# Effect of Herbicides on Production of Inoculum and Root Colonization of Plants Infected With *Phytophthora ramorum*[1]

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## Abstract

In Oregon, efforts to eradicate *Phytophthora ramorum* from forested areas have included use of herbicides to kill infected plants. Use of herbicides on disease-infected plants leads to various outcomes, from decreased spread of disease to greater spread of disease, depending on the plant-pathogen system being examined. In this study, viburnum (*Viburnum*) cuttings, rhododendron (*Rhododendron*) cuttings, and chestnut oak (*Quercus prinus* L.) seedlings were treated with herbicides at standard application rates for woody shrubs 4 days after their roots had been infected with *P. ramorum*. The amount of inoculum in runoff samples over time was studied using a quantitative assay analyzed as a mixed model regression, and the percent colonization of roots at the end of each experiment was analyzed by a general linear model. In preliminary experiments, the effect of 2, 4-D amine, glyphosate, and triclopyr were studied in samples taken every 3 days over a period of 19 days, which was sufficient time to observe physiological impairment of treated plants. In those experiments, herbicide had no effect on the amount of inoculum produced from roots or on percent root colonization. In studies lasting 35 days, long enough for herbicide-treated plants to completely die and non-treated plants to become well infected, weekly samples were taken, with three replicates per herbicide. Root-infected viburnum cuttings treated with glyphosate gave off significantly more inoculum than untreated cuttings (at days 14, 21, and 28, $p < 0.007$), but there were significantly more colonized roots on cuttings that had not been treated with herbicide ($p < 0.001$). Triclopyr-treated viburnum cuttings gave off slightly more inoculum than non-treated plants on days 28 and 35 ($p < 0.03$), but root colonization was not affected; imazapyr had no significant effect on inoculum production, but reduced root colonization ($p < 0.009$). When glyphosate was applied to root-infected chestnut oak seedlings, the herbicide-treated seedlings gave off more inoculum than non-treated ones on days 14, 21, and 28 ($p < 0.007$), but no difference in root colonization was seen. In a similar experiment using infected cuttings of *Rhododendron* 'Cunningham's White,' herbicide-treated cuttings gave off less inoculum at some sampling times than untreated plants on days 14, 21, and 28 ($p < 0.009$), but no effect on root colonization was observed. These results suggest that while herbicide treatment had some effect on the behavior of *P. ramorum*, generally increasing inoculum production while decreasing root colonization, it did not have effects of ecological significance on either.


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