

Environment at Crossroads

Challenges and Green Solutions

Prof. Arun Arya

Head (Retd.)
Department of Environmental Studies
The Maharaja Sayajirao University of Baroda
Vadodara

Dr. Pradipta Kumar Basu
OFFICER IN CHARGE, W.B.E.S.
Government General Degree College, Mangalkote
Dt. Purba Bardhaman, West Bengal- 713132



Published by

SCIENTIFIC PUBLISHERS (INDIA)

5 A, New Pali Road
P.O. Box 91
Jodhpur - 342 001 INDIA
E-mail: info@scientificpub.com
Website: <http://www.scientificpub.com>

All rights reserved. No part of this publication or the information contained herein may be reproduced, adapted, abridged, translated, stored in a retrieval system, computer system, photographic or other systems or transmitted in any form or by any means, electronic, mechanical, optical, digital, by photocopying, recording or otherwise, without written prior permission from the publisher. Any breach will attract legal action and prosecution without further notice.

Disclaimer: While every effort has been made to avoid errors and omissions, this publication is being sold and marketed on the understanding and presumption that neither the editors (or authors) nor the publishers nor the printers would be liable in any manner whatsoever, to any person either for an error or for an omission in this publication, or for any action to be taken on the basis of this work. Any inadvertent discrepancy noted may be brought to the attention of the publisher, for rectifying it in future editions, if published.

This book contains information obtained from authentic and highly regarded sources. Reasonable efforts have been made to publish reliable data and information, but the editors and publisher cannot assume responsibility for the validity of all materials or the consequences of their use. The editors and publisher have attempted to trace and acknowledge the copyright holders of all material reproduced in this publication and apologize to copyright holders if permission and acknowledgement to publish in this form have not been obtained. If any copyright material has not been acknowledged please write and let us know so that we may rectify it.


Trademark Notice: Publications or corporate names may be trademarks, and are used only for identification and explanation in bonafide intent without intent to infringe.

ISBN: 978-93-89184-93-8 (Hard back)

978-93- (E-book)

© 2020, Author

Printed in India


Dr. Pradipta Kumar Basu
OFFICER IN CHARGE, W.B.E.S.
Government General Degree College, Mangalkote
Dt. Purba Bardhaman, West Bengal- 713132



Contents

Foreword

Preface

A : Environmental Pollution and Microbes

1. Use of fast growing white wood rotting fungus *Ganoderma lucidum* (L.) Karst. for Cultural and Bioremediation Studies
— Arun Arya, Chitra Arya and Pradyut Dhar 1
2. A look into dark side of fungal agents : Researches on Human Diseases
— Varsha Raimalani and Brinda Panchamia 10
3. Occurrence of Fungal endophytes in the leaves of three *Terminalia* spp.
— Pradyut Dhar and Arun Arya 24
4. Role of microbes in Biodeterioration of Museum objects in Gujarat
— Arun Arya 32
5. Effect of cement dust pollution on the colonization of leaf surface microorganisms
— Arun Arya and Ankita Bhatt 40
6. Studies on seed borne diseases of *Cicer arietinum* (Chick pea) and trials with fungus *Trichoderma* as bio control agent against *Fusarium* sp.
— Niharika Nema and Arun Arya 47
7. Integrated Management of bakanae disease in Basmati Rice
— Anuja Gupta and Ravindra Kumar 55
8. Response of selected endophytic fungi to different abiotic stresses isolated from *Syzygium cumini* of eastern Uttar Pradesh, India
— Sharma V.K., Kumar J., Singh D.K., Mishra A., Gond S.K., Verma S.K., Kumar A., Singh and Kharwar R.N. 71
9. Status of Aeromycoflora and Aeroallergens in the Vadodara City
— Bablu Prasad and Arun Arya 91

