Title Baseline sensitivities to fludioxonil and pyrimethanil in *Penicillium expansum* populations from apple in Washington State

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Abstract

Penicillium expansum is the primary cause of blue mold, a common postharvest fruit rot disease of apple. In 2004, two new fungicides, fludioxonil and pyrimethanil, were registered for postharvest use on pome fruits in the U.S. To establish distribution of baseline sensitivity of *P. expansum* to fludioxonil and pyrimethanil before their commercial use, 120 isolates recovered from apple orchards and fruit packinghouses across the apple growing areas in central Washington were selected and tested *in vitro* for sensitivity to these two fungicides using mycelial growth assays. Baseline EC_{50} values ranged from 0.011 to 0.068 (average = 0.020) mg/L for fludioxonil and from 0.519 to 2.054 (average = 1.340) mg/L for pyrimethanil. One isolate showed reduced sensitivity to fludioxonil with an EC_{50} of 0.068 mg/L, which was significantly higher ($P < 0.0001$) than those of remaining isolates tested. Fludioxonil at 0.5 mg/L completely inhibited mycelial growth of all isolates tested except for the isolate with reduced sensitivity. Conidial germination and germ-tube elongation were completely inhibited by pyrimethanil at 0.5 mg/L and by fludioxonil at 0.1 mg/L except for the isolate with reduced sensitivity based on the mycelial growth assay. Discriminatory concentrations of 0.5 mg/L fludioxonil for mycelial growth and 0.5 mg/L pyrimethanil for germ-tube elongation were recommended for phenotyping isolates of *P. expansum* for resistance to these two fungicides. No cross-sensitivity correlation in *P. expansum* was observed among thiabendazole, fludioxonil, and pyrimethanil. Fludioxonil and pyrimethanil applied at label rates were effective in controlling blue mold on apple fruit inoculated with isolates exhibiting different degrees of sensitivity to these two fungicides. The results indicate that the current population of *P. expansum* can be effectively controlled by these two new postharvest fungicides. The information generated in this study on baseline sensitivity distribution is useful in monitoring future shifts in sensitivities to these two new fungicides in *P. expansum* populations from apples in the region.