Title Activity of secondary metabolites of *Penicillium expansum* R82 strain against postharvest fungal pathogens

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Abstract

Penicillium expansum is the predominant fungal pathogen responsible for blue mould of apple worldwide. In search for alternative means to TBZ for pathogen control, a *P. expansum,* R82 strain, was assayed for its antifungal activity on mycelial growth and conidial germination of some pathogens. For this purpose a sterile fungal filtrate (SFF) was prepared from malt extract broth previously inoculated with R82 and incubated at 20°C for 10 days. The SFF was tested *in vitro* trials to evaluate the inhibition of dry weight mycelium (DMW) and conidial germination of *B. cinerea, C. acutatum, M. laxa* and six *P. expansum* strains. All pathogens showed a significant decrease of DWM when grown in SFF of R82 with respect to the control. The highest growth inhibition was observed in *P. expansum* strains (-75,5%) followed by *M. laxa* (-63%), *C. acutatum* (-58%) and *B. cinerea* (-56%). The conidial germination of the six *P. expansum* strains treated with SFF was not inhibited, rather in some cases was stimulated. Microscopic observations of germinated conidia revealed a consistent increase of the length of the germ tube in all tested strains comparing to the control. However, the treated germ tubes appeared to be abnormal comparing to the ones grown on control broth. They were more branched and showed the absence of some fragments which can explain the reduction of the mycelium dry weight reported previously. Since the thin-layer chromatography tests revealed that the extracts from R82 SFF, obtained with various solvents, have not inhibitory activity against target pathogens, the production of volatile organic compounds (VOCs) was supposed. The VOCs produced by R82 strain inhibited completely the mycelium growth of *B. cinerea,* C. *acutatum,* and *M laxa,* while in the case of *P. expansum* strains, the inhibition was lower. Conidial germination of *B. cinerea, C. acutatum* and *M. laxa* was completely inhibited, while conidial germination of *P. expansum* was reduced by 18,1 % to 32 %, in comparison with the control. The potential of VOCs produced by *P. expansum* R82 strain as biofumigants are discussed.