

Sentinel Plant Monitoring of *Phytophthora ramorum* at a Research Nursery Over a Six-Year-Period Indicates Limited Aerial Pathogen Spread¹

Tomas Pastalka,² Karen Suslow,² and Wolfgang Schweigkofler²

Abstract

The National Ornamentals Research Site at Dominican University of California (NORS-DUC) is a research nursery that was established in 2009 to study invasive plant pathogens like *Phytophthora ramorum*, causal agent of sudden oak death and ramorum blight. In order to fulfill federal and state regulations, the possible movement of pathogens from the research site must be monitored using a sentinel plant system with host plants of *P. ramorum* (*Rhododendron*, *Camellia*, and *Viburnum*).

Symptoms on the sentinel plants are studied using culturing, immunoassays, and sequence analysis. Symptom development follows a clear seasonal pattern with a peak in the rainy season (December to March) and very few infections in the dry season. To date, *P. ramorum* has not been detected on sentinel plants, indicating limited aerial spread of the pathogen under the suboptimal climatic and environmental conditions for the pathogen in San Rafael (warmer and drier than areas closer to the coast). Infection studies in the research nursery corroborate this conclusion and indicate that other dispersal strategies (e.g. through water circulation or standing water) might play a more crucial role in certain environments, such as in nursery settings. However, *P. ramorum* infections did occur on host plants (California bay laurel, *Umbellularia californica*) in the proximity of the research site during the rainy season. *P. ramorum*-like symptoms on sentinel plants were associated with a number of Oomycetes, including *P. hibernalis*, *P. syringae*, *P. multivora*, *P. cf. fallax*, and an isolate closely related to *P. boehmeriae* as well as an ascomycetous fungus closely related to *Neofusicoccum cryptoaustrale*. *P. fallax* has previously only been isolated from crown dieback symptoms of eucalyptus in New Zealand and Australia and *N. cryptoaustrale* from eucalyptus in South Africa. Host ranges of the *P. cf. fallax* and *Neofusicoccum sp.* isolates detected in CA are unknown. These plant pathogens might represent new invasive species in the USA.

Aerial spread of *P. ramorum* in nurseries might be reduced using buffer plants. A NORS-DUC study was conducted to identify ornamental plants that are not susceptible to *P. ramorum* infection so growers may select these buffer plants to break up large, contiguous blocks of high-risk plants and thus reduce the area of destruction should the pathogen be found on their property. Three potential buffer plants were tested - *Buxus sempervirens*, *Nandina domestica*, *Liriope muscari* - two sun plants and one shade plant, respectively, and all heavily traded in the industry. Buffer plants were arranged around infected rhododendron plants during winter 2014/15 and symptom expression was evaluated in June of 2015. *P. ramorum* was not detected on buffer plants. The experiment was repeated 2015/16 under El Niño-conditions, and *P. ramorum* was isolated numerous times from *N. domestica* and *L. muscari*. To our knowledge, this is the first time that *P. ramorum* was found infecting those two plant species.

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² NORS-DUC, Dominican University of California, 50 Acacia Avenue, San Rafael, CA 94901.
Corresponding author: wolfgangschweigkofler@dominican.edu.