

MANAGEMENT METHODS OF INSECT-PEST

AMIT KUMAR PATEL
DR. TANMAY GHOSH
INDRAYANI GAWAS



Kripa Drishti Publications, Pune.

MANAGEMENT METHODS OF INSECT – PEST

Editors

Amit Kumar Patel

Assistant Professor,
Agriculture Entomology,
Dr. C. V. Raman University,
Vaishali, Bihar.

Dr. Tanmay Ghosh

Assistant Professor,
Department of Microbiology,
Dinabandhu Andrews College,
University of Calcutta.

Indrayani Gawas

Dr. Balasaheb sawant konkan krishi Vidyapeeth,
Dapoli.

Kripa-Drishti Publications, Pune.

Book Title: **Management Methods of Insect – Pest**

Editors By: **Amit Kumar Patel, Dr. Tanmay Ghosh,
Indrayani Gawas**

Price: ₹499

1st Edition

ISBN: **978-81-19149-03-2**



Published: **March 2023**

Publisher:



Kripa-Drishti Publications

A/ 503, Poorva Height, SNO 148/1A/1/1A,
Sus Road, Pashan- 411021, Pune, Maharashtra, India.

Mob: +91-8007068686

Email: editor@kdpublishations.in

Web: <https://www.kdpublishations.in>

© **Copyright Amit Kumar Patel, Dr. Tanmay Ghosh, Indrayani Gawas**

All Rights Reserved. No part of this publication can be stored in any retrieval system or reproduced in any form or by any means without the prior written permission of the publisher. Any person who does any unauthorized act in relation to this publication may be liable to criminal prosecution and civil claims for damages. [The responsibility for the facts stated, conclusions reached, etc., is entirely that of the author. The publisher is not responsible for them, whatsoever.]

PREFACE

Pest insects cause significant losses to food and fibre crops all over the world. They also transmit diseases to humans and domestic animals. The use of pesticides as the sole method of control has resulted in insect resistance as well as negative effects on human health, natural enemies, and the environment. In response to the negative effects of pesticides, the concept of integrated pest management (IPM) was developed nearly 60 years ago. Currently, IPM is a strong pest control paradigm all over the world. This chapter examines the history of IPM, its fundamental principles, decision-making rules, components, and primary tactical methods. Innovative tactical methods are discussed, including sterile insect technique (SIT), incompatible insect technique (IIT), and push-pull strategy. Furthermore, the implementation challenges and future prospects of IPM are highlighted.

An integrated survey of the biological foundation, principles, and methods of insect pest management, featuring representative papers by field leaders. Insect problems in agriculture are highlighted, with examples of developing programmes and techniques in the modelling, analysis, and application of insect pest management. Plant resistance, parasitoids, and the roles of diseases and insecticides in pest management are all covered. Extensive references and numerous practical examples of pest management usage are provided.

This book **Management Methods of Insect - Pest** covers pest outbreak monitoring and forecasting, yield loss and impact assessments, and all of the most recent methods for controlling and managing insects. It covers host manipulation, plant resistance, biological control, interference, agronomic precision control methods, and insecticides, as well as the socioeconomic and research management aspects of developing integrated pest management approaches.

This essential text is still required reading for students, researchers, and industry scientists involved in all aspects of insect pest management, applied entomology, crop protection, and medical and veterinary entomology.

CONTENT

1. Insect Pests of Pulse Crops - <i>Bismat un Nisa, Muneer Ahmad</i>	1
1.1 Introduction:	1
1.2 Chickpea:	4
1.2.1 Pest Complex:	4
1.2.2 Management:	9
1.3 Pigeonpea:	10
1.3.1 Pest Complex:	10
1.3.2 Integrated Pest Management:.....	16
1.4 Mungbean and Urdbean:.....	17
1.4.1 Pest Complex:	17
1.4.2 Integrated Pest Management (IPM) For Mungbean and Urdbean....	22
1.5. Lentil:.....	22
1.5.1 Pest Complex:	22
1.6. Field Pea:.....	23
1.6.1 Pest Complex:	23
1.6.2 Management:	24
1.7 Conclusions:	25
1.8 References:	25
2. Integrated Pest Management Strategies for Major Cereals - <i>Harmanpreet Kaur Gill, Vinay Kumar Mashkey, Diksha Choudhary</i>	28
2.1 Introduction:	28
2.2 Major Cereals:	31
2.2.1 Wheat:	31
2.2.2 Rice:	33
2.2.3 Maize:	34
2.3 Conclusion:	35
2.4 References:	35
3. Management Methods of Insect Pest of Field Crop - <i>Shradha Parmar, Maneasha, Dwarka</i>.....	37
3.1 Monitoring:	37
3.2 Biological Methods:	37
3.3 Cultural Control Practices:.....	38
3.3.1 Planting Time:.....	38
3.3.2 Seed Rate:	38
3.3.3 Plant Spacing:	38
3.3.4 Tillage:.....	39
3.3.5 Planted Diversity:.....	39
3.3.6 Inter Cropping:.....	39

