Plant Mol Biol (2016) 90:535
DOI 10.1007/s11103-016-0470-y

EDITORIAL

Plant–microbe symbiotic interactions

Sharon Lafferty Doty[1]

Published online: 22 March 2016

With the growing human population and the impacts of climate change, agricultural and bioenergy crops will need to be produced with reduced inputs of water, chemical fertilizers and pesticides to be more environmentally sustainable. Symbiosis with microorganisms can allow plants to overcome such challenges. By understanding the natural plant–microbe interactions at work to increase plant stress tolerance and health, innovative new technologies may be developed to increase production. Although the molecular interactions between rhizobia and legumes has been extensively studied, the communication between other beneficial plant microorganisms and the host plants, and the mechanistic basis for the increased growth and health imparted by these symbionts on the plant host are only recently being elucidated.

This special issue is dedicated to these topics, featuring research articles as well as review papers. Early communication, from chemotaxis, recognition of the microbes by the plant, effective colonization, and the plant genes necessary for positive response to the microorganisms are the focus of nine of the papers. Biotic stress tolerance conferred by plant-associated microorganisms against insects and microbial pathogens is covered in three papers. Increased tolerance to abiotic factors including salinity and limited nutrients as well as overall increased growth and health are the topics of three of the papers. Many of the authors included future perspectives on how to move this important research field forward. Information gained from plant–microbe interaction studies in native habitats may be especially relevant since the host plant and microorganisms have co-evolved with opportunities by the plant to select over time the most beneficial symbionts. Understanding the requirements for recruitment, recognition, colonization, and response will be essential if this knowledge is to be applied to commercial agriculture. Determination of the mechanisms by which microbiota impart tolerance to biotic and abiotic stress will enable optimization for improved plant health and growth under the increased challenges resulting from climate change.

The contribution of all the authors and the manuscript reviewers is greatly appreciated. My Guest Editor colleagues Adriana Hemerly, Behnam Khatabi, Corné Pieterse and I are also grateful for the support of the Editor-in-Chief and the editorial staff for making this Special Issue possible.

✉ Sharon Lafferty Doty
sldoty@uw.edu

[1] University of Washington, Seattle, WA, USA