About The Editors



Dr. Anupam Kumar is Assistant Professor in the department of Plant Pathology, Abhilashi University Mandi Himachal Pradesh. He received B.Sc.(Hons.) Agriculture in 2016 from Banda University of Banda Uttar Pradesh,M.Sc (Plant Pathology) in 2018 & PhD. in 2022 from Sardar VallabhBhai Patel University of Agriculture and Technology, Meerut Uttar Pradesh.He has qualified National Eligibility Test (ASRB,ICAR) during 2019. He has published many research papers and technical articles in different journals.



Dr. P. Thilagam was born on 3rd January, 1980 in Dharmapuri District of Tamil Nadu. She is currently working as an Associate Professor (Agricultural Entomology) at Horticulture College and Research Institute, Paiyur located at Krishnagiri district, Tamil Nadu. She has bagged three gold medals for securing highest marks in Agricultural Entomology and Soil science and Agricultural chemistry during undergraduate Programme. Her research mostly spindled in the field of integrated pest management mostly on horticultural crops and in devising bio-rational strategies in Pigeon pea to combat major insect pests. She has published 31 research articles, 10 book chapters and 50 popular articles She also attended three national training programmes, eleven national and six international conferences in India. She also crowned with Best research and women scientist awards 2022.



Mr. Jagdeesh Kurmi is a Senior Technical Assistant (Group-B) in Department of Agriculture, Mahoba, Uttar Pradesh. He has completed his graduation from Jawaharlal Nehru Krishi Vishwa Vidyalaya, Jabalpur (MP). After graduation, he joined as an Assistant Technology Manager (ATM) in the Department of Agriculture, Block-Patera, District-Damoh (MP) and provided service up to 3 years. Later, he joined as a Technical Assistant (Group-C) Department of Agriculture, Mahoba, Uttar Pradesh in 2016 and promoted to senior post in 2022. During the service journey, he wrote and published numerous research articles, book chapterspopular articles and awarded by various National and International awards. He has vast experience about agricultural and allied crop management practices.



Naveen Kumar is working as Assistant Professor, Department of AgriculturalEntomology at National P.G. College Barhalganj, Gorakhpur. He is pursuingPh.D. in Agricultural Entomology from D.D.U. Gorakhpur University, Gorakhpur. He has received his education from Dr. B.R.A. University, Agra (M.Sc. Ag. Zoology & Entomology) and C.S.J.M. University, Kanpur (B.Sc. Agriculture). He has qualified ASRB-NET 2013 in Agricultural Entomology. He has vast experience of teaching and research in the field of Agricultural Entomology. He has published many research papers in reputed journals.



Dr. S.S. Bora at present working as Scientist- C in Indian Cardamom Research Institute, Research Division of Spices Board India, an autonomous organization under Ministry of Commerce, Govt. of India. Dr. Bora completed his M. Sc (Agri) and Ph.D. in Entomology from Assam Agricultural University, Jorhat with profound excellence. He had a wide experience in the field of Agriculture research and extension. He has more than 20 numbers of research papers on fundamental and applied nature and several review papers published in journals of National and International reputes along with many book chapters and popular articles. He is associated with several scientific societies in the field of agriculture and associated with several journals as

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





0

Plant Protection

Fundamentals

Anupam Kumar, P. Thilagam,

Jagdeesh Kurmi,

Naveen Kumar and S. S.

Bora

Fundamentals of Plant Protection





Editor : Anupam Kumar, P. Thilagam, Jagdeesh Kurmi, Naveen Kumar and S. S. Bora

Fundamentals of Plant Protection

Authors

Dr. Anupam Kumar

Assistant Professor Deptt. of Plant Pathology Abhilashi University Mandi Himachal Pradesh.

Mr. Jagdeesh Kurmi

Senior Technical Assistant (Group-B) Deptt. of Agriculture Mahoba, Uttar Pradesh

Mr. Naveen Kumar

Assistant Professor Department of AgriculturalEntomology National P.G. College Barhalganj, Gorakhpur

Dr. S. S. Bora

Scientist- C Indian Cardamom Research Institute, Research Division of Spices Board India Ministry of Commerce Govt. of India



ND GLOBAL PUBLICATION HOUSE

ND GLOBAL PUBLICATION HOUSE

N D 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.

