SOIL MOISTURE EXTREMES AFFECT PHYTOPHTHORA ROOT ROT OF RHODODENDRON

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Root systems of container-grown plants are frequently subjected to extremes of soil moisture in the nursery. On the one hand, plants may be overwatered and experience oxygen deficiencies in their root systems, while on the other hand, underwatering can expose roots to severe drought stresses. Both forms of stress have been implicated in the development of Phytophthora root rots of agronomic plants. Prolonged flooding of the soil has been shown to weaken and predispose alfalfa plants to infection by *Phytophthora megasperma*, and drought stresses have been found to predispose safflower roots to infection by *P. cryptogea*.

Phytophthora root rot caused by *Phytophthora cinnamomi* Rands is considered to be the most important disease of rhododendrons in the United States, and much work has been done on this problem over the last several decades. A few years ago, researchers in Ohio tested a large number of rhododendron species and varieties for susceptibility to *P. cinnamomi*. They identified some varieties as very susceptible and some as highly resistant to disease. However, plants reported as resistant to *P. cinnamomi* have since been found to be severely diseased in some nurseries. Because nursery-grown plants are commonly exposed to stresses now known to predispose agronomic plants to root infection, a study was initiated to determine whether these stresses also could affect the susceptibility of a woody ornamental plant.

To examine this question, one-year-old rooted rhododendron cuttings were obtained from a large commercial nursery and potted in UC mix in the greenhouse. Two varieties were used throughout the experiments: 'Caroline', regarded as highly resistant to disease, and 'Purple Splendour', considered very susceptible. Preliminary experiments, in which nonstressed plants were inoculated by adding motile zoospores to the soil in which the plants were growing, confirmed the reported differences in their susceptibility. Experiments then were done to see if these differences continued to hold up under stress.

To examine the effects of drought stress, water was withheld from plants until obvious wilt symptoms appeared (leaf water potentials measured -15 to -18 bars). The stressed plants, along with nonstressed controls, then were inoculated and observed for disease development.

The normally resistant 'Caroline' became severely diseased following exposure to drought stress, but nonstressed plants remained unaffected. 'Purple Splendour' is so susceptible to infection under normal circumstances, that the imposition of drought stress had no additive effect on the subsequent rate or severity of disease.

Experiments also were done to examine the effects of flooding stresses on disease development. Plants were held under continuously flooded soil conditions for either 24 or 48 hours before the addition of zoospore inoculum; control plants were not flooded before inoculation. These experiments showed that stresses resulting from prolonged saturation of the soil also were capable of predisposing 'Caroline' to infection. Furthermore, the longer of the two saturation periods resulted in more severe disease than the shorter period. Again, 'Purple Splendour' plants were severely diseased both with and without the stress.

Excessive soil moisture is widely recognized as a factor in the development of Phytophthora root rots. Although the effects generally have been attributed to enhanced activity of the pathogen, the results of our experiments and those of others clearly show that flooded soil conditions can weaken and predispose the roots of some plants to infection. Likewise, injury to roots caused by drought stress can predispose them to infection. These two forms of stress occur often in container nurseries and may explain the conflicting reports in the literature concerning the susceptibility of some rhododendrons to Phytophthora root rot.

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