
Emerging Trends in Plant Pathology

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Editors

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 Springer

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ISBN 978-981-15-6274-7 ISBN 978-981-15-6275-4 (eBook)
<https://doi.org/10.1007/978-981-15-6275-4>

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The registered company address is: 152 Beach Road, #21-01/04 Gateway East, Singapore 189721, Singapore

To the Legend. . . .



(Dr. Y. L. Nene)

Foreword



Plant pathology as a discipline of agricultural science has played pivotal role over the years in understanding plant diseases and in mitigating losses through cultural and technological innovations. This is despite the disease scenarios that kept on evolving and changing due to biotic, abiotic and edaphic factors. The plant pathologists have eventually contributed significantly towards food security and in ameliorating the livelihood of farmers across the globe. The science of plant pathology has been an innovative and ever-emerging discipline in its scope, importance and technologies. There have been many such innovations and advancements in each and every aspect of plant pathology starting from the identification of the pathogen, underlining the molecular mechanism of pathogenicity and resistance and also the management strategies. With the commencement of the concept of sustainable agriculture, plant disease management has become more important and has shifted from the traditional chemical-based to more eco-friendly integrated disease management strategies with more focus on the biocontrol and other green technologies. The latest innovations in the field of detection and diagnosis, host resistance, disease forecasting and plant biotechnology have helped us in better management of the diseases, but challenges are still many more.

This first edition of *Emerging Trends in Plant Pathology* edited by K. P. Singh, B. K. Sarma and Shamarao Jahagirdhar provides a comprehensive description and highlights of the latest innovation and trends in the field of plant pathology and allied fields. The focus is on understanding both the basic and applied aspects of plant pathology and plant disease management. I hope the book would be of special

interest to both academics and professionals, working in the fields of plant pathology, microbiology, biotechnology and plant breeding, as well as the plant protection sciences. This book is a comprehensive reference for all those curious to understand the latest advancements in their field of specialization.

I congratulate the editors and contributors for their dedicated effort to bring out such a classic reference book for the scientific fraternity.



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Preface

The science of plant pathology is essential for reliable food production through management of plant diseases. Dynamics in the evolution of new races of plant pathogens and changes in the global climatic scenario have made plant pathology an ever-emerging discipline in its scope, importance and technologies. During the past decade tremendous advancements and innovations took place in every aspect of plant pathology starting from identification of pathogens to their management. Additionally, with commencement of the concept of sustainable agriculture, plant disease management has become more important and disease management strategies have shifted from the traditional chemical based to more eco-friendly strategies. Further, advancements in molecular biology studies have armed the researchers to develop newer strategies for plant disease management. Therefore, recently more focus has been on the applications of biocontrol agents, development of transgenic cultivars, plant genome editing to other green technologies. Recent innovations in the field of detection and diagnosis of plant diseases, host resistance, disease forecasting and plant biotechnology have helped in developing strategies to manage the diseases better and address the challenges still on the way.

In this first edition of *Emerging Trends in Plant Pathology* we have compiled chapters to reflect on the recent trends and innovations in the field of plant pathology. Emphasis was given to understanding both basic and applied aspects of modern tools and techniques developed for detection and diagnosis of plant diseases that has helped identifying pathogens associated with a disease in a very short time. Quicker detection and diagnosis leads to identification of many new and emerging plant pathogens, and it is of great help in designing effective management strategies against them. The book has therefore also focused on the host-pathogen systems at molecular level without considering the hosts and their pathogens as separate entities. Chapters were also compiled to elaborate our understanding on host resistance to plant pathogens and the mechanisms of actions of *R* and *Avr* genes of the host and pathogen, respectively. Additionally, plant diseases and their epidemics are highly influenced by environmental conditions and crop microclimate. The book also includes chapters covering broad overviews of the recent advancements in disease forecasting, remote sensing, GIS and GPS applications that help accurate prediction of plant diseases and thereby saving crop losses from pathogens. The book also highlights the developments in the area of biological control of plant

pathogens and use of microbial consortium which have received much attention in the past decade due to promotion in organic farming and sustainable agriculture globally. Further, the new-generation fungicides are considered far more eco-friendly and very effective at low concentration and are highly target specific. In this book, we have also focused on advancements in the use of secondary metabolites from microbes and novel plant extracts as eco-friendly pesticides. We also compiled chapters on the use of transgenics, cisgenics and genome editing that are being increasingly used for plant disease management.

This book is very timely in providing essential and comprehensive source materials, as it includes most relevant areas on emerging trends in plant pathology and their role in crop protection.