B: Climate Change and Sustainable Development

10. Effect of Fluorspar mining waste on germination and Plant Growth of *Zea mays* and *Vigna radiata*
— Disha Thakkar and Arun Arya 101
11. Toxicological potentials of heterogenous chemical mixtures
— Kauresh D. Vachhrajani and Kiran Morya 112
12. Organic Farming a new way to increase the Basmati Rice Production
— Shakuntala E. Pillai and Ravinayak Patlavath 128
13. Intelligent traffic and fast transport system to reduce vehicular pollution in urban areas
— Arun Arya 140
14. Be aware of Pollen, Fungal and Food Allergens
— V.M. Raole 147
15. Allelopathic effects of *Sesamum indicum* L. on *Cyperus rotundus* L.
— N.B. Singh and Sunaina 168
16. Clean up Strategy for the River Vishwamitri
— V.S. Patel 178
17. Removal of copper (II) from aqueous solution by using CSCMQ
— Priti U. Shah, Nirav Raval and Hitesh Solanki 191
18. The role of polyamines during environment associated stresses in plants
— Manisha Farsodia and Sunil Kumar Singh 218

C: Environmental Problems and Solutions

19. Forests and Biodiversity Conservation A Religious Perspective
— Prof. S.D. Sabnis 233
20. Role of *Casuarina* in soil conservation along sea coast of Gujarat
— Shalini Ojha 236
21. Essential oils as next generation fungicides: Contrivances and Challenges
— Akash Kedia, A.K. Dwivedy and Nawal Kishore Dubey 249

Dr. Pradipta Kumar Basu
OFFICER IN CHARGE, W.B.E.S.
Government General Degree College, Mangalkote
Dt. Purba Bardhaman, West Bengal- 713132



<i>Contents</i>	<i>ix</i>
22. Threatened and Endemic plant diversity of India	
— <i>M. Daniel and P.S. Nagar</i>	262
23. Endangered animals of Gujarat and their conservation	
— <i>Ankita Bhatt and Neha Singh</i>	273
24. Yagna an Ancient Indian Tradition for keeping environment clean	
— <i>Arun Arya and Chitra Arya</i>	281
25. Surface Modified Magnetic Nanoparticles: A New Generation of Nanoadsorbents for Facile Remediation Protocols	
— <i>Monika Yadav, Manita Das, Sonal Thakore and Rajendrasinh N. Jadeja</i>	291
Subject Index	312


Dr. Pradipta Kumar Basu
OFFICER IN CHARGE, W.B.E.S.
Government General Degree College, Mangalkote
Dt. Purba Bardhaman, West Bengal- 713132



Chapter - 21

Essential oils as next generation fungicides: Contrivances and challenges

Akash Kedia¹, Abhishek Kumar Dwivedy² and Nawal Kishore Dubey²

¹Department of Botany, Government General Degree College at Mangalkote, P.O. Khudrun, Burdwan-713174, W.B., India

²Center of Advanced Study in Botany, Banaras Hindu University, Varanasi-221005, U.P., India

Corresponding author- mail: nkubeybhu@gmail.com

ABSTRACT

Essential oils (EOs), the volatile aromatic oily liquids from higher plants are easily extracted by steam/hydro distillation and contain many low-molecular-weight terpenes and phenolics. Many EOs showed a broad spectrum of antifungal activity against various plant pathogenic fungi promoting their future application as plant based fungicide. Recent investigations pointed that some chemical constituents of these oils inhibit the synthesis of ergosterol in fungi, making them effective antifungal agents. As this target site is confined to fungi and is not shared with other groups, most EO chemicals are relatively non-toxic to mammals in toxicological tests, fulfilling the criteria for “reduced risk” fungicides. Further, many EOs and their components are already registered as safe and are widely used as flavoring agents in foods and beverages. This special regulatory status combined with the wide availability of EOs, can be convinced into fast-track commercialization of EO-based fungicides. Meanwhile, the issue of resistance development against many synthetic fungicides can further be minimized by using EOs owing to the complex mixture of constituents of EO. Ultimately, these “green fungicides have the greatest impact in development of “next generation fungicides” due to their safety to non-target organisms and the environment.

Keywords: Antifungal, essential oil, fungicide, safe.

INTRODUCTION

Fungi cause enormous loss to agricultural products both in the field and storage conditions throughout the globe. Success in reducing the damage of agricultural properties caused by fungi depends greatly on the timely application of fungicides. Chemical control through synthetic fungicides is the most prevalent



Dr. Pradipta Kumar Basu
OFFICER IN CHARGE, W.B.E.S.
Government General Degree College, Mangalkote
Dt. Purba Bardhaman, West Bengal- 713132

