grand fir, yew, and coast redwood) are among the naturally infected hosts that have been reported for this pathogen. There are large numbers of different types of conifers grown as Christmas trees and in conifer nurseries in the Pacific Northwest. In an effort to better understand the potential impact this pathogen might have on the Christmas tree, conifer nursery, and specialty forest products industries, a series of inoculation studies were conducted to determine the susceptibility of foliage and shoots from 25 conifers to *P. ramorum*. Growth stage and inoculum concentration had a significant effect on the susceptibility Douglas-fir. Needles on emerging shoots from dormant seedlings were only susceptible to infection when inoculated just after bud break. However, needles on actively growing terminals and side shoots of container-grown nursery seedlings were susceptible throughout their growing season. No disease developed when Douglas-fir and noble fir seedlings were inoculated with A1 or A2 mating types when the inoculum concentration was $<10^4$ zoospores per ml. Twenty of the conifers tested, including many of the important species that are used as Christmas trees, were susceptible to A2 mating types of *P. ramorum*. Symptoms included needle blight, a shoot blight resulting from needle infections, and stem dieback resulting from the growth of the pathogen from infected shoots into the stem. Significant shoot blight occurred on some *Abies* spp. Our research indicates that a number of conifers are potentially susceptible to *P. ramorum*. In addition, host phenology and inoculum concentration are important factors affecting infection of conifers by *P. ramorum*.