3.3.7 Crop Rotation:	39
3.3.8 Sanitation:.....	39
3.3.9 Water Management:	40
3.4 Physical Method:.....	40
3.4.1 Moisture:	40
3.5 Mechanical Method:.....	40
3.5.1 Hand Picking:	40
3.5.2 Trapping:	40
3.5.3 Clipping Pruning and Crushing:	40
3.5.4 Exclusion by Screen and Barriers:	41
3.6 Legal Control:	41
3.7 Chemical Control:	41
3.8 Conclusion:	41
3.9 Reference:	41
4. Integrated Pest Management (IPM) of Stored Grain Pest - Priyanka Gupta, Versha Sharma.....	43
4.1 Introduction:.....	43
4.2 Stored Grain Pest and their Classification:	44
4.3 Methods of Integrated Pest Management of Stored Grain Pests:.....	45
4.3.1 Cultural methods:.....	45
4.3.2 Physical Methods:	46
4.3.3 Mechanical Methods:	48
4.3.4 Chemical Methods:	48
4.3.5 Biological Methods:	49
4.4 Conclusion:	54
4.5 References:.....	54
5. Methods and Approaches of Insect and Pest Management - Dr. Basu Maan Daas.....	59
5.1 Introduction:.....	59
6. Integrated Pest Management (A Shifting Paradigm in Pest Management of Pulses) - R. S. Jai kishan Singh, Vishal Sarsaiya, Jai Prakash Gupta, Swapnil Kumar Pandey	69
6.1 Introduction:.....	69
6.2 Yield Loss in Pulses:	70
6.3 Integrated Pest Management in Pulses:	71
6.4 Conclusion:	74
6.5 References:.....	74

7. Management Methods of Insect Pest of Field Crop (Rice) - <i>Bimal Kumar Sahoo, Abhilash Behera</i>	75
7.1 Introduction:	75
7.2 Management Methods of Different Pests of Rice:	76
7.2.1 Borers and Foliage Feeders:	76
7.2.2 Sucking Pests:	81
7.3 Conclusion:	85
7.4 References:	85
8. A Microbial Approach to Tea Pest and Disease Management - <i>Dr. Supriya Sonowal, Dr. Shyamal Kumar Phukon, Mr. Shantonu Paul</i>	86
8.1 Introduction:	87
8.2 Pesticide Usage Pattern in Tea Ecosystem, Their Retrospects and Alternative Measures:	87
8.3 Microbial Formulations:	88
8.4 Role of Entomopathogenic Fungi:.....	90
8.5 Use of EPF in Pest Management:	91
8.6 Conclusion:	91
8.7 References:	92
9. Integrated Management of European Red Mite, <i>Panonychus ulmi</i> (Koch) in Apple Orchards - Sangita Sharma	93
9.1 Introduction:	93
9.2 Food Plants:.....	94
9.3 Effect of Weather:	97
9.4 Conclusion:	99
9.5 References:	99
10. Insect-Pest of Chrysanthemum (<i>Dendranthema grandiflora</i>) - <i>Abdul Rahman M., Laishram Hemanta, Chhail Bihari, Greeshma Baby</i>	102
10.1 Introduction:	102
10.2 Black Aphid- <i>Macrosiphoniella sanborni</i> (Aphididae: Hemiptera):	102
10.3 Thrips- <i>Microcephalothrips abdominalis</i> (Crawford), (Thripidae: Thysanoptera):	104
10.4 Leaf miner, <i>Liriomyza trifolii</i> (Burgess), (Agromyzidae: Diptera):.....	104
10.5 Mites:	106
10.6 Leaf Folder (<i>Hedylepta indicata</i>) (Pyraustidae: Lepidoptera):	107
10.7 Bud Borer (<i>Helicoverpa armigera</i>): (Noctuidae: Lepidoptera):.....	108
10.8 References:	108
11. Insect Pest Management of Fruit Crops - Indrayani Gawas, O. S. Warang, Dr. M. M. Kulkarni	109

