

Preface

Incidence of diseases on cereals and other crops is known from time immemorial. However, the causes of these diseases could not be correctly identified, because of the prevailing superstitious belief and religious dogmas that suggested that diseases were God-sent curses as punishment for the sins committed by the people of the region/country. Probes to ascertain the real causes of plant diseases were blunted and discouraged. But analytical thoughts began to percolate in the brave and discriminating minds. As the scientific reasoning and discernment pervaded the human mind, the ignorance covering the nature of the causes of plant diseases began to steadily disappear. With development of compound microscopes and other tools, it was possible to visualize the presence of fungi in the infected plant tissues. Concerted and enduring efforts of early researchers like Anton de Bary (1883–1898), proved unequivocally that potato late blight and other diseases were caused by fungi. Evidences provided by experimentation for establishing the microorganisms as the causative agents of crop diseases began to accumulate from nineteenth century. As different kinds of microbes were discovered to be responsible for various diseases infecting the same crop plant species and one pathogen to be able to infect many crops, wild and weed plant species, the need for developing efficient methods of detection of microbial pathogens rapidly and reliably was realized. Techniques had to be developed to detect, differentiate and quantify the fungal pathogens present in different ecosystems. Furthermore, rapid detection and precise identification of the pathogens form the basic requirement for the development of short- and long-term strategies for the effective management of crop diseases.

Fungi constitute a group that was first recognized as the disease-causing agents in plants. They are comparatively well developed and have several morphological, cultural, biological, physiological and biochemical characteristics that are used as the basis for the tests employed for detection of fungal pathogens and diagnosis of the diseases caused by them. The inadequacy of morphological and biochemical characteristics alone to detect and identify the fungal pathogens and to differentiate the varieties, races and biotypes within the same morphological species was indicated by several studies. Immunoassays and nucleic acid-based techniques have been demonstrated to have an edge over the conventional isolation-based methods. Hence, modern methods that are more sensitive, specific, rapid and reliable have been

developed by the intensive research efforts of scientists working in various countries around the world.

This volume presents exhaustive information based on extensive literature search on various methods of detection of fungal pathogens and diagnosis of diseases caused by them. Comparative effectiveness of different techniques is discussed critically to enable the researchers, teachers, extension specialists and graduate students to choose the suitable methods for their investigations. In addition, several protocols have been presented as appendix in appropriate chapters to meet this requirement. This volume is expected to provide the necessary platform for planning more critical studies that may improve the efficiency and reliability of the existing methods that have been employed for simultaneous detection of two or more kinds of pathogens, without compromising the sensitivity and specificity of detection of fungal pathogens and diagnosis of the diseases caused by them.

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