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Contents

1	Emerging Plant Diseases: Research Status and Challenges	1
	Dipannita Mitra	
2	Emerging Plant Diseases Under Changing Climate Scenario	19
	Muhammad Priyadi and Pooja Upadhyay	
3	Emerging Important Nematode Problems in Field Crops and Their Management	33
	Mujeebur Rahman Khan, Irfan Ahamad, and Mohammad Haniph Shah	
4	Modern Tools for Detection and Diagnosis of Plant Pathogens	63
	Madhurababu Kunta, Jong-Won Park, W. Evan Braswell, John V. da Graça, and Perry Edwards	
5	Plant Virus Diagnostics: Traditional to Recent and Emerging Advances	97
	V. K. Baranwal, Sajad Un Nabi, and Manoj K. Yadav	
6	Epidemiology and Management of Potato Virus Y	113
	Tyler D. B. MacKenzie, Xianzhou Nie, and Mathuresh Singh	
7	Major Fungal French Bean Diseases: Epidemiology and Management	141
	S. K. Gupta and Guervinder Singh	
8	Whitefly-Transmitted Plant Viruses and Their Management	175
	P. S. Soumia, G. Guru Pirasanna Pandi, Ram Krishna, Waqar Akhter Ansari, Durgesh Kumar Jaiswal, Jay Prakash Verma, and Major Singh	
9	Recent Advances in Management of Bacterial Diseases of Crops . . .	197
	M. R. Ravikumar, H. S. Mahesha, J. U. Vinay, and K. Dinesh	
10	Resistance Breeding and Exploitation of Wild Relatives for New Resistance Sources	211
	N. K. Singh, Anjali Joshi, Smrutishree Sahoo, and Birendra Prasad	

11 New-Generation Fungicides for Sustainable Production and Disease Suppression	249
Dele Omoyele Adeniyi, Deepshikha Kunwar, Lelia Nkechinyere Dongo, David Adedayo Animasaun, and T. Aravind	
12 Toxicity of Organophosphate Pesticide on Soil Microorganism: Risk Assessments Strategies	257
Durgesh Kumar Jaiswal, Ram Krishna, Saurabh Singh, Tarun Belwal, Jay Prakash Verma, and Janardan Yadav	
13 ‘Cu-Chi-Tri’, a New Generation Combination for Knowledge-Based Management of Oomycete Pathogen, <i>Phytophthora infestans</i>	297
Nandani Shukla, P. Lemke, B. M. Moerschbacher, and J. Kumar	
14 Seaweed and Associated Products: Natural Biostimulant for Improvement of Plant Health	317
Jai Singh Patel and Arpan Mukherjee	
15 Secondary Metabolites from Microbes for Plant Disease Management	331
U. V. A. Buddhika and S. Abeysinghe	
16 Beneficial Root Microbiota: Transmogrifiers of Secondary Metabolism in Plants	343
Akanksha Singh, Rupesh Chaubey, Stuti Srivastava, Sumit Kushwaha, and Rakesh Pandey	
17 Microbial Consortia for Plant Disease Management and Sustainable Productivity	367
Shamarao Jahagirdar, Gurudatta Hegde, P. U. Krishnaraj, and D. N. Kambrekar	
18 Microbial Biofilm: Formation, Quorum Sensing, and Its Applications in Plant Disease Management	385
Pravallikasree Rayanoothala, M. Divya, Sunita Mahapatra, and Srikanta Das	
19 Role of Endophytes in Plant Disease Management	399
Sunanda Chakraborty, Debanjana Debnath, Sunita Mahapatra, and Srikanta Das	
20 Bioprospecting of Diseases of Horticultural Crops in India	425
V. Devappa, C. G. Sangeetha, and N. Jhansirani	
21 Transgenerational Plant Immunity in Plant Disease Management	457
Md Mahtab Rashid, Raina Bajpai, Basavaraj Teli, Ankita Sarkar, and Birinchi Kumar Sarma	

22	Concept of Effectors and Receptors in Improving Plant Immunity	475
	C. S. Karibasappa, Yogendra Singh, T. Aravind, and K. P. Singh	
23	Transgenic Technology for Disease Resistance in Crop Plants	499
	T. Makesh Kumar, K. Divya, and S. Asha	
24	RNAi Technology: A Novel Platform in Crop Protection	561
	Munmi Borah and Naga Charan Konakalla	
25	Genome Editing for Plant Disease Resistance	577
	Rajeev Singh	
26	Green Nanotechnology and Its Application in Plant Disease Management	591
	V. B. Nargund, J. U. Vinay, K. N. Basavesha, S. Chikkanna, S. Jahagirdar, and R. R. Patil	
27	Plant Disease Management in Organic Farming System: Strategies and Challenges	611
	Laxmi Rawat, T. S. Bisht, and Dinesh Chandra Naithani	
28	Organic Agriculture for Plant Disease Management	643
	D. K. Shahi, Sweta Kachhap, Arvind Kumar, and B. K. Agarwal	
29	Pest Risk Analysis and Plant Quarantine Regulations	663
	V. Celia Chalam, Kavita Gupta, Ruchi Sharma, Vaishali Dutt Sharma, and A. K. Maurya	
30	Remote Sensing Technology and Its Applications in Plant Pathology	683
	Ghada A. Khder	
31	Decision-Making Tools for Integrated Disease Management	703
	K. P. Singh, T. Aravind, Amit Kumar Srivastava, and C. S. Karibasappa	
32	Bioinformatics in Plant Pathology	725
	Aamir Khan, Sakshi Singh, and Vinay Kumar Singh	

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