

Methods in  
Molecular Biology 835

Springer Protocols

Melvin D. Bolton  
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# Plant Fungal Pathogens

Methods and Protocols

 Humana Press

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## Preface

Members of the plant pathology community have long recognized the importance of intestinal to plant health. Modern agricultural systems provide a substrate for plant pathogens, and the game is on.

This book provides a review of the biological and molecular model systems in plant pathology. Since the publication of plant pathology, the field has been expanding, including the study of recent developments in next-generation sequencing, knock-out technologies, and the identification of disease resistance genes.

Taken together, this book provides a current synthesis of plant pathology.

*Fargo, ND  
Wageningen*

ISSN 1064-3745                      e-ISSN 1940-6029  
ISBN 978-1-61779-500-8            e-ISBN 978-1-61779-501-5  
DOI 10.1007/978-1-61779-501-5  
Springer New York Dordrecht Heidelberg London

Library of Congress Control Number: 2011943884

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Printed on acid-free paper

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## Preface

Members of the Fungal kingdom are ubiquitous in nature. Over the course of evolution, fungi have adapted to occupy specific niches, from symbiotically inhabiting the flora of the intestinal tract of mammals to saprophytic growth on leaf litter resting on the forest floor. Modern agricultural cropping systems have offered fungal plant pathogens vast amounts of substrate for colonization, resulting in disease development. Although the long-term goal for plant pathologists and geneticists is to breed for genetic resistance to combat fungal pathogens, a glimpse at the history of plant breeding has shown that breeders play an ongoing chess game against plant pathogens without a clear winner so far.

This book brings together over 40 chapters that contribute toward our understanding of the biology and pathology of fungal plant pathogens. Drawing on techniques utilizing model systems such as *Arabidopsis thaliana* as well as agricultural crop plants, this book highlights some of the latest techniques critical for students pursuing molecular plant pathology. However, most protocols can be adapted to any pathosystem or fungal pathogen. Since pathogenicity and disease development may depend on effector proteins secreted by plant pathogens during infection, several chapters are dedicated to various means of identifying effectors. In addition, protocols on various aspects of fungal biology are included, including those utilizing molecular biology, proteomics, and metabolomics. Given the recent deluge of fungal genome sequencing projects, chapters on genome annotation and next-generation sequencing of fungal genomes are included. Finally, protocols for gene knock-outs, fungal transformation, and molecular tools for disease and/or pathogen quantification are included that are critical for revealing the role for a fungal gene of interest in disease development.

Taken together, the protocols and review chapters in this book are timely and provide a current set of techniques that cover a wide-range of methods to study molecular aspects of pathogenesis. We hope that this book will be useful for those new to the field of molecular plant pathology as well as experienced fungal research laboratories.

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