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## Preface

The prospects of increasing production of horticultural crops by increasing land under cultivation are very much limited. The average productivity of most horticultural crops in India is low. There is a wide gap between yields obtained and potential yields with improved varieties and technologies. The productivity enhancing technologies include the use of high-yielding varieties/F1 hybrids, high-density planting, integrated nutrient and pest management, micro-irrigation and fertigation, use of bioregulators, genetically modified crops, and protected cultivation. Among the productivity enhancing technologies, protected cultivation has a tremendous potential to increase the yield of vegetables and flower crops by several-folds. Hence, it is essential to increase productivity of horticultural crops through protected cultivation in order to meet the future demand and fulfillment of commitment to the sustainable horticultural development.

High-tech production of high-value horticultural crops under protected conditions adopting modern technology is the recent development in this field. Greenhouse crop production is now a growing reality throughout the world with an estimated 405,000 ha of greenhouses spread over in more than 55 countries in the world where cultivation of crops is undertaken on a commercial scale under cover and it is continuously growing at a fast rate internationally.

Tomato, capsicum, cucumber, lettuce, rose, carnation, gerbera, orchids, and anthuriums are the most extensively grown vegetable and ornamental crops under greenhouses to achieve higher returns. The purpose of growing crops under greenhouse conditions is to extend their cropping season and to protect them from adverse environmental conditions, such as extreme temperatures and precipitation, and from diseases and pests. Quality is a high priority for greenhouse crops, requiring much care in pest and disease management, not only to secure yields but also to obtain a high cosmetic standard. Historically, not enough attention has been paid to exploiting and amending production technology for the control of pests and diseases. This makes the control of pests and diseases in protected crops even more challenging, with many important problems being unresolved and new ones arising as the industry undergoes more changes in production systems.

Pests and diseases are one of the major challenges to protected cultivation (glasshouses and plastic houses and tunnels). Year-round warm temperatures and relatively high humidity and abundant food make the protected environment of greenhouses highly favorable to pests and diseases. While much is

known about disease epidemiology and insect behavior, scant attention, however, has been paid to the manipulation of greenhouse environments expressly to avoid disease epidemics and insect infestations, which together can easily account for 30 % crop losses. This is a significant factor in a grower's balance sheet which is often overlooked and usually dealt with simplistically by indiscriminate pesticide applications. Hence, integrated management must be incorporated into the present production systems, and appropriate research and experimentation programs must be developed in order to generate a pest and disease control technology adapted to the ecological conditions and predominant species.

The information on pest and disease management under protected cultivation of horticultural crops is very much scattered. There is no book at present which comprehensively and exclusively deals with the above aspects. This book deals with pests (insect and mite) and diseases (fungal, bacterial, viral, and nematode) in protected horticultural crops (fruits, vegetables, and ornamentals) in detail using physical, cultural, chemical, biological, host resistance, and integrated methods. This book is divided into 35 chapters which comprehensively cover all the aspects of pest management in horticultural crops in greenhouse.

The book opens with initial chapters describing the scenario where integrated pest and disease control operates, that is, the greenhouse and its environment. Ensuing chapters provide the basic strategies and tactics of different control methods including integrated control, with special reference to greenhouse crops. Further chapters include the different facets of biological pest and disease control – its scientific bases, its development in practice, and its commercialization and quality control. The preeminence of biological control in the book is not surprising since without doubt it is the cornerstone of integrated insect pest control and is also becoming increasingly more important in disease control. The concluding chapters of the book show us the present situation of integrated pest and disease control in the most important greenhouse crops (fruits, vegetables, and flower crops) worldwide. The final chapter deals with the future challenges assigned to researchers to identify non-pesticide methods and integrate sustainable pest management technologies that can contribute to increased productivity, such as breeding for durable resistance, biological control, and cultural methods, and which will have minimal adverse environmental and social impacts.

This is a reference book which attempts to provide postgraduate and professional readers already familiar with the subject with a means to acquire deeper knowledge on integrated control of pests and diseases in greenhouse crops and furthermore suggest possible roads to take in future tasks. Another decisive stimulant for this endeavor was the realization of the growing need to incorporate integrated systems of protection from arthropod pests and diseases for the thousands of hectares of protected crops in the world. The fruit, vegetable, and ornamental plant markets and the technical and economic efficiency of crop protection require these integrated control systems. The book adopts multidisciplinary approach (involving entomology, plant pathology, nematology, and horticulture) in addressing both basic and applied aspects of integrated pest management in greenhouse crops.

This book will be of immense value to the scientific community as a whole involved in teaching, research, and extension activities. The material can also be used for teaching postgraduate courses. The book can serve as a very useful reference for policy makers and practicing farmers. Suggestions to improve the contents of the book are most welcome (e-mail: [reddy\\_parvatha@yahoo.com](mailto:reddy_parvatha@yahoo.com)). The publisher, Springer (India) Pvt Ltd, New Delhi, deserves commendation for their professional contribution.

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P. Parvatha Reddy

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