Mobile No.:-9026375938

Email: <u>bsglobalpublicationhouse@gmail.com</u> Web: <u>https://bsglobalpublicationhouse.com</u>



Price:- 449/-

© Editors 2023

All the chapters given in the book will be copyrighted under editors. 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 editors and publisher. **ISBN NO:-** 978-81-968058-4-5

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.

Disclaimer: The authors are solemnly responsible for the book chapters compiled in this volume. The authors 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 authors or publishers to avoid discrepancies in future editions.

PREFACE

Welcome to the world of Fundamental of Plant protection, a vital realm where the health and productivity of our crops meet the challenges posed by pests, diseases, and environmental factors. This book, "Fundamentals of Plant Protection," is a comprehensive guide crafted to equip readers with the essential knowledge and skills required to safeguard our agricultural treasures.

As global populations burgeon and climate change introduces new complexities to our ecosystems, the need for sustainable and effective plant protection practices has never been more urgent. Whether you are a seasoned agronomist, a student embarking on a journey in agriculture, or an enthusiast eager to delve into the intricate world of plant health, this book aims to be your steadfast companion. In these pages, we traverse the fundamental aspects of plant protection, delving into the intricacies of soil health, crop selection, pest management, and the myriad factors that contribute to successful plant production. Our journey encompasses the latest innovations in technology, the wisdom of time-tested practices, and a conscientious approach toward environmental sustainability.

This endeavor is not merely an academic exploration but a call to action. Agriculture is not just about cultivating crops; it is about fostering a delicate balance between nature and human sustenance. The insights offered here are grounded in a commitment to responsible agriculture that meets the needs of the present without compromising the ability of future generations to meet their own needs. As the author, my aspiration is for this book to serve as a bridge between theory and practice, providing a foundation for sound decisionmaking in the field.

I encourage you to engage with the material critically, apply the knowledge gained, and contribute to the ongoing dialogue shaping the future of plant protection. I extend my gratitude to the educators, researchers, and practitioners whose collective wisdom has informed the content of this book. May it inspire curiosity, foster a deeper appreciation for the intricate web of plant life, and empower you to be a steward of sustainable agriculture.

Happy reading, and may your journey into the fundamentals of plant protection be both enlightening and transformative.



Dedicated to My Beloved







TABLE OF CONTENTS

S.N.	Chapters	Pages No.
1.	Biological Control: Present Status and Future Needs <i>Chandan Kumar Panigrahi¹ and Subhalaxmi Roy</i> ²	1-13
2.	An Insight into Plant Diseases A.D.V.R. Teja ^{1,*} and Vilas S. Wargane ¹	14-34
3.	Ecology of Invasive Insects *Anto Rashwin A. and A. Krishnaveni	35-53
4.	Crop Protection and Pest Management Kaushik Kumar Das ^{1,*} , SK MD Ajaharuddin ²	54-68
5.	Insect Pathology Chandan Kumar Panigrahi ¹ and Debashree Sarangi ²	69-79
6.	Advancement of Detecting Plant Diseases Mr. Chandan Kumar Panigrahi ¹ and Ms. Madhumita Behera ²	80-89
7.	Integrated Pest Management *Anto Rashwin A. and Joel Sanjeeth I.	90-103
8.	Principles of Plant Disease Management K. Rajesh ¹ , Ragiman Sreenath ¹	104-119
9.	Enhancement and Modernization guidelines for Plant Quarantine Facilities in India <i>Reguri Divya Reddy</i> ¹ <i>and Dr. Anoorag R. Tayde</i> ²	120-133
10.	The role of biological control in pest management ¹ Sarvendra Singh, ² P.Thilagam, ³ Almaszabeen Badekhan, ⁴ Senthilraja N	134-162
11.	Plant – Fungal Interactions: Mycorrhizae and Pathogens <i>Rajbala Yadav¹, Ajay Kumar¹</i> *	163-181