About The Editors



Dr. Awanindra Kumar Tiwari is currently working as Scientist- Plan Protection (Entomology) at KrishiVigyan Kendra, Raebareli of Chandra Shekhar Azad University of Agriculture and Technology, Kanpur, UP. He has completed his Ph.D. (Agril.Zoology and Entomology) from Department of Zoology, University of Allahabad, Prayagraj. He has 15 years' experience as Scientist. He obtained Excellence in Extension and Best KVK Scientist Award. He has published many National and International Research Papers, Books, Chapters and Popular Articles. Dr. Tiwari has vast experience and expertise in Agril. Entomology, Biological Control, IPM, Sodic Land

Reclamation, Organic Farming and Natural Farming. He has work experience, 4 years as Project Manager (A World Bank Funded Project- Uttar Pradesh Sodic Land Reclamation), 3 years as Block Development Officer and 8 years as Farm Manager.



Varsha soni, Born in Ratlam District of Madhya Pradesh. She has completed her B.Sc. Agriculture from RVSKVV University, Gwalior and M.Sc. (Agriculture) in Plant Pathology from RVSKVV University Gwalior. She is presently working as an Assistant Professor (Plant Pathology) in SAGE University, Indore, Madhya Pradesh. She has also contribute in govt project AC&ABC(MANAGE.) and drone technology training programme .She has contributed in many publications including articles, review papers, Book Chapter and blogs.



Dr. Abhisek Tripathy is working as an Assistant Professor in Plant Pathology at Faculty of Agricultural Science sunder Siksha 'O' Anusandhan University, BhubaneswarWithprofound excellence and a merit or ious academic record, he has completed his under-graduation fromKerala Agricultural University through ICAR- AIEEA-UG in 2015 with National Talent Scholarship (NTS) to his name. After wards, he has completed his Master's degree in Plant Pathology from Indira GandhiKrishiVishwavidyalaya, Raipurin2017 by securing meritorious rank in ICAR-AIEEA- PG Further more, he has completed his doctoral degree in Plant Pathology with a

specialization in Plant Bacteriology from Odisha University of Agriculture and Technology, Bhubaneswar. He has into his account several Peer-reviewed Research and Review papers published in acclaimed National and International Journals along with many Book chapter sand numerous Popular Articles and Booklets. He has several awards like "Young Plant Pathologist Award", "Young Professional Award", "Best Research Scholar Award", "Young Agriculturist Award" to his name from eminent societies across the states to his name. He has been part of meritorious scientific societies across India. He has qualified ICAR NET-2018. More over, he has attended several training programmes, workshops ,international and national conferences, symposiums, seminars across the borders. He has a great Contribution for Empowerment of YouthinAgriculture.



Dr. Siva Roopa Kumar KSD is working as an assistant professor in plant pathology at Sri Krishnadevaraya College of Horticultural Sciences (affiliated with Dr.YSRHU), Andhra Pradesh. In 2015, he completed his graduation in horticulture from Dr.Y.S.R. Horticultural University. He successfully completed his master's degree in plant pathology from Dr.Y.S.R. Horticultural University in 2017. He has qualified for the ICAR-AIEEA-PhD (SRF) 2017 entrance examination and completed his doctoral degree in plant pathology from Assam Agricultural University in 2023. He has qualified for ASRB-NET. His main emphasis of research in masters and doctoral degrees

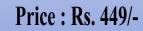
was on citrus diseases like citrus greening disease (HLB) and citrus tristeza virus (CTV). He also worked as a Junior Research Fellow (JRF) for two years under the DBT-Twinning project at Assam Agricultural University and ICAR-ACPV. He presented his papers at various national and international conferences. He has attended a ten-day national training program on metagenomics. He has contributed to research articles, conference papers,



Dr. Shivam Singh, Assistant Professor, Department of Plant Pathology, Narayan Institute of Agricultural Sciences, Gopal Narayan Singh University, Jamuhar, Sasaram, Bihar 821305. He has earned B.Sc. Ag. (Hons.) from Chandra Shekhar Azad University of Agriculture & Technology, Kanpur (U.P.) 208002 in 2017. He was granted M.Sc. (Ag.) and Ph.D. with specialization in Plant Pathology from Acharya Narendra Deva University of Agriculture & Technology, Kumarganj, Ayodhya (U.P.) 224229 in 2019 and 2023 respectively. He has published many Research Papers in reputed journals, Book Chapter, Hindi Popular Article, Abstract, Poster Presentation many more.

N D Global Publication House 31, Near Lakshmi Sagar Police Chowki Shahganj Haringtonganj Ayodhya Uttar Pradesh, Pin -224284, India.





