

Epidemiology of *Phytophthora ramorum* Infecting Rhododendrons under Simulated Nursery Conditions

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The current understanding of diseases caused by *Phytophthora ramorum* and their dynamics in nursery crops is almost entirely derived from casual field observations. This paper presents information on the findings of the first year of a two-year study. The goal of the study is to help understand basic epidemiological factors- inoculum viability, dispersal, and infectivity- that may influence disease occurrence and severity in a rhododendron nursery in central California.

Stream Water Inoculum: We need to know whether naturally-infested stream water could infect nursery hosts if the water is used for irrigation. Stream water in Lompico creek (Felton, California) has been monitored and viable inoculum has consistently been detected (with pear baiting) during rainy winter and early spring conditions (December 2003- April 2004), and only later in dry conditions when infected California bay (*Umbellularia californica*) leaves were blown into the stream by strong winds (June, 2004). Rhododendron stock (*Rhododendron* ‘Cunninghams White’) was irrigated, beginning February 24, 2004 until the present, with water pumped from the stream. To date, no infection has been detected in rhododendron stock.

Soil Inoculum: We need to know the conditions that soil-borne inoculum could be important in infecting rhododendron stock. The surface 1 cm of container soil in rhododendron stock was mixed with 100 infected rhododendron leaf disks. Each inoculated container was surrounded by non-infested container stock and irrigated with drip or sprinkler irrigation. To date, infection only occurred on leaves touching soil that contained infected leaf disks. In an associated inoculum viability experiment, the same infected leaf disks were monitored in the field or in a greenhouse. The leaf disks were periodically removed and viability was assessed by plating with selective media. In the field, viability of recovered disks has declined from 100% (week 0) to 0% (38 weeks) and has produced zoospores (with soil flooding) for up to 12 weeks. In the greenhouse, nearly all recovered leaf disks remained viable (up to 100%), presently, for 38 weeks.

Aerial Inoculum: The dynamics of aerial dispersal from infected plants to adjacent and nearby plants needs to be understood. Experiments were designed to evaluate “long” distance dispersal (up to 4 meters) and “short” distance dispersal, within a pot-to-pot nursery block. New infections were only detected on plants in the “short” distance experiment, immediately next to and up to about 30 cm away from a centrally-located artificially-infected plant, and on other parts of an artificially infected plant. In the “long” distance experiment, no infections were detected, and no propagules were detected in rain traps located 1 to 4 meters away from the infected plant during rain events. The presence and relative concentration of the propagules were detected on inoculated leaves following rain events by washing leaves with deionized water in the early morning and collecting the wash. Detection only occurred in the early spring (February, 2004) and not during or following March, 2004, when extraordinarily warm and dry conditions existed.