Fungicide Control of *Phytophthora ramorum* on Rhododendron

Kurt Heungens, Isabelle De Dobbelaere, Martine Maes, Agricultural Research Centre (CLO), Department of Crop Protection (DGB), Burg. Van Gansberghelaan 96, 9820 Merelbeke, Belgium, phone: ++32/9/272-2487, k.heungens@clo.fgov.be

Commercial Rhododendron plants are the most important hosts of *Phytophthora ramorum* in Europe. As part of the EU emergency phytosanitary measures 2002/757/EU and 2004/426/EU all commercial Rhododendron-growing premises are surveyed. Detection of *P. ramorum* leads to eradication and quarantine measures and thus to considerable financial damage for the companies involved. The percentage of *P. ramorum* findings in the Flemish part of Belgium is similar to that in the surrounding countries but the impact of the EU measures on the Flemish Rhododendron industry is considerable because Flanders is one of largest Rhododendron-producing areas in Europe. Therefore, growers are taking all possible measures to avoid *P. ramorum*, including preventive fungicide treatments. However, because little information is available on the effect of the different oomycete fungicides on *P. ramorum*, there is a danger of conducting sub-optimal protective fungicide treatments. The objective of our research was to evaluate oomycete fungicides for their effect on *P. ramorum*. We first screened most active ingredients from the oomycete fungicides on the Belgian market for their in vitro effect on the mycelial growth of four *P. ramorum* strains. We then tested a selection of these fungicides for their effect against *P. ramorum* on Rhododendron plants.

A wide range of in vitro fungicide activity was observed. Metalaxyl and dimethomorf showed complete growth inhibition at 1 μg ml^{-1} medium. Cymoxanil, etridiazole, and mancozeb caused complete growth inhibition at 10 to 100 μg ml^{-1}. At 100 μg ml^{-1} chlorothalonil, Cu-oxychloride, famoxadone, fluazinam, fosetyl-Al, and propamocarb did not completely inhibit mycelial growth. Cyazofamid was the only compound that showed inhibitory activity at the lowest concentration (23% growth inhibition at 0.001 μg ml^{-1}) but it failed to completely inhibit growth at even 100 μg ml^{-1}. Fungicide effects were independent of the strain of *P. ramorum* used, except for one strain, which showed a decreased sensitivity to metalaxyl. Fungicides that performed best on plants were metalaxyl, dimethomorf, and cyazofamid, resulting in near-complete avoidance of stem infections. Fosetyl-Al and cymoxanil had intermediate effects. Mancozeb was least effective of the products tested. Protective effects were best when the lower surface of the leaf was covered with the fungicide. This is consistent with the observation that zoospore-mediated infection of non-wounded leaves takes mostly place through the lower surface of the leaves. Fungicide treatments 2 days after zoospore inoculation were much less effective than protective treatments (1 day before zoospore inoculation). This indicates that while protective applications can be very succesful, curative applications may be insufficient to completely eradicate the pathogen from an infected plant.

This research shows that protective applications of specific fungicides can contribute to effective control strategies of *P. ramorum* on Rhododendron. Considering we identified a strain with decreased activity against metalaxyl, it seems recommendable to limit the number of consecutive uses of products with a single target site. However, growers may face few options in alternating fungicides due to the limited number of products with use permits on Rhododendron.