

SEED BORNE DISEASES ECOFRIENDLY MANAGEMENT

Editors

Dr. Arun Arya

Professor in Botany and Co-ordinator Seed Technology Programme,
Botany Department, Faculty of Science
The Maharaja Sayajirao University of Baroda,
Vadodara - 390 002, India

Dr. Cecilia Ines Monaco

Asstt. Professor
Faculty of Agriculture & Forestry
National University of La Plata,
Provincia de Buenos Aires
Argentina



SCIENTIFIC PUBLISHERS (INDIA)

P.O. BOX 91

JODHPUR

Published by:

Scientific Publishers (India)

5-A, New Pali Road, P.O. Box 91

Jodhpur - 342 001

E-mail: info@scientificpub.com

www.scientificpub.com

Print: 2012

ISBN: 978-81-7233-783-4

© Arya & Monaco, 2007

Lasertype set: Rajesh Ojha

Printed in India

PREFACE

The initial handful of seeds obtained from selected individual plants of a particular variety, for the purpose of purifying and maintaining that variety, by the originating plant breeder and its further multiplication under his own supervision is very essential. Seed deterioration is a major problem in different parts of the world. India being primarily an agrarian country suffers from various fungal, bacterial, viral pathogens and insect pests. The losses become manifold when environmental conditions are favourable. The damage to the seeds can be controlled by proper storage conditions and collecting seed in healthy condition. Fungal diseases like rusts and smuts are within control by adoption of modern technologies but a greater effort is required to make these control measures more effective. The most significant change in the field of Plant Protection Research during the last two decades is the emphasis on non-conventional methods of plant protection. Efforts are on to introduce novel concepts in microbial ecology and agricultural biotechnology. The eminent Indian scientist Dr. Y.L. Nene (1999) said, "Since the time humans practiced crop husbandry, they must have been conscious of the importance of seed". Documents supporting such awareness are listed in holly books for Hindus *i.e.* Vedas and Puranas :

**Om annpate anyasya no dehi anmivashyah sushminah.
Pra pra dataram tarish urjam no dhehi dwipade chatushpade.**

Yajur 11-83

Good food is very essential for the progress of any country, the prayer says "O Lord of food! may you provide stimulating and non-injurious food to us. May you increase the bestower in wealth. May you provide food and energy to our men and animals." India's food grain production will have to touch 490 million tones in another 20 years against the 200 million tonnes it produces today. Thus India will have to replicate green revolution, which is possible by introduction of genetically modified crops and reducing the post harvest losses by different methods including ecofriendly management.

Growers loose crops like potato, onion and garlic as well as various fruits due to their high water content. Increasing the water content of tissue leads to susceptibility caused by soft rot pathogens. The pectic substances may

differ considerably in composition and these may affect susceptibility of composition. The structure of pectic substances determines the cell wall consistency. Calcium, Boron and growth regulator may alter their susceptibility to attack. Parenchyma may contain inhibitors of pectic enzymes which may retard or prevent degradation of pectic substances in the cell walls.

The present book **Seed-borne diseases: Eco-friendly management** is a compilation of 20 different chapters written by experts in the field. We thank all the authors for contributing their articles in a very short time. The book covers pests like insects, aphids, sucker thrips, and mites etc. besides damage caused by fungal, bacterial and viral pathogens. The authors have tried to explain that besides biotechnological approaches like production of GM crops there are various methods which should be used as an integrated approach to control seed borne and seedling diseases. We take this opportunity to thank all the contributors for giving their valuable papers and hope that the book will be useful to researchers, progressive farmers and all those involved in seed industry to maintain good quality of seeds. We thank to the staff of the Botany Department for assisting in compilation of the book, particularly Mrs. R. Titus for typing some papers. We thank Shri Pawan Kumar to take up this project and publish the volume nicely.

ARUN ARYA
CECILIA MONACO

LIST OF CONTRIBUTORS

Arun Arya (1,16,18)

Department of Botany, Faculty of Science,
The Maharaja Sayajirao University of Baroda
Vadodara – 390002, India.
Email:aryaarunarya@rediffmail.com

Arya Chitra (16)

Department of Botany, Faculty of Science,
The Maharaja Sayajirao University of Baroda,
Vadodara – 390002, India.

Bharathi, A. (5)

Department of Seed Science and Technology,
TNAU, Coimbatore, (Tamil Nadu) India.

Chakrabarti. S.K. (3)

Central Potato Research Institute,
Shimla (H.P.) India

Chandel Sunita (19)

Department of Mycology and Plant Pathology
Dr. Y. S. Parmar University of Horticulture
and Forestry
Solan- 173230 (H.P.) India

Chauhan Praveen (7)

Department of Botany and Microbiology
Gurukula Kangri University,
Hardwar-249404 (Uttaranchal) India

Choudhary A. K. (14)

University Department of Botany,
T. M. Bhagalpur University,
Bhagalpur-812007. (Bihar) India

Dal Bello Gustavo (2)

Comision de Investigaciones Cientificas
de ls provincia de Buenos Aires,
CIDEFI- Facultad de Ciencias Agrarias
Y Forestales 60y119, (1900) La Plata,
Argentina

Gupta A.K. (10)

Department of Mycology and Plant Pathology,
Dr. Y.S. Parmar University of Horticulture
and Forestry,
Nauni, Solan- 173230 (H.P.) India

Gupta Anuja (11)

Indian Agriculture Research Institute
Regional Station,
Karnal- 132001 (Haryana) India

Kaushik P. (7)

Department of botany and Microbiology
Gurukula Kangri University,
Hardwar-249404 (Uttaranchal) India

Khurana S. M. Paul (3)

Central Potato Research Institute,
Shimla (H.P.) India

Maheshwari V.K (11)

Indian Agriculture Research Institute
Regional Station,
Karnal- 132001 (Haryana) India

Monaco Cecilia (17, 20)

Centro de Investigaciones de Fitopatologia
(CIDEFI), Facultad de Ciencias Agrarias y
Forestales, Universidad Nacional de La Plata
60y119, 1900 La Plata, Provincia de Buenos
Aires, Argentina.

