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Plant pathology which deals with diseases of crop plants and their management has now entered into a borderless discipline of modern molecular plant pathology wherein host–pathogen interactions are studied at cellular and genetic levels. The advanced molecular tools, primarily used in human medicine and microbial science are also applied to plant sciences. Hence, a voluminous amount of knowledge regarding pathogenesis, host responses and recognition has accumulated and is better understood by studies at the genomic level with modern genetic tools. This has prompted the crop scientists to understand how a pathogen recognizes a host cultivar and how the host cultivar avoids the pathogen perception so that the crop remains resistant and continues the arms race in this evolutionary sequence of host and pathogen interaction. Most of the plant pathogen research papers are now dealt at the molecular level. The *Annual Review of Phytopathology* brings out the viewpoints of eminent scientists in each area of plant–pathogen interactions in the fields of diagnostics, molecular recognition of host and pathogen, genomic interactions and pathogenesis, molecular tools for building host resistance, signal transduction between host and pathogen, molecular epidemiology and disease management by using genetic manipulation.

The current volume is remarkable and deals with the state-of-the-art knowledge in the research innovations of plant–microbe interactions. The discussion of various aspects of plant–microbe interactions is reasonably comprehensive and is perhaps the most interesting reference in this new area of modern plant pathology. The book itself is compact and condenses host–pathogen interactions into 18 effective chapters.

The book opens with the chapter by Heath, ‘Memoirs of a “cell biological” plant pathologist’. The author describes how she became a plant pathologist, her research interest in the field of host–pathogen interactions and her studies on microscopy using light microscope, electron microscope, etc., how she directed

her research on the interactions between plants and biotrophic fungi, her investigations on host compatibility, host resistance, non-host resistance and the evolution of host–parasite specificity.

The chapter by Miller *et al.* deals with the fascinating topic of plant disease diagnostic capabilities and networks. The authors take the reader through an exciting journey into the developments in diagnostic procedures. Disease diagnostics through the application of current biotechnological techniques for plant disease diagnostics; emphasizes the importance of new techniques, disease diagnosis; the latest trends in diagnosis have been well described. Similarly Munkvold addresses the critical issues of seed pathology progress in academia and industry. The chapter highlights the research innovation in seed pathology. It focuses on the three vital aspects of seed pathology, i.e. research innovations in detection of seed borne pathogens and elucidation of their epidemiology, advances in the development and use of seed treatments; and progress towards standardization of phytosanitary regulations and seed health testing methods.

Recent research advances in the field of bacterial/fungal interactions, with suitable examples are presented by Kobayashi and Crouch. The authors specially elaborate on bacterial pathogens of fungi in agriculture and their implications in controlling plant diseases caused by fungi. Types of antibiosis are illustrated with specific case studies. A detailed account on the mechanisms of pathogenesis is presented. Fungal host responses to bacterial stimuli are also detailed. Stall *et al.* in their article provide a brief summary on durability of resistance in tomato and pepper to *Xanthomonas* causing bacterial spot based on hypersensitivity. Interesting and informative aspects of the recent evolution of bacterial pathogens with particular reference to the gall forming *Pantoea agglomerans* (PA1) are presented by Barash and Manulis-Sasson in chapter 7. It offers insight into an unique model for emergence of new bacterial pathogens. It also details the horizontal gene transfer which is the major driving force in creation of the PA1. The chapter also describes the crucial functions of the plant produced indole-3-acetic acid (IAA) and cytokinins (CK) in gall initiation, role of type III effectors in determination of host specificity and evolution of the pathogen into pathovars.

Klosterman *et al.* focus on the diversity, pathogenicity and management of *Verticillium* species. The authors elaborate the recent advances in the analysis of compatible and incompatible interactions, controversies surrounding *Verticillium* taxonomy, the disease cycle and population biology and innovative management aspects of *Verticillium*. The disease cycle of *Verticillium* is described with a fresh outlook. Xu and Nicholson’s article focuses on community ecology of fungal pathogens causing wheat head blight. They update on the *Fusarium* head blight (FHB) of wheat, recent developments in *Fusarium* taxonomy, epidemiology of FHB pathogen, synergistic interactions among FHB pathogens, and various aspects of management of FHB pathogens. The chapter also covers advances in molecular techniques into research of taxonomy population variability, disease management, detoxification aspects of FHB.

