

# Plant Defence: Biological Control

# Progress in Biological Control

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# Plant Defence: Biological Control

 Springer

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# Preface

Approximately 6.6 billion humans now inhabit the Earth. Notably, the human population has grown nearly ten-fold over the past three centuries and has increased by a factor of four in the last century. Therefore, demand for food, feed and fodder is ever increasing.

Plant diseases worldwide are responsible for billions of dollars worth of crop losses every year. Productivity of crops is at risk due to the incidence of pests, pathogens and animal pests. Crop losses to pests can be substantial and may be reduced by various control activities. Estimates on the crop loss are available for major food and cash crops on the world level. Among crops the total loss potential of pests world-wide varies from 25 to 40%. Globally, enormous losses of the crops are caused by the plant diseases, which can occur from the time of seed sowing in the field to harvesting and storage. Important historical evidences of plant disease epidemics are Irish Famine due to late blight of potato (Ireland, 1845), Bengal famine due to brown spot of rice (India, 1942) and Coffee rust (Sri Lanka, 1967). Such epidemics had left their effect on the economy of the affected countries and deep scar on the memories of human civilization.

Plant diseases, caused primarily by fungal and bacterial pathogens, cause losses of agricultural and horticultural crops every year. These losses can result in reduced food supplies, poorer quality of agricultural products, economic hardship for growers and processor and results ultimately in higher prices for the consumers. For many diseases, traditional chemical control methods are not always economical nor are they effective, and fumigation as well as other chemical control methods may have unwanted health, safety and environmental risks.

Biological control involves use of beneficial micro-organism, such as specialised fungi and bacteria to attack and control plant pathogens and diseases they cause. Biological control offers an environmental friendly approach to the management of plant diseases and can be incorporated in to cultural and physical controls and limited chemical uses for an effective integrated pest management system. Due to the high cost of synthetic pesticides and concerns over environmental pollution associated with the continuous use of these chemicals, there is a renewed interest in the use of botanicals and biological control agents for crop protection. Benefits and

risks are always associated with new technologies and their utilization. These types of considerations have encouraged microbiologists and plant pathologists to gain a better knowledge of biocontrol agents, to understand their mechanism of control and to explore new biotechnological approaches to induce natural resistance. This book provides a comprehensive account of interaction of host and its abiotic stress factors and biotic pathogens, and development of biological control agents for practical applications in crops and tree species, from temperate to subtropical regions. The contents are divided into the following sections:

- General biology of parasitism
- Applications of biological and natural agents for disease resistance
- Host parasite interaction
- Mechanism of defence

The chapters have been written by well known workers in their research field.

The book is primarily designed for use by upper undergraduates and post graduates studying crop protection, agricultural sciences, applied entomology, plant pathology, and plant sciences. Biological and agricultural research scientists in biotechnology, forestry, plant pathology and post harvest technology, crop management and environmental sciences, agrochemical and crop protection industries, and in academia, will find much of great use in this book. Libraries in all universities and research establishments where agricultural and biological sciences are studied and taught should have multiple copies of this very valuable book on their shelves. The editors wish to thank all the contributors and staff of the Springer for their cooperation in completion of this book.

Prof. J.M. Mérillon and Prof. K.G. Ramawat

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