

Biopesticides: Innovations and Practices

Editors

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About the Book

This book is intended to share scientific knowledge and expertise to the community in the field of agriculture, especially relating to biopesticides. The book provides citations and reviews of more than 1000 recent publications in the field of biopesticide research, and recommendations for future areas of new vistas of research in the field of biopesticides. The book also provides methodologies and technologies for isolation and chemical characterization of biomolecules, diagnostic tools for microbes, analytical techniques for phytochemicals and nanomaterials, and protocols for bioassays and field studies. For the better understanding of the readers, this book includes more than 73 tables, 60 figures and 28 colour plates.

The entire book is divided into four sections, and chapters in each section highlight a dedicated aspect of agricultural pests/pathogens and biotechnological options for insect pest management viz., entomopathogens, botanical pesticides, natural enemies, bionanomaterials and other IPM components. It also discusses about the impact, advantages, limitations and future prospects of these biotechnological options.

Each chapter is attempted to make as stand-alone document, making it a valuable reference source for Agrarians, field practitioners, biologists, scientists in related fields and agriculture school libraries.

About Editors

K. Sahayaraj, Ph.D. is a Professor (Associate) at the Department of Zoology, St. Xavier's College of Manonmaniam Sundaranar University and a Director in the Crop Protection Research Centre in the same institution since the June 1998. Over the past 28 years, Dr. Sahayaraj's research efforts have been dedicated to multidisciplinary, integrated approaches to understanding how reduviids distribute and diversify in various ecosystems, and how their adaptive characters can be applied to pest management, especially through bio-intensive pest management. Dr. Sahayaraj has over 198 scientific papers and projects published. He is an internationally recognized expert in many areas of advanced entomology including insect chemical ecology, artificial diet formulation, biopesticide formulation, bio-intensive integrated pest management, bionanomaterial, and insect molecular biology. He is a regularly sought after and requested lecturer at the majority of science colleges at Tamil Nadu, India. Dr. Sahayaraj organized four international conferences (BIOCICON) and seven more national conferences. Dr. Sahayaraj is the Managing Editor of the Journal of Biopesticides, Editor for more than 10 reputed journals. Reviewer of more than 15 journals, particularly Entomotropica, journal of Insects, Pest Management Sciences, Pesticide Biochemistry and Phytochemistry, Photobiology B: Biology etc. Recent publications of Dr. Sahayaraj deals with essential oils, seaweeds, reduviid predators, fungi for pest management; culture, bioefficacy and venom biochemistry of reduviid predators; bionanomaterial synthesis, characterization and biological application. He has been honored with several awards from regional (Best Researcher in Science, St. Xavier's College), national (Scientists of the year-2008, NESAI, New Delhi; Young Achievers Award-2010 by SADHNA, Solan; Bharat Seva Ratan Gold Medal Award-2014 by GEPR, New Delhi; Bharat Seven Rethan Gold Medal by GEPBRA, New Delhi) and international agencies (Hyoshi Environmentalist Award, Japan; YOUNG IOBC travel grant awardee). Dr. Sahayaraj has operated thirteen research projects funded by national (DST, DBT, CSIR, MOEs, MEFs) and international (IFS) funding agencies. He has also received grants on several occasions for conducting farmers' and students' training programmes and international conference on Biopesticides and international travel grant from TWAS, CSIR, DST, TNSCST, MES, ICMR, ICAR and UGC. He has guided and supervised 18 Ph.D. scholars and supervising two researchers. He has been regularly transferring the laboratory finding to the neighborhood farmers and offering guidance to them on BIPM. For a better understanding and pursuance by farmers, he brought out 05 manuals/books in his regional language.

Dr. P. Selvaraj, Ph.D. in applied entomology at Manonmaniam Sundaranar University, Tirunelveli, Tamil Nadu, India (2001-2003). Then he joined as Scientist in Sun Agro Biotech Research Centre, Chennai (2004 to 2008) headed by the eminent Entomologist Dr. Dr. B. Vasantharaj David wherein he undertook research and development activities on biofertilizers and biopesticides including entomopathogens, Azadirachtin formulations, Pheromones based trapping systems etc. and preparation of reports for pesticide registration with CIB, New Delhi. He was also involved in Collaborative research on insect pests and their parasitoids in collaboration with USDA (with three different Research groups viz. Australia, USA and France) and ICIPE, Kenya. During his career he underwent two training programmes at ICIPE, Nairobi, Kenya in 2005 and visited HORDI Sri Lanka as visiting scientist to establishing Mango fruit fly parasitoid research station at HORDI for AFI, ICIPE, Kenya. He was appointed Assistant Professor in the Department of Advanced Zoology and Animal Biotechnology, St. Xavier's College, Palayamkottai, from May, 2008. So far has 37 research publications including 6 International and 12 National Journals, 3 books chapters and 2 books and 2 training manuals. He is actively involved in organizing seminars/conferences and training programmes for both national and international participants; reviewing articles and publishing books and Journals.

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Keywords

22.1. Introduction

22.1.1. Existing management options of weeds

22.1.1.1. Manual method

22.1.1.2. Mechanical method

22.1.1.3. Chemical method

22.2. Application of Nanotechnology to manage problem weeds

22.3. Nano-herbicides to exhaust the weed seed bank

22.4. Nano-herbicides to eradicate the perennial weed

22.5. Developing nanoherbicides molecule targeting the new domain

22.6. Developing smart delivery mechanism to the targeted site

22.7. Nanoherbicides for rainfed Agriculture

22.8. Nanoherbicides for season long weed control.

22.9. Detoxification herbicide residue

22.10. Synthesis of Template for Loading Herbicide Active Ingredient for Control

22.11. Procedure

22.12. Future focus

22.13. Conclusion

22.14. References

Chapter 23. Agro nanomaterials: past and present scenarios

T. Seenivasagan and K. Sahayaraj

Abstract

Keywords

- 23.1. Nanomaterials**
- 23.2. Nanomaterials pesticide determination**
- 23.3. Pesticide absorption / destruction**
- 23.4. Controlled release of pesticide delivery**
- 23.5. Crop growth induction**
- 23.6. Pestiferous insect's management**
- 23.7. Post-harvest pest management**
- 23.8. Nanocomposites**
- 23.9. Conclusions**
- 23.10. References**

Chapter 24. Changing scenario of insect pests and research priority on pest management in Cotton

Murugesan, N. and K. Elanchezhyan

Abstract

Keywords

- 24.1. Introduction**
- 24.2. Pre Transgenic Cotton (Bt cotton) Era**
- 24.3. Adoptable Srivilliputtur IPM module (ASIPM)- Components**
- 24.4. Post Transgenic Cotton (Bt cotton) Era**
- 2.5. Conclusion**
- 2.6. References**

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