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Plant Stress Tolerance

An Integrated Omics Approach

Springer

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Preface

The initial idea for writing this book was formulated during a discussion between us (the book authors) supported by the positive feedback of Dr. Helmy who had already published a book in the "SpringerBriefs in Systems Biology" series. During this discussion, Dr. Helmy shared his experience and introduced the concept of the "SpringerBriefs" series. We then outlined the book proposal and submitted it to the Springer editor Noreen Henson who encouraged and invited us to start working on writing this book for publication in the "SpringerBriefs in Systems Biology" series.

According to the UN DESA report, "World Population Prospects: The 2015 Revision," the world population is expected to reach 8.5 billion and 9.7 billion by the years 2030 and 2050 respectively (http://www.un.org/en/development/desa/news/population/2015-report.html). Therefore, the production of agricultural products may need to be doubled by 2050 in order to meet the required demand for food as a result of the increased population. One of the major focuses in agricultural production research is to understand how plants tolerate unfavorable biotic and abiotic stresses which, therefore, increases the crop yield. In the last two decades, "omics" technologies (such as genomics, transcriptomics, proteomics, and metabolomics) represented a landmark in the development of biological sciences, including plant sciences with novel applications in investigating and improving stress tolerance in plants. This book is specifically tailored to meet the needs of a broader audience, particularly to include postgraduate students and junior researchers in areas such as plant biotechnology, plant omics, system biology, environmental stresses, and bioinformatics. The book is aimed to provide a simple and brief overview of cutting-edge research on "omics" applications in the field of plant sciences, with special focus on different approaches towards plant stress tolerance (including both biotic and abiotic stresses).

The book is divided into four chapters: Chap. 1 introduces the different types of plant stresses (biotic and abiotic) and how plants respond and deal with these stresses. Furthermore, Chap. 2 introduces the omics technologies used to study plant stresses and the bioinformatics platforms associated with these technologies. Chapter 3 provides a general overview of the omics technologies employed to understand biotic stresses with special focus on plant parasitic nematodes as a case

study. Lastly, Chap. 4 discusses different omics technologies utilized with functional genomics approaches to study abiotic stress tolerance mechanisms in plants. In conclusion, this book provides an overview of up to date information for graduate students, junior academic scientists, and researchers on utilizing recent advances in omics technologies in the area of plant stresses.

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