Pathways of Spread of *Phytophthora ramorum* in a Simulated Nursery Setting: An Update[1]

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Abstract

European phytosanitary measures as applied to nurseries require that potential host plants within a radius of 2 m of a *Phytophthora ramorum*-infected plant must be destroyed and that remaining host plants within a radius of 10 m cannot be traded until they are inspected and found to be pest free at further specific inspections. Despite the wide application and acceptance of these distances, they are not based on data regarding the in-field spread of this pathogen. Our previous study reported at the Fourth Sudden Oak Death Science Symposium demonstrated that direct aerial spread between potted plants in nurseries is rare and limited in distance. As an extension of this reported work, we have performed a study with two objectives: 1) to test the relative importance of direct versus indirect spread of *P. ramorum* in nurseries, and 2) to test the movement of *P. ramorum* from symptomatic plants to the root ball of neighboring plants via drain water film. Such movement could eventually lead to long-distance spread of the pathogen via the nursery trade in latently infected plants.

Experiments were conducted at a mock nursery plot under specific biosafety conditions. The plot was lined with an impermeable film, a common practice in potted plant production in Europe. Rhododendron was chosen as the test plant due to its susceptibility and its prevalence as a nursery host for *P. ramorum* in Europe. Pathogen dispersal was monitored from individual infected potted plants placed in the middle of a circle of healthy detector plants. The rate at which the disease spread onto the detector plants was monitored in replicated experiments. Indirect splash dispersal (via the water film on the plastic ground cover and back to the leaves), as well as direct aboveground plant-to-plant dispersal (via air or via leaf-to-leaf splashing), were investigated by selective physical blocking of such pathways.

Indirect dispersal via the drain water film was at least as important as direct dispersal. Contamination of the drain water film was confirmed using leaf baits and direct PCR-mediated detection at significant distances from the source plants. This demonstrated that indirect spread via the water film could take place over larger distances than direct dispersal. Movement of the pathogen from the water film into the root ball of detector plants was demonstrated using leaf baiting of the root balls, combined with physical blocking of this pathway.

These data suggest that, in nurseries, direct aerial dispersal of *P. ramorum* can be relatively less important than spread via the drain water film; the pathogen can spread over several meters when an impermeable surface cover is present. The presence of such a cover could, therefore, be considered as a factor when quarantine actions are taken. Drain water films can contribute not only to indirect aerial plant-to-plant spread, but also to root ball infection. Such infections could add to the long distance spread of the pathogen via latently infected plants.

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