

Integrated biotechnological methods to treat the high toxicity of olive mill wastewater sludge loaded polyphenols and lipids

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1. Introduction – This work aims to produce a compost through valorization of sludge generated from olive mill wastewater. The toxicity of the sludge, which is due to the high phenolic and lipids content was efficiently addressed by optimizing the composting conditions, through the inoculation with thermophilic bacteria and precise control of the process parameters.

2. Experimental - The composting assays were carried out in 100L bioreactor through mixing olive mill sludge and green wastes (v/v). In order to stimulate microbial activity, the initial mixture has been inoculated with thermophilic microorganisms. For each experiment, physico-chemical properties were evaluated, and polyphenols content was determined based on Folin-ciocalteu method. Furthermore, the lipid content was evaluated after an extraction with dichloromethane followed by an evaporation to dryness under partial vacuum. Ultimately, compost phytotoxicity was evaluated via the monitoring of germination index of both *Brassica rapa* and *Lepidium sativum*.

3. Results and Discussion - The obtained results showed that the composting process reduced polyphenols and lipids content by almost 90% during the stabilization phase. Thermophilic phase (55°C) was achieved after 9 days. At the end of the experiment, the registered pH value was 7.7, the decomposition rate exceeded 60%, and the germination index was significantly improved.

4. Conclusions - The microbial inoculation of olive mill wastewater sludge and Green waste during composting process allowed enrichment of the microbial population, resulting in better degradation efficiency with regards to enolic and lipid compounds. Moreover, the initial phytotoxicity was significantly reduced. Hence demonstrating the potency of the process.



Image 1. Olive mill wastewater impact