

EMERGING CHALLENGES IN AGRICULTURAL ENTOMOLOGY

EMERGING CHALLENGES IN AGRICULTURAL ENTOMOLOGY

Mr. Pankaj Kumar

Ph.D. Scholar (Entomology)
SVPUA&T, Modipuram, Meerut

Mr. Ashish Pal

Ph.D. Scholar (Entomology)
SVPUA&T, Modipuram, Meerut

Mr. Shivendra Singh Jadaun

P.G. Scholar (Entomology)
SVPUA&T, Modipuram, Meerut

Mr. Vimal Kanaujiya

Ph.D. Scholar (Entomology)
SVPUA&T, Modipuram, Meerut

Ms. Nandini Singh

Ph.D. Scholar (Entomology)
SVPUA&T, Modipuram, Meerut



ORBIT INK PUBLICATION

Kota, Rajasthan, India

Copyright © 2026 ORBIT INK PUBLICATION

Published by Orbit Ink Publication

First Edition: 2026

All Rights Reserved

No part of this book may be reproduced in any form, by photostat, microfilm, xerography, or any other means, or incorporated into any information retrieval system, electronic or mechanical, without the written permission of the publisher.

Product Form:

Digital download, online and hard bound

Edition:

ISBN: 978-81-686107-4-3

Head, Production (Higher Education and Professional) & Publishing Director

Dr. Jitendra Mehta

Product Manager

Aman Saxena

General Manager

Jaya Mehta

Graphic Designer

Avneet Kaur

Information contained in this work has been obtained by Orbit Ink Publication (India), from sources believed to be reliable. However, neither Orbit Ink Publication (India) nor its authors guarantee the accuracy or completeness of any information published herein, and neither Orbit Ink Publication (India) nor its authors shall be responsible for any errors, omissions, or damages arising out of use of this information. This work is published with the understanding that Orbit Ink Publication (India) and its authors are supplying information but are not attempting to render engineering or other professional services. If such services are required, the assistance of an appropriate professional should be required.

Office Address:

ORBIT INK PUBLICATION

Plot No. A-73, Shubh Aangan, Raipura, Kota,
Rajasthan-324004 India

Visit us at: <https://orbitink.vitalbiotech.org>

Contact No. +91-9784677044

Printed at: Orbit Ink Publication, Kota

Preface

Agricultural entomology is undergoing a period of rapid transformation as global agriculture confronts unprecedented challenges arising from climate change, invasive insect species, pesticide resistance, biodiversity loss, and evolving cropping systems. At the same time, advances in molecular biology, precision agriculture, artificial intelligence, remote sensing, and integrated pest management are reshaping the way insect pests are monitored and managed. These developments demand a multidisciplinary approach that integrates fundamental entomological knowledge with innovative and sustainable solutions.

Emerging Challenges in Agricultural Entomology has been written to provide students, researchers, educators, extension professionals, and practitioners with a comprehensive understanding of the current issues and future directions in agricultural entomology. The book presents recent advances in insect ecology, pest surveillance, host-pest interactions, biological control, insecticide resistance, climate change impacts, digital pest management, and environmentally sustainable crop protection strategies. Emphasis is placed on translating scientific knowledge into practical approaches that enhance agricultural productivity while safeguarding environmental and human health.

We hope this book serves as a valuable academic resource and inspires readers to develop innovative, resilient, and sustainable pest management strategies to address the evolving challenges facing global agriculture.

Mr. Pankaj Kumar

Mr. Ashish Pal

Mr. Shivendra Singh Jadaun

Mr. Vimal Kanaujiya

Ms. Nandini Singh

Date - 30/07/2026

CONTENTS

S. NO.		PAGE NO.
1.	Emerging Challenges in Agricultural Entomology: Current Status and Future Perspectives	1-10
2.	Climate Change and Shifting Insect Pest Dynamics in Agricultural Ecosystems	11-22
3.	Invasive Insect Pests: Global Spread, Biosecurity and Management Challenges	23-34
4.	Insecticide Resistance: Mechanisms, Monitoring and Resistance Management	35-46
5.	Emerging Technologies for Smart Insect Pest Surveillance and Forecasting	47-56
6.	Artificial Intelligence, Machine Learning and Precision Agriculture in Entomology	57-66
7.	RNA Interference (RNAi), CRISPR and Gene Editing for Sustainable Pest Management	67-76
8.	Nanotechnology-Based Innovations in Agricultural Entomology	77-88
9.	Biological Control Strategies: Emerging Biocontrol Agents and Conservation Approaches	89-100
10.	Pollinator Decline: Challenges, Conservation and Sustainable Crop Production	101-112

- 11. Plant-Insect-Microbiome Interactions and Their Role in Pest Management 113-124**
- 12. Digital Entomology: Remote Sensing, IoT, Drones and Decision Support Systems 125-132**
- 13. Emerging and Re-emerging Insect Pests in Field, Horticultural and Plantation Crops 133-144**