Beneficial microorganisms: the best partner to improve plant adaptative capacity

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Abstract: Currently, the world is facing a high population increase as well as climate change involving global warming, water shortage which limits agronomic productivity, necessary to achieve food security for the growing population. As sessile organisms unable to run away from danger, plants are endowed with sophisticated mechanisms to overcome all stressing situations for survival, involving an enormous amount of chemical molecules, specific for each situation. In addition, they establish intimate relationships with beneficial microorganisms creating the plant microbiome. Within this microbiome are beneficial bacteria, known as Plant Growth Promoting Rhizobacteria (PGPR), which represent a great tool to boost plant fitness in different aspects, as they are able to trigger multiple targets simultaneously.

The present work describes the physiological mechanisms involved in plant adaptation to water stress, nutrient absorption, and adaptative responses to biotic stress and how bioeffectors are able to modulate these responses, focusing on the mechanisms involved in plant adaptation to water stress (salinity and water shortage), plant innate immunity and general mechanisms involved in plant protection to pathogen outbreaks. A few examples in Solanum lycopersicum, Olea europea and Rubus sp illustrate effects of PGPR increasing plant adaptative capacity

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