

Evaluation of chemical and biological agents for control of *Phytophthora* species on intact plants or detached leaves of rhododendron and lilac

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The recent incidence of Ramorum blight, caused by *Phytophthora ramorum*, on many nursery crops has focused attention on improving management strategies against *Phytophthora* diseases in nurseries. We evaluated several chemical agents that target Oomycete pathogens for their capacity to inhibit infection of rhododendron (cv Nova Zembla) leaves by *P. ramorum* (both NA strain 2027 mating type A2 and European strain D12A mating type A1) compared to *P. cactorum*, *P. citricola*, *P. nicotianae*, and *P. citrophthora*. We inoculated needle-wounded rhododendron or lilac leaves from plants previously treated with various chemicals that were (a) removed and inoculated, or (b) inoculated and left on intact plants, maintained in high humidity. Inoculation of leaves on chemically-treated intact plants with *P. ramorum* or other *Phytophthora* species yielded similar results to those from inoculation of leaves detached from the same treated plants. Most of the chemicals tested had some efficacy on some species of *Phytophthora*, but Subdue Maxx (drench or foliar) had the greatest disease-suppressive activity against all species of *Phytophthora* except *P. citrophthora*, and was effective for at least 6 weeks after application. Some chemicals had varied efficacy depending on the species of *Phytophthora*. Dipping leaves in the chemicals 24 hr prior to inoculation resulted in the same activity profile as applying chemicals to intact plants or detached leaves, and in some cases efficacy was increased. Bacterial antagonists (*Bacillus brevis* or isolates of *Paenibacillus polymyxa*) significantly inhibited all *Phytophthora* species in *in vitro* challenges, but were ineffective in inoculation assays of leaves dipped in a cell suspension of each antagonist 24 hr prior to inoculation with *P. ramorum* or other species. These tests indicate that inoculating detached leaves was comparable to inoculating intact plants to evaluate chemical and biological agents against *Phytophthora* species, and that several systemic or translaminar chemicals were effective in suppressing infections but without eradication of the pathogens.