

technologies. My colleagues at Meerut will certainly use the book as a supplementary source of new information for teaching plant breeding to our students.

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**Annual Review of Phytopathology.** Robert K. Webster *et al.* (eds). Annual Reviews, 4139 El Camino Way, P. O. Box 10139, Palo Alto, California 94303-0139, USA. 2000. Vol. 38. 646 pp. Price: US \$154.00

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I prefer to review the 38th volume of *Annual Review of Phytopathology*, which is also the new millennium issue, referring to the important statement of Luis Sequeira from the first article 'Legacy for the Millennium: A Century of Progress in Plant Pathology' – 'The past century witnessed the growth of plant pathology as an important and dramatic challenge to meet the demands for increased food, fibre and fuel production from a declining agriculture base'. Consolidating this past, the new century is witnessing exciting developments due to the changes in global scenario, public need and new challenges in food security through newer tools available from bioinformatics, molecular biology and recombinant DNA technology. In this context, the book under review has consolidated the progress of plant pathology made over the last years and projected the trends for the future. The editors have carefully brought out this volume with twenty-three articles, beginning with the biographical work of Shear in 'C. L. Shear: Gifted mycologist, plant pathologist, and APS founder' by P. D. Peterson and C. S. Griffith, and a retrospective view on the understanding of host-pathogen interactions by N. T. Keen. Other articles focused on include epidemiology, diseases caused by viruses, genes and genetic diversity, specifics of plant diseases and plant disease management. The chronology of events from the last

millennium beginning with the birth of plant pathology, its services to plant growers, advancements in biotechnology and genetics, with an international scope towards globalization have all been well described. Hence, this volume of *Annual Review of Phytopathology* is in itself an important textbook for beginners, historians, researchers and scientists who are concerned with enhancing agricultural productivity of this century.

Epidemiology, the study of diseases in populations, is a branch of plant pathology that generates information on the interaction of host, pathogen and environment and has applications in development of disease management strategies. The general article by P. E. Waggoner and D. E. Aylar reviews the epidemiology of plant diseases known over the last century in comparison with medical epidemiology. The two other articles describing the epidemiology of leaf and stem rust fungus of wheat and the dispersal pattern of *Phytophthora* are specific in nature, substituting the views of the former authors. The three articles together, apart from integrating observations on the interplay of pest, photosynthesis and supply and demand to reckon losses in agriculture, also deal in detail with strategies used to manage diseases, understanding diversity of pathogens, genetic inheritance of resistance and pathogenicity and influence of weather on spreading of disease. These read together with contributions made in the twentieth century on plant health management, clearly bring out the advancements in the last century that made food production exceed demand on a global basis.

Understanding the molecular mechanism of defence in plants and the factors that trigger resistance will aid in isolating and characterizing the *R* gene(s) of host and *avr* gene(s) of pathogen that have application in plant quarantine and development of management strategies. In this context, the article on 'Modulation of plant defense responses by bacterial lipopolysaccharides', the ubiquitous, indispensable components of Gram-negative bacteria, by Dow *et al.* is appropriate. Similarly, the article on 'Role of mitochondrial DNA in the senescence and hypovirulence of fungi and the potential for plant disease control' gives an account of occurrence of mitochondrial hypoviru-

lence in phytopathogenic filamentous fungi under natural conditions and suggests its possible exploitation as biocontrol agent.

Another area of research extensively covered in this volume through six articles is plant disease management. The article 'Advances in plant health management in the 20th century' reviews the biotic and abiotic factors that restrict plants from expressing their full potential. This article also outlines contributions of biocontrol to plant health management. The article by B. R. Kerry on 'Exploitation of microbial agents for biocontrol of nematodes' describes the various interactions between plant-parasitic nematodes and rhizosphere microbial flora'. It highlights the importance of hosts in the development of biocontrol strategies, the success of which depends on the understanding of interactions at population, organismal and molecular levels.

Molecular technologies of detection are currently becoming central for plant disease management. The article on the 'Impacts of molecular diagnostic techniques on plant disease management' covers the historical outline of various methods used for detection before the development of ELISA and the impact of the advent of molecular biology leading to the development of PCR-based detection techniques. Covered in this article are also the case studies illustrating the application of these techniques for detection of micro-organisms, especially fungi and viruses in certification programmes, plant quarantine, disease management and crop production. The future prospects of nucleic acid-based and antibody-based microarrays for disease diagnosis are also highlighted.

Another article of interest is that on the 'Impact of food safety concerns on the future of disease management' by N. N. Ragsdale. One of the major discoveries in plant pathology is that of fungicides that has helped in the green revolution, supplying low-cost food items to the ever-increasing human population. However, in the recent years, lot of concern is shown towards use of pesticides due to their effects, especially on human health and environment, resulting in the development of food safety measures which restrict the use of fungicides. The article by N. N. Ragsdale, while analysing pesticide risks has clearly brought out the

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importance of fungicides in disease management, indicating the possibility of increasing costs for producers and consumers due to loss/restricted use of this valuable pest management tool. The author has also highlighted one of the press release news item in USA during 1999 stating that the American Institute for Cancer Research has indicated that the importance of a diet rich in fruits and vegetables greatly outweighed the estimated risk resulting from pesticide residues in fruits. Further, the press release opined that there was no convincing evidence that pesticides on the

fruits and vegetables affected the risk of human cancer. Thus, the author advocates for the research to improve risk decisions, including residue analysis and the supporting methodology, mode of action, environmental and metabolic fate and human exposure as well as the development of models to provide more realistic risk estimates.

Thus, this volume of *Annual Review of Phytopathology* in a compendium of modern plant pathology blended as a treatise of historical progress, with an objective analysis focused for the future. This compilation is a needed addi-

tion for all libraries and an asset for the researchers and students of agriculture, general biology, botany and molecular biology and also for policy makers.

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