12. Insect Pest Management Methods of Plantation Crops - Indrayani Gawas, Dr. B. R. Salvi, Dr. Sumed Thorat	122
13. Insect Pest Management of Vegetable Crops - Indrayani Gawas, Dr. Y. R. Parulekar, Dr. B. R. Salvi	142
14. Integrated Pest Management under Changing Climate - Rahul Borah, Kasturi Sarmah, Sushruta Boruah, Devayani Sarmah	158
14.1 Introduction:.....	159
14.2 Effects of Climate Change on Insect/Pest:.....	160
14.3 Integrated Pest Management to Mitigate the Effects of Climate Change: ...	160
14.4 Conclusion:	163
14.5 References:.....	164
15. Tritrophic Interaction Influenced by Climate Change - Kasturi Sarmah, Sushruta Boruah, Devayani Sarmah, Rahul Borah	166
15.1 Introduction:.....	167
15.2 Effect of Elevated CO ₂ :.....	168
15.3 Effect Of Elevated Ozone	169
15.4 Other Pollutants:.....	169
15.5 Effect of Climate Change on Plant-Herbivore Interactions:.....	170
15.6 Effect of Climate Change on Natural Enemies:	170
15.7 Alteration in Plant Secondary Metabolites:	171
15.8 Climate Change Mitigation Strategies:.....	171
15.9 Conclusion:	172
15.10 References:.....	172
16. Management Methods of Insect Pest of Storage Grain Pest - N. Anandhabhairavi, S. Arivarasan, P. Jayapal, A. B. Sruthi	176
16.1 Introduction:.....	177
16.2 Stored Grain Insects:	177
16.3 Chemical Control:	179
16.3.1 Fumigation:.....	179
16.4 Physical Control:	179
16.4.1 Temperature, Heat, And Pressure Top of Form Top of Form:	179
16.4.2 Inert Dusts, Sands and Silica Aerogel:.....	180
16.4.3 Ionizing Radiation.....	180
16.5 Behavioral Control:	180
16.5.1 Insect Pheromones:	180
16.5.2 Insect Growth Regulators:	181
16.6 Microbial Control:	181
16.7 Cultural Control:.....	181
16.8 Biological Control:	182
16.9 Control by Natural Plant Products:.....	182

16.10 Conclusion:..... 183
16.11 References:..... 184

ABOUT THE EDITORS

Amit Kumar Patel, an alumni of Bundelkhand University, is an assistant professor of Agriculture Entomology at Dr. C.V. Raman University, Vaishali, Bihar. He has published 15 research papers in various NASS rated national as well as international journals, 12 popular articles, published 2 book chapters and presented papers in national and international seminars and conferences. He has got several awards including young Entomologist award, Young Achievers Award and Young Scientist Award and Best Oral Presentation Award.

Dr. Tanmay Ghosh, presently working as Assistant Professor, Department of Microbiology, Dinabandhu Andrews College, University of Calcutta. He completed his early study from Tarakeswar High School. He did B.Sc and M.Sc from University of Calcutta in the subject of Microbiology. He did his PhD degree from Department of biotechnology, NIT, Durgapur. He did his PhD degree from Department of biotechnology, NIT, Durgapur. He is now pursuing post doctoral degree (Doctor of Science, D.Sc) from University of California. His research as well as topic of interest on Agriculture, Microbiology, Seed Pathology and Environment. He has published book on medicinal plants. He is actively engaged in research activity having 65 scientific research articles in international reputed peer-reviewed journal, UGC approved journal and in Scopus listed journal, Springer, Elsevier. He awarded by several prestigious awards like best paper award on Agriculture, Life science, Environment and Biotechnology from International Seminar. He has published 25 international book chapter, has 6 international books written by him. He was awarded by "Hooghly Ratna" for research on Microbiology, Agriculture, Mycology and Bacteriology from Kumud Sahitya Mela. He is an active participant on all sorts of extension activities, regular giving his speech and act as a resource person in all India Radio, Television. He is an expert on organizing of National & International Seminars.

Indrayani Gawas, She has completed her Bsc in horticulture (2017), MSc. (2019) with 1st class In Plantation spices medicinal and aromatic crops and currently pursuing Ph.D. in university, Dr. Balasaheb sawant konkan krishi vidyapeeth Dapoli. She has also passed JRF and SRF exams conducted by ICAR. She has published five research papers in various NASS rated national as well as international journals, six popular articles, published four book chapters and more than seven abstracts in seminar and conferences. She has got six awards in various national and international conferences and seminars including young horticulturist award and best research scholar award, best oral presentation awards.



Kripa-Drishti Publications
A-503 Poorva Heights, Pashan-Sus Road, Near Sai Chowk,
Pune - 411021, Maharashtra, India.
Mob: +91 8007068686
Email: editor@kdpublishations.in
Web: <https://www.kdpublishations.in>

Price: ₹ 499

ISBN: 978-81-19149-03-2

