

Biopesticides For Sustainable Agriculture

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BIOPESTICIDES

For Sustainable Agriculture

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PREFACE

Biopesticides are derived from natural organisms or their genes or metabolites that are used to protect crop plants against damaging pests. Due to the host specificity and efficiency in pests management, these are viewed as an alternative to chemical pesticides. Wide spread resistance to synthetic pesticides, unacceptable negative consequences especially environmental pollution and damage to non target organisms, pesticidal residue on crop produce and pests resurgence have necessitated to the comprehensive solution to pests and disease management.

The dependency of pest management on biopesticides is increasing slowly but steadily. They represent only 2.89% of the overall pesticide market in India and is expected to exhibit an annual growth rate of about 2.3% in the coming years. In India, so far only 12 types of biopesticides have been registered under the Insecticide Act, 1968. neem based pesticides, *Bacillus thuringiensis*, NPV and *Trichoderma* are the major biopesticides produced and used.

The increasing interest of researchers, policy planners and consumers in ecofriendly techniques it was - felt essential to compile the information available on scenario, status, commercial production quality control of biopesticides and their recommendation for different crop ecosystem. The improvement of biopesticides and role of biotechnology in improving the efficacy and production techniques are another important issues to be address. The deliberations made by various scientists during the summer school on 15th June to 5th July 2012 have been compiled and edited in the form of a book for students, teachers, extension functionaries who are directly or indirectly associated with the agriculture.

ABOUT THE BOOK

The role being played by small microbial and tiny insects for the management of noxious insect pests is unparalleled. These are contributing significantly in pest population reduction in agro-horticultural ecosystem. The diversity of microorganisms and bioagents are providing solutions to many loss causing agents like phytophagous and weedy insects, mites, fungus, bacteria, virus etc. the increasing trend of organic farming has also accelerated the utilization of farmer's friendly organisms i.e. biopesticides. Keeping in view of research advancements and adoption of biopesticides, the book has been written which contains 36 important chapters including 20 chapters on principle and application of biopesticides in agro-ecosystem and 16 other related chapters like scope in organic farming, use of biotechnology for improvement or efficacy scenario and status of biological control and IPM in India importance of insect biosystematics, monitoring and sampling of pest population and changing scenario of disease in Bt cotton. Detailed information has been given on type, scope, use of biopesticides, dosage and method of application, mode of action, target pests and their merit and demerit after use. An effort also has been made to present the work on interaction of plant and microbes and the commercial multiplication technique of antagonistic fungi. The importance of entomopathogenic nematode is also getting importance slowly but steadily. The chapter on entomopathogenic nematode as a potent biopesticides IPM justifies production and their usages. Besides information available on quality control of biopesticides and effect on pollinators are also well documented.

The book is planned to document some useful indigenous information on bio-intensive pest management. Utmost attention has been given to compile the information in easy and understandable language, practically applicable and comprehensive, therefore, shall create the interest among the readers like students, teachers, scientists and extension functionaries.

ABOUT THE EDITORS

Dr. O.P. Ameta is Professor and Head, Department of Entomology Rajasthan College of Agriculture (RCA), Maharana Pratap University of Agriculture and Technology (MPUAT), Udaipur. He has been engaged in Validation and Popularization of IPM Technology in cotton, spices and pulses. He has standardized the technology for the multiplication of Biopesticides viz.; Ha NPV, SI NPV and *Trichoderma*. He has guided seven Ph.D. and eight M.Sc. (Ag.) students. He has more than 200 publications including 100 research papers, popular articles, one book, one edited book, three technical booklets and leaflets etc. He was awarded University Best Teacher award 2004 for his outstanding contribution in teaching, research and extension.

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SCENARIO, STATUS AND SCOPE OF BIOPESTICIDE IN INDIAN AGRICULTURE

O.P. Ameta and M.K. Mahla*

1. Introduction

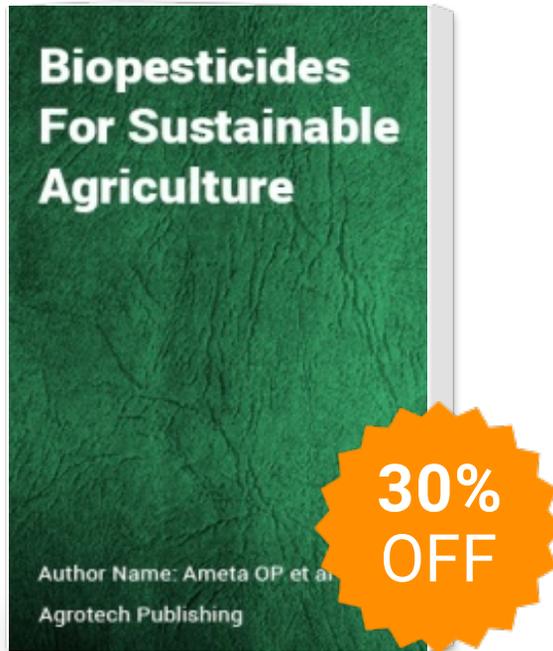
Indian agriculture suffers an annual loss of about Rs 863884 million due to insect pests (Dhaliwal *et al.*, 2010). The use of synthetic chemical pesticides has been used widely for reducing the crop loss caused by pests and diseases. More and more quantities of chemicals are used for agricultural intensification to feed an ever growing population. In fact, the pest induced loss is on the rise despite increasing usage of pesticides. Fortunately, realization of the negative effects of these chemicals on nature and natural resources like pollution, pesticide residue, pesticide resistance etc, have forced us to shift focus on more reliable, sustainable and environment friendly agents of pest control, the bio pesticides. In spite of the efficacy, the use of bio pesticides has remained very low due to a number of socio-economic, technological and institutional constraints. Rise in income levels due to a growing economy coupled with increasing awareness of health related effects of chemical pesticides, the demand of organic food has increased. Because of increasing demand and the government's efforts to mitigate adverse effects on climate, the biopesticides are considered as key components of Integrated Pest Management (IPM) programmes to reduce the load of synthetic chemical pesticides.

2. Definition of Bio pesticides

FAO Definition: A compound which kills organisms by virtue of

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