"Closing the loop" with Oyster Mushroom to recycle agricultural organic waste

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Circular economy aims at optimizing production process exploiting and reusing various wastes. Fungi play a key role in recycling lignocellulosic matter and thanks to their ability to produce several metabolite are the most promising organisms to "closing the loop" in several agricultural production processes. Furthermore, edible fungi are intensely used as nutraceutical and functional foods thanks to their ability to produce bioactive molecules such as antioxidants, β-glucans, triterpenoids.

Our study, framed in the European ALCOTRA project FINNOVER, has two aims: i) exploiting *Pleurotus ostreatus* to reuse the lavender solid waste from the production of lavender essential oil (extracted by steam distillation); ii) find new products to revamp the agriculture in the western Liguria coast.

More precisely, Pulsed Ultrasound-Assisted Extraction (PUAE) was employed to extract from 2 lavender solid wastes (*Lavandula angustifolia* Mill. and a hybrid called *Boscomare*) the liquid phenolic compounds whose valorisation as bioactive fraction is another goal of FINNOVER project not discussed here. After this extraction, a Second Solid Waste remains (SSW) was tested for mushrooms cultivations.

Two strains of *P. ostreatus* (one of which is autochthonous from Liguria) were selected to test different substrates in order to find the best spawn recipe for growing *P. ostreatus* on two different SSWs. More precisely we tested 5 types of substrates made with 2 SSWs mixed with 3 vegetal wastes (poplar sawdust, oak sawdust, and straw) in different percentages. The recipe with the major growth yield was used to prepare a spawn for a laboratory pilot experiment and, later, for a farm pilot experiment. The mycelium was treated for extracting different kinds of metabolites. Once individuated and standardized the extraction, we performed an analysis in HPLC coupled to medium and high resolution mass spectrometry for the quali-quantitative characterization of metabolites, being our work devoted to identify molecules of nutracetical and/or pharmacological interest.

The results related in vitro tests showed that lavender up to 30% in the recipe did not affect the miceliar growth rate. Other cultivation pilot tests confirmed these data and highlighted a fruitbody rate of about 20%.