An Update on *Phytophthora* Species in California Native Plant Nurseries and Restoration Areas[1]

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Abstract

In 2012, *Phytophthora tentaculata* was detected for the first time in North America on the roots and crowns of declining sticky monkey flower plants (*Diplacus aurantiacus*) in a Monterey County, CA native plant nursery. At the time, *P. tentaculata* was listed among the top five exotic *Phytophthora* species of concern to the US due to its potential economic and environmental impacts. In 2014, *P. tentaculata* was detected on toyon (*Heteromeles arbutifolia*) and again on sticky monkey flower plants that had been outplanted at a restoration site in CA. These plants originated from a different CA nursery than the original detection, where coffeeberry plants (*Frangula californica*) were also found to be infected. In response to the concerns of spreading exotic *Phytophthora* species to the wildlands through native plant nursery stock, the California Department of Food and Agriculture lab tested more than 1,200 samples for *Phytophthora* spp. from Jan. 2014 to Jan. 2016. Samples were collected from native plant nurseries and wildlands and tested by immunoassay, culturing, baiting, and PCR using *Phytophthora*-specific primers. In addition to *P. tentaculata*, at least 25 other species of *Phytophthora* were detected from the roots of native plants or were baited from the root zones of outplanted material. One or more *Phytophthora* spp. was detected from 25% of the samples submitted. *P. cactorum* was the most commonly detected *Phytophthora* species in the study and was confirmed from 15 different native plant genera. *P. tentaculata, P. cactorum, P. cambivora, P. lacustris*, and the *P. cryptogea* complex comprised 67% of the total *Phytophthora* detections. At least 10 different *Phytophthora* species were detected from symptomatic *D. aurantiacus* roots; prior to this work, not one *Phytophthora* species was known to infect this host. In total, at least 70 new *Phytophthora* native plant associations were identified. Native plant nursery stock is planted into environments which have few, if any, native *Phytophthora* species. The inadvertent spread of exotic *Phytophthora* species into natural systems could have long-term environmental and economic impacts. The California native plant industry has reacted to these findings by raising the standards and expectations for nursery cleanliness and is beginning the process of improving growing practices.

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[1] A version of this paper was presented at the Sixth Sudden Oak Death Science Symposium, June 20-23, 2016, San Francisco, California.

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