



Università degli Studi di Napoli Federico II

PhD in Biotechnology - 40th cycle

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Microalgae as a sustainable solution for modern agriculture

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Agricultural methods are continuously intensifying under global demographic pressure, leading to serious environmental consequences¹. The European Union's "Farm to Fork" strategy has driven demand for sustainable alternatives to synthetic pesticides and fertilizers. Microalgae and cyanobacteria are photosynthetic microorganisms representing a potential alternative as a source of new bioactive molecules such as phytohormones, proteins, pigments (chlorophylls, carotenoids, and phycobiliprotein), carbohydrates, lipids, and phenolic compounds². Some act as biopesticides against phytopathogens³, while others can act as biostimulants, promoting plant growth, nutrient uptake and enhancing resistance to abiotic and biotic stresses⁴. Moreover, microalgae biomass could be used as organic fertilizer, improving plant nutrition. This PhD project aims to develop a process based on the obtainment of extracts from microalgae and cyanobacteria to be used as biostimulant, biopesticide, and biofertilizer on crops. Cultivation will be conducted using wastewaters, reducing freshwater footprint while facilitating nutrient recycling and effluent treatment. Promising extracts will be encapsulated in nanoparticles for agrochemical formulation, offering an innovative and sustainable solution for modern agriculture.

References

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