

Monitoring for *Phytophthora ramorum* and Other Species of *Phytophthora* in Nurseries and Urban Areas in the Southeastern USA¹

Yeshi A. Wamishe,² Steven N. Jeffers,³ and Jaesoon Hwang²

Abstract

Nurseries in the southeastern United States that received ornamental plants in 2004 colonized by *Phytophthora ramorum* and the surrounding urban areas are being monitored to determine if this pathogen has escaped and become established. At the same time, the prevalence and diversity of other species of *Phytophthora* are being investigated. Water and field soil were collected from six retail nurseries in Florida in February and March 2006 and from three retail nurseries in South Carolina in both spring and fall 2006. Water samples (1 to 2 liter) were collected from streams, retention basins, and irrigation ponds; samples of field soil (1 to 2 liter) were collected from areas where diseased plants previously had been located. In addition, 20 suburban streams draining urban landscapes in South Carolina, where infested or infected plants may have been planted, also were monitored. Streams fed by multiple feeder creeks and that drained large landscape areas were selected for monitoring. Three to seven streams were sampled in each of five cities (Seneca, Greenville, Spartanburg, Columbia, and Aiken) in the central to northern part of South Carolina. A 1- to 2-liter sample of water was collected from each stream in spring and fall 2006. Water samples from nurseries and suburban streams were held in a cool ice chest and processed within 10 to 14 hours after collection. For each water sample, eight subsamples (50 to 200 ml, depending on water quality) were pulled through 47 mm-diameter membrane filters (Nuclepore with 3 µm pores or Durapore with 5 µm pores) by vacuum to trap propagules of *Phytophthora* spp. Filters then were inverted onto PARPH-V8 selective medium to recover isolates of *Phytophthora* spp. Colonies of *Phytophthora* spp. were counted and representative isolates were sub-cultured and stored at 15°C in the dark. For each nursery soil sample, three 100-ml subsamples were flooded with 200 ml of distilled water and camellia and rhododendron leaf pieces were floated on the water surface for 3 days at 20°C in the dark. Leaf pieces then were embedded in PARPH-V8 selective medium, and plates were placed in the dark at 20°C for 7 to 10 days to isolate *Phytophthora* spp. Representative colonies were subcultured and stored as mentioned above. GPS coordinates were recorded at each soil and water sample site, and water temperature and pH were measured at each water site.

At the nurseries in both Florida and South Carolina, *Phytophthora* spp. (including *P. cinnamomi*, *P. citricola*, *P. palmivora*, *P. gonapodyides*, and several unidentified species) were recovered from 13 out of 15 water samples and from 16 out of 24 soil samples. At one nursery in Florida, low levels of *P. ramorum* were recovered from a sample of standing water in a retention basin and from one field soil sample that was collected where infested plants previously had been loaded and unloaded. However, state personnel found camellia plants with ramorum blight nearby when we were collecting our water and soil samples. *P. ramorum*

¹ A version of this paper was presented at the Sudden Oak Death Third Science Symposium, March 5–9, 2007, Santa Rosa, California.

² Research Associates, Department of Entomology, Soils, and Plant Sciences, Clemson University, Clemson, SC 29634-0315.

³ Associate Professor, Department of Entomology, Soils, and Plant Sciences, Clemson University, Clemson, SC 29634-0315.

Corresponding author: S. N. Jeffers, sjffrs@clemson.edu.

was not recovered when additional water and soil samples were collected 2 weeks later. Therefore, these results may indicate that the *P. ramorum* propagules detected in the two soil and water samples were only transient inocula from the diseased plants present at the time samples were collected and were not evidence of an established population. Additional sampling and testing will be needed to determine whether or not *P. ramorum* is persisting in the area. To date, *P. ramorum* has not been detected in any of the streams draining urban landscapes in South Carolina; however, other species of *Phytophthora* were found in all 20 of the suburban streams sampled. Identification of these species is in progress. *P. gonapodyides* was recovered from all the streams, and the diversity of species of *Phytophthora* appeared to be greater in the fall than the spring. Monitoring of nurseries and suburban streams will continue in 2007.

Key words: Sudden oak death, *Phytophthora* spp. in streams and nurseries, diversity.

Acknowledgments

The authors thank: Florida and South Carolina nursery personnel and Florida Department of Agriculture and Consumer Services personnel in Florida for their cooperation and the Center for Plant Health Science and Technology (United States Department of Agriculture-Animal and Plant Health Inspection Service, Plant Protection and Quarantine) for support and funding.