Title: Interactions of microgreens and microbiomes as functional regulators of its quality, resistance and shelf-life

ACRONYM: MICROGREENS

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Microgreens are edible seedlings that are usually harvested 7–20 days after germination when they have two fully developed cotyledon leaves. One major limitation to the growth of the microgreen agroindustry is the fast quality deterioration occurring soon after harvest, which restricts commerce to local sales and keeps prices high. After harvested, microgreens quickly dehydrate, wilt, decay and rapidly lose some nutrients. Available literature research has explored pre- and post-harvest interventions, such as light and temperature control, modified atmosphere packaging, and calcium treatments to maintain quality, increase nutritional value, and extend shelf-life. However, more work is required to optimize both production and storage conditions to improve the quality, safety, resistance and finally shelf-life of microgreens, **especially fundamental research on interactions and mechanisms between microgreens and microbiomes are missing and needed.**

This project will contribute to developing sustainable forms of microgreens superfood, including herbs and vegetables such as coriander, basil, radish and beet. The idea of the project is based on making use of the power and functional traits provided by the microbial-based solutions, as well as understanding microgreens-microbiome interactions. **The overall goal of the project is to support effective increase of microgreens quality in sustainable cultivation including control of microgreens quality, safety, resistance and shelf-life and maintenance of beneficial microbiome of microgreens, by understanding the interactions between microbiomes and microgreens. Altogether, this project will generate a basic knowledge which will help to understand how to obtain a resilient microgreens cropping system better able to recover from abiotic stresses in changing climate.**

The first and crucial steps towards enhanced sustainability lie in the recognition if microgreens interact with, and foster, a healthy microbiome, as well as with microbial inoculants. **As microgreens are novel functional food sources with great potential for sustainably diversifying global food systems, promoting human health, and facilitating the access of a steadily growing urban population to fresh microscale plants, there is a need to deepen knowledge in the context of microbiome-based solutions, their importance and understanding for microgreens superfood safety and quality.** This is very relevant to improve understanding and knowledge, as well as to indicate new trends of development of agriculture and horticulture discipline.

This project includes interdisciplinary research activities, structured with a well-balanced division between various research fields contributing to the achievement of sustainable microgreens cropping by integrating biological, chemical, genetic, bioinformatical and environmental dimensions while addressing smart breeding strategies, sustainable production and climate challenges. **The overall approach of the project is based on transdisciplinary, integrative and innovative research methodology. In order to achieve the aim of the project including increasing the microgreens quality by new approaches and assays, that requires basic research concerning explanations of microbiome-microgreens interactions, metataxonomic, biochemical, chemical and microbiological analyses and transcriptomic approach to assess expression of the genes involved in the microgreens resistance to environmental abiotic stresses.** Planned research for understanding mechanisms, functionality and interactions of microgreens and microbiome will be performed in order to improve quality, protection, production and resilience of microgreens.