A good and concise compilation of information regarding many aspects of the biology of viroid–host interaction is presented by Ding which summarizes the recent advances in the understanding of viroid structures and cellular factors enabling these functions. The chapter also covers basic biology of viroid infection, host defence, multiple strategies of survival, functional genomics and proteomics of viroid systemic infection and molecular basis of viroid diseases. Interesting highlights of the accounts on Hordeivirus replication, movement and pathogenesis are presented by Jackson *et al.* The biological properties of the four members of the Hordeivirus genus and



Stereo image of a radially colour-coded, surface-shaded representation of the paratransmission virus *Penicillium stoloniferum* virus S (PsV-S) reconstruction.

advances in understanding of organization and expression of the viral genomes are described. The infection processes and pathogenesis of the most extensively characterized Hordeivirus are described and a brief overview of recent advances in the use of BSMV for virus-induced gene silencing with very good coloured illustrations is given. The article by Ghabrial and Suzuki is devoted to viruses of plant pathogenic fungi and describes selected mycoviruses that cause debilitating diseases and/or reduce the virulence of their phytopathogenic fungal hosts. The article describes the potential of viruses of plant pathogenic fungi in the development of novel bio-control strategies and in gaining an insight into the molecular basis of fungal virulence along with good photographs. Taxonomy and evolution of mycoviruses, structure of DS-RNA mycoviruses and important mycoviruses/fungal interactions are also dealt in this chapter.

Kachroo and Kachroo summarize the mechanism of fatty acid-derived signal in plant defence and then give a comprehensive account on the current knowledge of fatty acids, FA-derived oxylipins and enzymes catalysing FA metabolism in plant defence. The chapter also elaborates on fatty acid biosynthesis and the role of fatty acids in plant defence particularly in systemic immunity. The review article by Vlot *et al.* helps in understanding the role of salicylic acid (SA) – a multifaceted hormone to combat plant disease. The authors discuss the interaction between SA signalling pathway and those regulated by other hormones and/or defence signals. The chapter surveys how SA in plants regulates both local disease resistance mechanisms,

including host cell death and defence gene expression, and systemic acquired resistance. Genetic studies of the complex network of proteins required for SA-mediated defence signalling, SA signal interactions with other hormone signal pathways, antagonisms between JA (jasmonic acid) as well as ABA (abscisic acid) and auxin signalling are also highlighted.

In the chapter on RNAi and functional genomics in plant parasitic nematodes, Rosso *et al.* describe in detail the comparative genomics and evolution of parasitism in nematodes, transcriptomes of host-parasite interactions, functional analysis of parasitism genes in plant system, RNAi for functional genomics and relevance of RNAi for post-genomic studies. The potential of transgenic plants that mediate specific RNAi against essential genes for nematode control is highlighted with several examples. The article on migratory plant endoparasitic nematodes by Moens and Perry provides information on the contrasts and divergence of migratory endoparasitic nematodes with beautiful colour photographs; focuses on the contrast in life cycles and the wide spectrum of adaptations to obligate parasitism of most species of plant endoparasitic nematodes and examines how these aspects impinge on management aspects. Life cycles, survival and dispersal, host range, interactions with other pathogens and their control using various methods are also presented in this chapter. A short chapter by Bird *et al.* focuses on the biology and functional genomics of root knot nematodes and also describes the conserved metabolic pathways in root knot nematodes with good colour illustrations.

The chapter by Stergiopoulos and de Wit ventures into the domain of elicitors and presents a detailed account on current research in the field of effectors of extracellular fungal pathogens and effectors from haustorium-forming fungal pathogens; future search for fungal effectors by comparative genomics, functions and host targets of effectors; and effector recognition by R proteins.

The closing chapter is devoted to the study of *Ustilago maydis* as a pathogen describing the disease cycle, recent developments that place this system at the forefront of understanding the function of several effectors in eukaryotic pathogens and describe the expected spin-offs for closely related species exploiting comparative genomic approaches.

This volume with expert opinions has opened up new areas for researchers to ponder upon and master the knowledge already developed for the biotic stress physiology and genetics. Advanced knowledge regarding diagnostic tools, cellular epidemiology, gene manipulation of the host and pathogen has been gained along with better understanding of the arms race between the host and pathogen so that both the systems can continue to evolve in the evolutionary sequence.

This book serves as an important reference book for graduate students, scientists and professionals interested in the subject.

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