Infection of Five *Phytophthora ramorum* Hosts in Response to Increasing Inoculum Levels[1]

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Abstract

The objective of this work was to establish inoculum density relationships between *Phytophthora ramorum* and selected hosts based on whole plant inoculations. Knowledge of levels of initial inoculum needed to generate epidemics is needed for disease prediction and development of pest risk assessments. Sporangia of six *P. ramorum* isolates representing the NA1 and EU1 clonal lineages were produced by incubating 20 percent V8-juice agar plugs containing mycelium, in 1 percent soil extract for 48 hours and adjusting the suspensions to 0, 50, 100, 500, 1,000, 2,000, and 3,000 sporangia/ml. Whole plants (2- to 3-year-old) of chestnut oak (*Quercus prinus* L.), northern red oak (*Q. rubra* L.), red maple (*Acer rubrum* L.), mountain laurel (*Kalmia latifolia* L.), and *Rhododendron* 'Cunningham's White' were dip-inoculated and incubated in a 20 °C dew chamber in darkness for 5 days. The total number of diseased and healthy leaves was recorded and leaves were scanned. A linear model, as well as, a two-parameter asymptotic regression analysis through the origin were fit to the data. For all five species, the percentage of infected leaves increased from 0 to 2,000 sporangia/ml and then leveled off. Calibration threshold estimates for obtaining 50 percent infected leaves based on the linear analysis ranged from 36 to 750 sporangia/ml for the five hosts. Half-life (LD50) estimates from the asymptotic regression analysis ranged from 94 to 319 sporangia/ml. Multiple regression analysis revealed statistically significant differences ($p = 0.0076$) among hosts in increases in infection in response to increased inoculum density. Our results provide estimates of initial inoculum levels necessary to cause disease on these five *P. ramorum* hosts and will be useful in disease prediction and for development of pest risk assessments. Spore concentrations occurring in nature have rarely been determined experimentally. Thus, it is not known whether the level of spores determined experimentally to result in a given level of disease occurs commonly in native ecosystems.

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