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MONITORING THE COMPOSTING PROCESS OF DIFFERENT AGRICULTURAL WASTES AND EVALUATION OF THE EFFECTS OF THE FINAL PRODUCTS ON PLANTS

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EXTENDED ABSTRACT

Treatment and recycling of agricultural and agro-industrial wastes abundant in the Mediterranean regions may contribute significantly to soil quality and fertility, and enhance suppressiveness against soil borne diseases. Grape mark wastes (GM), spent mushroom substrate from the cultivation of *Agaricus* mushroom species (SMS) and residues/by-products from the olive oil extraction process (olive mill wastewaters-OMW, olive leaves-OL, olive press cake-OPC, and extracted olive press cake-EPC) were composted in various mixtures. The C/N ratios of the original wastes ranged from 16.8 (SMS) to 70.5 (OPC). Nine composts were prepared either from the original waste materials or from 1:1 dw/dw mixtures (GM; GM+EPC; SMS; SMS+EPC; SMS+OMW; OL; OL+EPC; OL+OMW; OL+OPC) through a composting process performed in static perimetrically insulated piles, for a period of three months. Their moisture was kept between 40-60% of their water-holding capacity and turnings were performed at the end of each thermophilic phase. The phytotoxicity of the final products was determined.

The degradation of fluorescein di-acetate and the CO_2-C evolution were evaluated as estimates of the microbial activity during composting of the OL+OPC mixture and were shown to be related to temperature fluctuations in the compost piles, revealing greater values of fluorescein and CO_2-C release at the higher temperatures of each turn (middle of thermophilic phases) compared to the end of each thermophilic phase. However, at the end of the last thermophilic phase the total microbial biomass was significantly greater than at the middle of this phase whereas, both fluorescein release and CO_2-C evolution showed extremely low values. This indicates that the labile C substrate depletion in the final product results in reduced microbial activity, but this does not necessarily indicate a small size for the microbial population colonising the final compost products.

Pot experiments, set up in order to investigate the nutritional effects of the composts on the growth of maize indicator plants showed that the spent mushroom compost mixtures resulted in the best plant growth, followed by the grape mark waste material, whereas the composts based solely on olive extraction by-products performed poorly. All composts however, showed disease suppressiveness effects against soil-borne pathogens of the genera *Phytophthora* and *Fusarium*.

Key words: compost, FDA, CO_2 – C evolution, microbial activity, microbial biomass, plant growth, agricultural wastes, olive wastes, spent mushroom substrate, grape mark.