Emerging Trends Plant Protection

지 ır Tiwa (Sai I | Shiv

vari, Varsha : i Durga Siva

rga Siva • Singh







Emerging Trends in Plant Protection

Editors: Awanindra Kumar Tiwari, Varsha Soni, Abhisek Tripathy, K Sai Durga Siva Roopa **Kumar and Shivam Singh**

Emerging trends in Plant Protection

EDITORS Awanindra Kumar Tiwari Varsha Soni Abhisek Tripathy K Sai Durga Siva Roopa Kumar Shivam Singh



ND GLOBAL PUBLICATION HOUSE

ND GLOBAL PUBLICATION HOUSE

ND Global Publication House 31, Near Lakshmi Sagar Police Chowki Shahganj Haringtonganj Ayodhya Uttar Pradesh, Pin -224284, India.



Head Office:- Murali Kunj Colony, Near Chandra Greens, Society, Transport Nagar, Mathura, Uttar Pradesh, Pin-281004, India.

MobileNo.:-9026375938



Price:- 449/-

© EDITORS 2024

All the chapters given in the book will be copyrighted under author. No Part of this publication may be re produced, copied or stored in any manager retrieval system, distributed or transmitted in any form or any means including photocopy recording or other electronic method. Without the written permission of author and publisher.

ISBN NO:- 978-81-969162-0-6

No Part of this work covered by the copyright hereon may be reproduced or used in any form or by any means- graphics, electronic or mechanical including but not limited to photocopying, recording, taping, web distribution, information, networks or information storage and retrieval system - without the written permission of the publisher.

• Only Mathura shall be the jurisdiction for any legal dispute.

Disclaimer: The authors are solemnly responsible for the book chapters compiled in this volume. The editors and publisher shall not be responsible for same in any manner for violation of any copyright act and so. Errors if any are purely unintentional and readers are requested to communicate the error to the editors or publishers to avoid discrepancies in future author.

PREFACE

Welcome to Plant protection is a vital aspect of agriculture and environmental stewardship. As the global population burgeons and climate change poses increasingly complex challenges, ensuring the health and productivity of crops becomes paramount. In recent years, there has been a noticeable shift in the approaches and technologies employed in plant protection, driven by advancements in science, technology, and evolving agricultural practices.

This volume on emerging trends in plant protection aims to provide a comprehensive overview of the innovative strategies, tools, and methodologies that are shaping the future of plant health management. From traditional practices to cutting-edge biotechnological solutions, this compilation explores the multifaceted landscape of plant protection, highlighting both established methods and novel approaches that promise to revolutionize the field.

The chapters contained herein cover a wide array of topics, ranging from integrated pest management and biocontrol to precision agriculture and genetic engineering. Each chapter delves into specific aspects of plant protection, offering insights into the latest research findings, practical applications, and future directions. By bringing together contributions from experts across various disciplines, this volume serves as a valuable resource for researchers, practitioners, policymakers, and students interested in advancing the sustainability and resilience of global agriculture.

As editors, we are deeply grateful to the contributors for their scholarly contributions and to the readers for their interest in this important subject. We hope that this volume will inspire further exploration, collaboration, and innovation in the field of plant protection, ultimately contributing to the achievement of food security, environmental conservation, and agricultural sustainability on a global scale.

Happy reading and happy gardening!

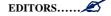


TABLE OF CONTENTS

S. N	CHAPTERS	Page No.
1.	Harnessing Natural Genetics Resistance ¹ Chandan Kumar Panigrahi, ² Gangadhara Doggalli, ³ P.Tejasree, ⁴ Ranjan kumar jena	1-31
2.	Genome Editing for Crop Protection ¹ Chetangouda G Patil, ² Kamini kaushal, ³ P.Tejasree, ⁴ Chandan Kumar Panigrahi	32-62
3.	RNA Interference and Plant Disease Control ¹ Uttej Karla, ² Gangadhara Doggalli, ³ P.Tejasree, ⁴ Chandan Kumar Panigrahi	63-82
4.	Micro-biome Manipulation for Plant-Health ¹ P.Thilagam, ² Shobharani M, ³ Ranjan kumar jena, ⁴ Bal veer Singh	83-104
5.	Biological Controls and Bio-pesticides ¹ Kavita kansotia, ² Dr.P.Thilagam, ³ Panthagani Venkata Koushik, ⁴ Dr. Vinayaka K. S	105-118
6.	Nano-technology for Pesticide Delivery and Pathogen Sensing S.Arul Diana Christie	119-135
7.	High- Throughput Phenotyping for Crop Protection ¹ Uttej Karla, ² Govardhan Lal Kumhar, ³ P.TEJASREE, ⁴ Chandan Kumar Panigrahi	136-154
8.	Precision Agriculture Technologies and Automated Pest Detection ¹ Purvi Tiwari	155-173
9.	Climate Change Impacts on Pest Pressure *P Bhumita	174-191
10	Chemical Pesticide Discovery and Rational Design <i>Rajkumari Padamini</i>	192-208