

# Long-Lasting Study of Fungicide Efficacy against Czech Cucurbit Powdery Mildew Populations

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## INTRODUCTION

*Golovinomyces orontii* s.l.(Go), (syn. *Erysiphe cichoracearum* s.l.) and *Podosphaera xanthii* (Px) (syn. *Sphaerotheca fuliginea*) are two most commonly reported obligate biotrophic ectoparasites causing cucurbit powdery mildew (CPM) in the Central Europe (Křístková et al. 2009). Systemic and translaminar fungicides with specific single-site mode of action, but generally more at risk of resistance development, are worldwide more frequent used in CPM control than contact fungicides that are multi-site inhibitors with far lower risk of resistance development. Development of resistant isolates of CPM to twelve groups of fungicides has been repeatedly reported in abroad (Lebeda et al. 2010a). Till the year 2011, we have focused on screening of efficacy of selected fungicides with various active ingredients to Czech CPM populations. Since 2012, there have been tested new groups of fungicides and continued monitoring of dinocap and azoxystrobin.

## MATERIAL AND METHODS

150 Czech CPM isolates (78 Go, 72 Px) from 2007 to 2011 were screened for efficacy to the four frequently used fungicides (fenarimol, dinocap, thiophanate-methyl, azoxystrobin) and a control fungicide (benomyl) with five concentrations using a modified leaf-disc bioassay. From 2012 to 2013, a set of 50 CPM isolates (23 Go, 27 Px) was tested on efficacy of four new commonly used and registered fungicides (quinoxifen, propiconazole, fenpropimorph, penconazole) and also dinocap and azoxystrobin with three concentrations and using the same method as in previous years. Highly susceptible *Cucumis sativus* cv. Stela F<sub>1</sub> was used for preparation of leaf discs. Evaluation was conducted according to Lebeda & Sedláková (2010). The total degree of infection (DI) for each isolate was calculated by Townsend & Heuberger (1943). Three types of reactions were assigned: sensitive (degree of infection, DI = 0-10%), moderately resistant (DI = 10.1-34.9%), resistant (DI = ≥ 35%).

## RESULTS AND DISCUSSION

From 2007 to 2011, efficacy of screened fungicides towards CPM isolates varied significantly. Fenarimol and dinocap were highly effective whereas benomyl and thiophanate-methyl appeared ineffective. This phenomenon reflected situation in Czech CPM populations from previous years (Sedláková & Lebeda 2008; Lebeda et al. 2010a, 2010b). Azoxystrobin showed decreased efficacy. Till the year 2007, there has been available no data about occurrence of azoxystrobin-resistant strains from Czech Republic (CR). There were noted differences in efficacy of screened fungicides towards CPM isolates from 2012 to 2013. Propiconazole, fenpropimorph and penconazole were highly effective. Fenpropimorph showed phytotoxicity to *C. sativus* 'Stela F1' leaf discs. Dinocap expressed decreased efficacy from 2012 to 2013 (mainly for *Go*). In the case of azoxystrobin, there has been observed a shift towards prevalence of azoxystrobin-resistant strains in Czech CPM populations since 2007 to 2013 (Lebeda et al. 2010a, 2010b). The highest number of various reaction patterns of CPM populations was observed to quinoxifen. In the case of newly screened fungicides, there has been available no reports from CR since the year 2012. These results could be considered to a base for next future experiments.

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