

PhD Thesis Defense

On Monday February 24th 2025 at 3.00 pm, in the classroom G, Via Santa Sofia 100

Ferdinando Fragalà (XXXVII cycle)

Will discuss his PhD theses titled

Double Degree
UNICT- UFV

ECOFRIENDLY AGRICULTURAL USE OF BIOPRODUCTS FROM MUNICIPAL BIOWASTE WITH A POTENTIAL HIGH VALUE

Thesis Abstract

This doctoral thesis explores the valorization of municipal bio-waste (MBW) as an alternative feedstock for producing high-performance compounds beneficial for agricultural applications. MBW management often poses environmental challenges, prompting the investigation of innovative strategies to utilize waste biomass effectively. This research focuses on evaluating the potential agricultural applications of products from alkaline hydrolysis of solid anaerobic digestate from municipal biowastes (BPs) and these latter ones subjected to a further ozonisation treatment (BPs OX). The first study investigates the effects of BP preparations (BPs and BPs OX) on crop seed germination and their pesticide properties against economically significant fungal phytopathogens. Results reveal species-specific positive effects on seed germination, with exceptions regarding phytotoxicity at higher concentrations. Furthermore, the fungicidal potency of BPs OX against multiple fungal targets is demonstrated, indicating potential applications in agrochemicals. Moreover, the second study introduces an innovative foliar spray application technique for biostimulants, facilitating their utilization in agricultural practices. Results suggest that significant improvements in lettuce growth with optimized BPs and BPs OX concentrations, highlighting the potential for enhanced crop yields through environmentally safe biostimulant application methods. In addressing key concerns of agriculture, the thesis finally explores the use of bioproducts (BPs) directly applied to the soil to improve plant nutrient efficiency and mitigate environmental impacts caused by excessive nitrogen fertilizer application. Experimental trials involving BPs application alone or in combination with mineral fertilization (MF) demonstrate promising results in enhancing lettuce growth, nitrogen use efficiency, and reducing nitrate leaching. Overall, this thesis contributes to the development of sustainable and eco-friendly agricultural practices by harnessing municipal biowastes to produce high-performance compounds and biostimulants, thereby addressing environmental concerns and promoting agricultural efficiency.

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