

***In Brief.... Phytophthora* plant pathogens in California native plant nurseries and habitats. Why the concern?**

Over the past several years, numerous *Phytophthora* (pronounced Fie-TOF-ther-uh) plant pathogens have been detected in California native plant nurseries and habitat restoration sites. Here we summarize what has transpired and the actions being taken to reduce the risk of spreading these pathogens.

What is a “Phytophthora”? *Phytophthora*, which means “plant destroyer”, is a genus of microscopic water molds, fungal-like organisms that are most closely related to diatoms and brown algae (Kingdom Stramenopila). The genus *Phytophthora* is large, with over 100 described species, including the sudden oak death pathogen and other destructive pathogens of agricultural, ornamental, and forest plants.

Why the concern? During the past several years, a first-in-the-USA detection of *Phytophthora tentaculata* occurred in several California native plant nurseries and in restoration areas on outplanted sticky monkey flower (*Diplacus aurantiacus*), toyon (*Heteromeles arbutifolia*) and coffeeberry (*Frangula californica*) nursery stock. Preliminary follow-up investigations have identified more than 15 *Phytophthora* species in native plant nurseries. Additionally, the threatened lone manzanita (*Arctostaphylos myrtifolia*) and pallid manzanita (*A. pallida*); the endangered coyote ceanothus (*Ceanothus ferrisiae*); and other native species including madrone and California bay have been recognized as dying from *Phytophthora* infestations that have been introduced into their habitats.

Inadvertent planting of *Phytophthora*-infected nursery stock into native habitats has the potential to introduce these pathogens into wildlands. Furthermore, many of these *Phytophthora* species appear to have wide host ranges, capable of causing disease on plants across many families. However, there are many unknowns about the impacts of *Phytophthora tentaculata* and other introduced *Phytophthora* species in California. We are working from an abundance of caution developed from experience with *Phytophthora ramorum*, the sudden oak death pathogen, which has killed over 3 million oaks in CA since its introduction on nursery stock about 30 years ago.

Response. Native plant nurseries and vegetation ecologists in California have reached out for assistance to state plant health regulators, plant pathologists and others (see partial list of participating organizations below) to: 1) understand pathways for pathogen spread, 2) determine which native plant hosts can be infected by *P. tentaculata* and other *Phytophthora* species that have been detected in nursery-grown plants, 3) determine the extent of the infestations, 4) review and evaluate sanitation procedures in both the nursery and field settings, and 5) develop and adapt best management practices to minimize the likelihood that native plant nursery stock will be infected with exotic *Phytophthora*-species. A Working Group for Phytophthoras in Native Plant Habitats has formed to determine steps needed to protect wildlands and assist the restoration industry.

Participating organizations: California Department of Food and Agriculture, Golden Gate National Parks Conservancy, Presidio Trust, USDA Forest Service – Pacific Southwest Research Station, California Native Nursery Network, California Native Plant Society, University of California Cooperative Extension, Marin Municipal Water District, Phytosphere Research, San Francisco Public Utilities Commission, Santa Clara Valley Water District, National Ornamentals Research Site at Dominican University of California and others.

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