

# Susceptibility Levels of *Rhododendron* Species and Hybrids to *Phytophthora ramorum*<sup>1</sup>

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## Abstract

Until now there has been little scientific information available about the susceptibility of different *Rhododendron* species and cultivars to *Phytophthora ramorum*. However, growers could use this knowledge as part of their control strategy. In our susceptibility screening we first optimized different inoculation methods on stem and leaf material. Four methods were chosen for the actual screening: two on detached leaves and two on detached stems, each time involving either wounded or non-wounded tissues. Finally, 63 *Rhododendron* species and hybrids were screened and the correlation between the different inoculation methods was investigated. Inoculation methods involving wounding revealed limited differences in susceptibility between the species and hybrids. However, inoculation methods on non-wounded tissues showed a larger degree of variation in susceptibility. This suggests that when some form of resistance is present, it probably takes place at the level of tissue penetration.

*Key words:* host resistance, inoculation method, penetration

## Introduction

The most important hosts of *Phytophthora ramorum* in Europe are cultivated *Rhododendron* species and hybrids. Since November 2002, EU emergency phytosanitary measures have been taken to prevent the introduction and spread of *P. ramorum* in Europe. Surveys at all commercial *Rhododendron*-growing premises are part of these measures and have led to *P. ramorum* findings at 2 to 5 percent of the inspected sites in several European countries. An eradication and quarantine program was initiated at these premises in case of positive findings, resulting in serious commercial losses for the grower. Belgium is one of the larger *Rhododendron*-growing areas in Europe, and growers are taking all possible preventive measures to

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avoid *P. ramorum* infestations at their site. These measures mainly consist of sanitation, limiting the leaf wetness period, avoiding plant injuries, and preventive fungicide treatments. Using host resistance would be another possible tool, for which there is high interest among growers. The objective of this study was to provide scientific knowledge about the relative susceptibility of several commercially important *Rhododendron* cultivars, as well as several botanical species.

## Materials and methods

A total of 21 botanical *Rhododendron* species and 42 *Rhododendron* hybrids were screened for their susceptibility to *P. ramorum*. Species were selected to represent the main subdivisions within the genus *Rhododendron*. Hybrids were selected based on their economic importance. Two *P. ramorum* isolates from *Rhododendron* and two from *Viburnum* were tested on a few *Rhododendron* cultivars to check for strain effects. Different inoculation methods were tested on detached leaves and stems and evaluated based on consistency and expected relevance. Some methods were based on those described by Tooley and others. (2004). Timing and evaluation system were optimized for each inoculation method.

In the main screening experiments, four inoculation methods were used on either wounded or non-wounded leaves or stems. The methods involving non-wounded tissue were used to estimate the ability of the hosts to resist tissue penetration. The methods involving wounded tissue were geared at evaluating the resistance to pathogen growth inside leaf and stem tissue. Leaf and stem materials were as uniform as possible and less than 1 year old. Assays were performed in nine batches from June to September, each time including a standard cultivar as the internal control.

## Results and Discussion

Preliminary tests using four different *P. ramorum* isolates did not indicate significant pathological variation between the four *P. ramorum* isolates. Therefore, the main tests were performed using one isolate. All cultivars and species were susceptible to some extent when wounded leaf or wounded stem tissue was inoculated. Limited differences were observed in lesion size between most cultivars and species. In contrast, inoculation of non-wounded leaves and stems did not result in symptoms on some cultivars and species. These data suggest that if resistance is present, it is most likely taking place at the level of tissue penetration. Time of year and age of plant material did not affect the results with most assays except for the one involving non-wounded leaves. There was a statistically

significant, but low, correlation between the inoculation methods. We concluded that multiple inoculation methods can be useful in these susceptibility screens as they can reveal different aspects of resistance.

This research has differentiated *Rhododendron* species and hybrids in disease susceptibility classes and can contribute to further nursery management and control strategies. Long-term application of the data may involve breeding for disease resistance.

## **References**

Tooley, P.W.; Kyde, K.L.; and Englander, L. 2004. **Susceptibility of selected ericaceous ornamental host species to *Phytophthora ramorum***. *Plant Disease* 88: 993-999.