PhD Thesis Defense

Alberto Fiorenza **and** ***Emaneule La Bella*** (XXXVI cycle)

Will discuss their PhD theses titled

A. Fiorenza: Essays on exploring social media data and spatial econometric models in non-market valuation

E. La Bella: Multipurpose agricultural reuse of microalgal biomasses from different sources and their extracts

On **Monday February 12th 2024 at 4.30pm** at the Direction Meeting room, Via Santa Sofia 100.

A. Fiorenza Abstract

Botryospheriaceae are important fungi distributed worldwide and able to persist as endophytes, saprophytes, and latent pathogens. In the recent years have aroused great interested due their capability to cause disease when the host is under stress conditions and especially because climate-change positively affect the distribution and virulence of some species. Is well known that climate is one of the main factors affecting the distribution of these fungi and nowadays *Botryosphaeriaceae* represent a serious threat for agricultural, ornamental and forestry ecosystem. There are many reports of *Botryosphaeriaceae* affecting agricultural crops in Sicily (Italy). Innovative and ornamental crops, emerging and widely diffused in the Island, respectively, are still under studied and subjected to *Botryosphaeriaceae* infections. For these reasons we decided to conduct research on those crops. Among them, avocado (*Persea americana*) is an important crop which is increasing its production area year by year and represent a serious source for Sicilian industry. We have conducted surveys in the main Sicilian avocado orchards in order to highlight the diversity of the Botryosphaeriaceae species that threatened this host diffusion. At the same time ornamental crops in the urban area and in nursery, that are under investigated and represent an important inoculum source, showed high disease incidence imputable to *Botryosphaeriaceae* infection. In particular, we have conducted surveys on Indian laurelleaf fig (*Ficus microcarpa*) in the main urban area, and on different *Acacia* sp. growth in a nursery in Milazzo (Sicily). The present research project aimed to elucidate the diversity of the *Botryosphaeriaceae* species in avocado, Indian laurel-leaf fig, and *Acacia* sp. Results of the morphological and molecular characterization revealed presence of different *Botryosphaeriaceae* species and pathogenicity test confirm the capability of the recovered pathogens to cause diseases.

Advisor:
Prof. Giancarlo Polizzi
Co-advisor:
Prof. Dalia Aiello

E. La Bella Abstract

Under the current scenario, the use and development of new plant biostimulants has become a common practice in agriculture, providing a number of benefits in stimulating plant growth and potentially

contributing to a more sustainable and resilient agriculture. Moreover, they offer an alternative to synthetic products, which have increasingly failed out of favour with consumers. A new emerging class of biostimulants is represented by microalgae-based products. However, the economic viability of microalgae production for agricultural purposes faces challenges. This being considered, the present thesis has been carried out to implement a methodological approach based on the use of microalgae to improve crop productivity while ensuring an easy and feasible approach for microalgae growth. As a starting base of the study, the research focused on the application of a cellular extract of Chlorella vulgaris as a biostimulant in lettuce cultivation. Lettuce plantlets underwent two different treatment modalities, foliar spray and root drenching. Both application methods successfully increased plant growth, stimulating some plant enzymes involved in primary and secondary metabolism. Subsequequently, a phycoremediation process was performed on a laboratory scale to evaluate the decontamination performance and growth potential of microalgae on waste substrate. The evidence showed that applying microalgae in wastewater treatment allows two main goals: water remediation and microalgae biomass production. Finally, microalgae biomasses cultivated on wastewater were investigated as soil inoculants. The results indicated that the addition of microalgae cells to the soil successfully improved plant growth by stimulating nitrogen assimilation through the enhancement of the key enzymes of this pathway and improving overall soil fertility. Finally, a considerable reduction in nitrogen losses in groundwater was also observed as a consequence of the addition of microalgae cells in the soil.

Advisor:
Prof.ssa Ivana Puglisi
Co-advisor:
Prof. Andrea Baglieri