Abstract

Beneficial Microorganisms: The Best Partner to Improve Plant Adaptative Capacity [†]

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Abstract: The world is currently facing a high population increase, as well as climate change involving global warming and water shortages, which limits the 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 bio-effectors 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 the effects of PGPR in increasing plant adaptative capacity.

Keywords: beneficial bacteria; adaptation; water stress; food

Supplementary Materials: The poster presentation is available online at <https://www.mdpi.com/article/10.3390/IECPS2020-08639/s1>.