For. Path. 36 (2006) 385-394

Port-Orford-cedar resistant to *Phytophthora lateralis*

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Summary

Plytophthora lateralis, an exotic root pathogen, is the primary cause of Port-Orford-cedar *(Chamaecyparis lawsoniana)* mortality throughout its native range in southwest Oregon and northwest California. Most trees in the field are very susceptible, but genetic resistance to this pathogen has been demonstrated. Since the late 1980s, the USDA Forest Service and the Bureau of Land Management in cooperation with Oregon State University have conducted an intensive programme to identify and test resistant trees from the field, and propagate them in a seed orchard with the goal of providing resistant seedlings for regeneration. Susceptible families showed only 0-10% survival using a variety of inoculation techniques. Rooted cuttings of resistant parents are seldom killed, and seedling families of these parents exhibit 25-100% survival, depending on family and inoculation technique. Symptom development on resistant trees, including sunken lesions, and resinosis as well as reduced colonization and re-isolation success, was consistent with a hypersensitive reaction. In a long-term field test, five resistant families had 20-80% survival after 16 years, while three susceptible families had 0-8% survival in the same interval.

Introduction

Port-Orford-cedar (POC) *[Chamaecyparis lawsoniana* (A. Murr.) Parl.] is an ecologically and economically important forest tree native to a small area of southwest Oregon and northwest California (ZOBEL et al. 1985). An exotic, invasive root pathogen, *Phytophthora lateralis* TUCKER and MILBRATH (1942), causes widespread mortality of POC in both forest and landscape plantings (ROTH et al. 1957; HANSEN et al. 2000). Several programmes have been initiated to restrict the transport of the pathogen and to find and develop resistance in the tree (BETLEJEWSKI et al. 2003). In this paper, we report the survival rates of selected susceptible and resistant POC trees after artificial inoculation and long-term exposure to natural infection by the pathogen, and describe differences in host reactions and pathogen viability.

Phytophthora lateralis is an aggressive pathogen (TRIONE 1959). Its principle known host is POC, and it is nearly always lethal. Pacific yew *(Taxus brevifolia)* is also infected and killed when inoculum loads arc particularly high (DENITTO 1991; MURRAY and HANSEN 1997). The origin of *P. lateralis* is not known, although it was first described killing POC in horticultural nurseries. It spreads as sporangia and zoospores in streams and is transported by vehicles along roads in the forest (HANSEN et al. 2000). Even in infested areas, however, occasional POC escape mortality by *P. lateralis.*

HANSEN et al. (1989) tested several POC trees that had survived natural exposure to the pathogen and others that had not been exposed, using various inoculation techniques on cuttings, seedlings and branches in the greenhouse. While the vast majority of trees were susceptible, genetic resistance to this pathogen was demonstrated in a few POC trees. Since

Received: 09.01.2006; accepted: 20.04.2006; editor: R. Stephan