

Investigating the Potential of Biological Control Against *Phytophthora ramorum*¹

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Abstract

Phytophthora ramorum is a unique organism in many ways, having a broad host range and both soilborne and aerial infection stages. This makes implementing effective control measures very complex. The use of biological control has been demonstrated against various *Phytophthora* spp. in general, but not specifically against *P. ramorum*. One aspect of biological control considered for use in this study was the use of microorganisms. Over 100 fungi, bacteria, and actinomycetes were isolated from natural field soil, leaf surfaces, and plant parts (endophytes). Some soil organism and endophyte isolates demonstrated strong growth inhibition towards *P. ramorum* colonies on agar plates. Encysted zoospores were completely inhibited from germinating on agar plates when pipetted 2 mm from active colonies of Sar-endo3, Alleg-endo2, Act-2Db, Act-3E, Act-3B1, and Act-3B2. Isolate Ch-1F inhibited zoospore germination 41 percent, while isolate CW-endo2 increased germination 27 percent compared to the control. Further tests using detached leaves, treated with some of these inhibitory organisms prior to inoculation with *P. ramorum* zoospores, reduced infection and leaf necrosis. Control leaves were 100percent infected with an average of 35 percent necrosis, compared to leaves pretreated with isolates CW-endo2, Sar-endo3, Act-3E, Act-3B1, and Act-3B2 were 60 percent, 60 percent, 40 percent, 40 percent, and 40 percent infected, respectively, and 21 percent, 19 percent, 33 percent, 17 percent, and 17 percent necrosis, respectively. Several *Trichoderma* spp. isolates were mycoparasitic, attacking the sporangia and chlamydospores. Another aspect of biological control considered in this study was the use of natural plant products. Caffeic acid amended to V8 agar medium at concentrations of 1 or 3 g/L inhibited the germination of *P. ramorum* zoospores 98 percent and 100 percent, respectively. Direct germination of sporangia was inhibited 25 percent and 100 percent, respectively. Rice bran extract, which contains caffeic acid derivatives, inhibited leaf necrosis caused by *P. ramorum* zoospores when first applied to Rhododendron “Cunningham’s White” leaves before inoculation. Although preliminary, these tests do demonstrate a potential for natural plant products and microorganisms to limit the infectivity and spread, if formulated properly.

Key words: *Phytophthora ramorum*, biological control.

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