

NORS-DUC research presented at 2016 Mt. Tam Science Summit

Research by scientists at the National Ornamentals Research Site at Dominican University of California (NORS-DUC) was presented October 28 & 29 at the 2016 Mt. Tam Science Summit. NORS-DUC is a federally funded research facility founded in 2009 to examine ways to control the spread of invasive plant pathogens.

Marin County's Mount Tamalpais is threatened by invasive species, forest pathogens, wildfire, and climate change. The science summit featured presentations and posters by scientists focused on the condition of Mt. Tam's plants, animals, and natural processes.

The NORS-DUC team presented two posters at the symposium, which was held at The Sausalito Portuguese Cultural Center at 511 Caledonia St., Sausalito.

A collaboration between Dominican, the United States Department of Agriculture (USDA), and the California Department of Food and Agriculture (CDFA), NORS-DUC is a research site dedicated to the study of invasive quarantine pathogens of ornamental plants in an open, nursery-like environment.

Scientists from Dominican, other universities, and public and private research centers conduct studies on quarantine soil-borne organisms at NORS-DUC. The facility's focus is diseases of ornamental and forest plants, especially those caused by members of the genus *Phytophthora*, like *P. ramorum*, the causal agent of Sudden Oak Death, and more recently *P. tentaculata*, a newly discovered plant pathogen in North America impacting native plant nurseries in California.

The site's main focus is applied research, such as validation and development of best management practices; development of remediation options for soil, water, and infested plants; and development of monitoring and control strategies.

Here are the two posters the team presented at the Mt. Tam Science Summit:

Title: Research on the Quarantine Pathogen *Phytophthora ramorum* at NORS-DUC, the National Ornamentals Research Site at Dominican University of California.

Abstract: *Phytophthora ramorum*, the causal agent of Sudden Oak Death and Ramorum blight, can infest several dozen host plants, among them are many important ornamental plants like Rhododendron, Viburnum, and Camellia. Federal and state regulations require the destruction of nursery plants infected by *P. ramorum* and treatment of contaminated soil. Infected nursery material is also the most important factor in the long-range spread of *P. ramorum*, and has been shown to be responsible for new introduction of the pathogen in natural habitats.

The National Ornamentals Research Site at Dominican University of California (NORS-DUC) was founded in the year 2009 by a Farm Bill grant to study *P. ramorum* in a sophisticated research nursery that reflects an authentic commercial nursery setting (www.dominican.edu/norsduc). NORS-DUC goals are to develop practical solutions for containment, remediation, and eradication of quarantine pathogens in nurseries and reducing the risk of long-range spread of pests through infested nursery stock shipments. Research at NORS-DUC is conducted by a team of permanent staff, as well as by *P. ramorum* experts from other institutions who can apply for grants to work at NORS-DUC. The research site offers a unique opportunity to study different aspects of ornamental diseases caused by *P. ramorum* and other quarantine organisms that cannot easily be accomplished using experiments in a laboratory.

Title: Sentinel Plant Monitoring of *Phytophthora ramorum* at a Research Nursery over a Six-Year-Period Indicates Limited Aerial Pathogen Spread

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*, the 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 suboptimal [K1] climatic and environmental conditions [FS-2]. 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. These plant pathogens might represent new invasive species in the USA.

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