



**Olive mill and winery by-products support the production of *Pleurotus citrinopileatus* mushrooms with enhanced nutritional and functional properties**

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**Abstract:** Wine and olive oil industries produce huge amounts of residues and wastes; their treatment and disposal are mostly associated with complex processes which are often of limited applicability and/or viability. In the frame of this study, olive tree pruning plus two-phase olive mill wastes (OMW) or grape marc plus wheat straw (GMC) were assessed as substrates for the cultivation of the choice edible mushroom *Pleurotus citrinopileatus*. Moreover, fruitbodies were evaluated in respect to their content in selected bioactive compounds, and FTIR spectra were obtained to examine their variation in substrates. In OMW, primordia formation was delayed by five days and biological efficiency was reduced by 51% when compared to the control (wheat straw, WS). In contrast, primordia formation in GMC was accelerated by four days while the biological efficiency increased by 32% in respect to the control. The concentration of individual phenolics and terpenics in the substrates under investigation was significantly higher than in the control. This resulted at mushrooms with increased total phenolic content and higher antioxidant capacity. As regards individual phenols content, fruitbodies appearing on GMC exhibited significantly higher concentrations of *p*-hydroxybenzoic acid, *p*-hydroxyphenylacetic acid and cumaric acid, while those cultivated on OMW presented higher concentrations of resveratrol, kaempferol and vanillin. Furthermore, oleanolic and ursolic acid were detected only in mushrooms produced in OMW and GMC (not in WS), indicating that *P. citrinopileatus* selectively absorbs phenolic and terpenic compounds from such substrates. Fruitbodies exhibited increased content in ergosterol (a vitamin D<sub>2</sub> precursor) which was positively correlated with the corresponding concentrations of squalene (i.e. a triterpenoid, key-component in the biosynthesis of sterols) in the substrates studied, while glucans and fatty acids content showed no significant differences among mushrooms originating from the substrates tested. In addition, FTIR spectra seem to provide a promising (rapid and inexpensive) tool for detecting the presence of specific compounds in *P. citrinopileatus* mushrooms.

**Keywords:** edible mushrooms; *Pleurotus citrinopileatus* cultivation; olive mill waste; grape marc; bioactive compounds; ergosterol, phenolic; FTIR

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