Resveratrol bioconversion into dimeric stilbenoids using fungal biofactories

D. Bulgari[1], M. Corti[1], A. Kunova[1], F. Annunziata[1], G. Peron[2], S. Dall'Acqua[3], C. Pizzatti[1], M. Saracchi[1], M. Pasquali[1], S. Dallavalle[1], A. Pinto[1], P. Cortesi[1]

[1]Università degli Studi di Milano, Dipartimento di Scienze per gli Alimenti, la Nutrizione e l'Ambiente, Via Celoria, 2, 20133, Milano Italy; 2Università di Brescia, Dipartimento di Medicina Molecolare e Traslazionale, viale Europa 11, 25123 Brescia, Italy. 2Università di Padova, Dipartimento di Scienze Farmaceutiche, via Marzolo 5, 35131 Padova, Italy. Email: daniela.bulgari@unimi.it

Resveratrol bioconversion by fungi is a fascinating area of research, as they possess a wide range of enzymes that can metabolize various organic compounds such as stilbenoids and convert them into valuable products. In vitro antifungal assays have demonstrated different activity levels of grape stilbenoids - such as viniferins - against *Pyricularia oryzae*, *Plasmopara viticola* and *Botrytis cinerea*. These compounds can be synthesized or extracted from different natural sources or raw materials, however, the potential of fungal whole cells as a tool to provide biologically active dimers of resveratrol has been poorly investigated. In this study, the ability of *Botrytis cinerea* and *Cryphonectria parasitica* to convert resveratrol into dimers was investigated in liquid cultures.

Both fungal species grew in broths amended with resveratrol, but their morphology was affected in the presence of resveratrol dissolved in DMSO. Reverse-phase HPLC analysis confirmed that *B. cinerea* produces delta-viniferin, epsilon-viniferin and pallidol, and with this study, we report for the first time the same ability also for *C. parasitica* hypovirulent strain. The stilbenoid production dynamics revealed that *B. cinerea* quickly converted resveratrol into dimers that are not detectable 24 hours later in nutrient-rich medium. On the contrary, *C. parasitica* required more time than *B. cinerea* to convert resveratrol, but the dimers could be detected even after 48 hours. These data open the perspective to use *C. parasitica* hypovirulent strains for the sustainable and zero-waste production of bioactive molecules to be used for plant protection.