

# Signaling and Communication in Plants

## **Series editor**

František Baluška

Department of Plant Cell Biology, IZMB, University of Bonn, Kirschallee 1,  
D-53115 Bonn, Germany

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James D. Blande • Robert Glinwood  
Editors

# Deciphering Chemical Language of Plant Communication

 Springer

*Editors*

James D. Blande  
Department of Environmental  
and Biological Sciences  
University of Eastern Finland  
Kuopio, Finland

Robert Glinwood  
Department of Crop Production Ecology  
Swedish University of Agricultural Sciences  
Uppsala, Sweden

ISSN 1867-9048                      ISSN 1867-9056 (electronic)  
Signaling and Communication in Plants  
ISBN 978-3-319-33496-7              ISBN 978-3-319-33498-1 (eBook)  
DOI 10.1007/978-3-319-33498-1

Library of Congress Control Number: 2016947068

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Printed on acid-free paper

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The registered company is Springer International Publishing AG Switzerland

# Preface

The concept that plants interact with other organisms by emitting volatile chemicals is well established. Through the emission of volatile chemicals, plants advertise their physiological condition, which can provide valuable information to organisms that detect the odorous bouquet. Take, for example, volatiles emitted by herbivore-damaged plants; they can be received by neighbouring plants that increase their defences, foraging herbivores that can opt to forage either in the same area or elsewhere depending on perceived competition, predatory insects for which the chemicals indicate the presence of their prey, and numerous other members of the community. Volatile chemicals, as well as being emitted by plants, can be detected by plants and elicit various responses. Therefore, plants are not only communicators delivering a volatile presentation to an audience, but are members of an audience receiving chemically encoded information from other sources.

In the last decades, efforts to understand and decipher the chemical language of plants have increased substantially. In this book, we traverse three parts that deliver cutting-edge knowledge on several critical components of volatile-mediated plant communication. Part I covers the production and emission of volatile chemicals and the complexity of chemical messages that plants deliver. Attention is given to the temporal dynamics of plant volatile emissions, the role of abiotic factors in regulating emissions and the impact of multiple stresses as interacting inducers of emissions. A picture begins to build about the complexity of the volatile bouquets emitted by plants and how they can be viewed as an informative chemical language. Throughout the book, there is a focus on chemical ecology, which comes to the fore in Part II. In Part II, a clear picture is developed of the myriad interactions mediated by plant volatiles, spanning interactions between plants and herbivores, predatory and parasitic insects, hyperparasitoids, vertebrates, other plants, pollinating insects, microorganisms and mutualists. Interactions occurring both above- and below-ground are featured. In Part III, there are two chapters on recent developments to understand the detection and processing of volatile signals by plants. Plant electrophysiology and volatile uptake and conversion are the key concepts explored, which complement and add to the ecology of plant–plant interactions covered in

Part II. Some chapters in the book, particularly Chaps. 4, 8 and 12, provide detailed information on current methodologies and offer perspectives on future applications to advance the field of chemical ecology and further elucidate the chemical language of plants. We finish with a synthesis of the key findings within the book and some further ideas for future research directions.

Uppsala, Sweden  
Kuopio, Finland

Robert Glinwood  
James D. Blande

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