Parmeswari K. (5)

Department of Seed Science and Technology,
Tamil Nadu Agriculture University (TNAU)
Coimbatore, (Tamil Nadu) India

Pattanayak D. (3)

Central Potato Research Institute (CPRI)
Shimla (H.P.) India

Perello Analia (20)

Centro de Investigaciones de Fitopatología (CIDEFI), Facultad de Ciencias Agrarias y Forestales, Universidad Nacional de La Plata 60y119, 1900 La Plata, Provincia de Buenos Aires, Argentina.

Pradeep A.G.(8)

Department of Studies in Applied Botany and Seed Pathology, University of Mysore, Manasagangotri, Mysore-570006 India

Rai V. Ravishankar (8, 13)

Department of Studies in Applied Botany and Seed Pathology, University of Mysore, Manasagangotri, Mysore-570006 (Karnataka) India

Ravichandran G. (5)

Central Potato Research Institute Ooty, Nilgiris (Tamil Nadu) India

Sasikala K (9)

Tamil Nadu Rice Research Institute Aduthurai – 612101 (Tamil Nadu) India

Sharma Neeta (4)

Botany Department, Lucknow University, Lucknow – 226007 (U.P) India

Sharma R.C. (10)

Department of Mycology and Plant Pathology, Dr. Y. S. Parmar University of Horticulture and Forestry, Nauni, Solan- 173230 (H.P.) India

Sharma Y.P.

Department of Botany University of Jammu, Jammu-180006, India.

Sindhu Jagveer (6)

Asia and Pacific Seed Association (APSA) P.O. Box 1030, Kasetsart Post office, Bangkok 10903, Thailand. Email: apsa@apsaseed.com

Sinha K.K (14)

University Department of Botany, T.M. Bhagalpur University, Bhagalpur- 812007 (Bihar) India

Sisterna Marina (2)

Comision de Investigaciones Cientificas de la provincia de Buenos Aires, CIDEFI- Facultad de Ciencias Agrarias Y Forestales 60y119, (1900) La Plata, Argentina

Sumbali Geeta

Department of Botany University of Jammu, Jammu-180006, India.

Thippeswamy G. (13)

Department of Studies in Applied Botany and Seed Pathology, University of Mysore, Manasagangotri, Mysore-570006 (Karnataka) India

Tomar Manica (19)

Department of Mycology and Plant Pathology, Dr. Y. S. Parmar University of Horticulture and Forestry, Nauni, Solan- 173230 (H.P.) India

Tripathi Pramila (12)

Department of Botany, Banaras Hindu University, Varanasi. (U.P.) 221005 India

Vanangamudi K. (5)

Adhiparasakthi Agricultural College Kalavai, Vellore, Tamil Nadu

CONTENTS

<i>Preface</i>	<i>iii</i>
<i>List of Contributors</i>	<i>v</i>

Part I

SEED BORNE DISEASES: ECOFRIENDLY MANAGEMENT

1. Need for an eco-friendly alternative to manage seed borne diseases		
	— <i>Arun Arya</i>	1
2. Natural plant extracts : an alternative control of seed borne fungi		
	— <i>Marina Sisterna and Gustavo Dal Bello</i>	15
3. Engineering disease resistance : a paradigm shift in plant disease management		
	— <i>S. M. Paul Khurana, S. K. Chakrabarti and D. Pattanayak</i>	37
4. Complexity of stored grain ecosystem		
	— <i>Neeta Sharma</i>	57
5. Use of Botanicals in seed storage		
	— <i>K. Vanangamudi, A. Bharathi, K. Parameswari and G. Ravichandran</i>	71
6. Harmonization of Phytosanitary regulations in Asia		
	— <i>Jagveer Sindhu</i>	93
7. Biopesticides, A scenario in India : Present and future scope		
	— <i>P. Kaushik and P. Chauhan</i>	99

-
8. Eco-friendly measures to safeguard farmers saved seeds from fungal pathogens
— *V. Ravishankar Rai and A.G. Pradeep* 131
9. Seed treatment techniques for quality seed production of rice cv. CR1009 in semi dry condition
— *K. Sasikala* 137
10. Effect of seed borne mycoflora on health of conifer seeds and its ecofriendly managements
— *A.K. Gupta and R.C. Sharma* 145
11. Integrated management of loose smut disease of wheat caused by *Ustilago segatum*
— *Anuja Gupta and V.K. Maheswari* 163
12. Biologicals and biorationals in the managements of agricultural insect pests - An eco-friendly approach
— *Pramila Tripathi* 171
13. Evaluation of the efficacy of bio-pesticides on seed mycoflora and seedling quality of some oil seed crops
— *V. Ravishankar Rai and G. Thippeswamy* 191
14. Formulation of wild plant extracts for the biological control of crop diseases
— *K.K. Sinha and A.K. Choudhary* 199
15. Pre and post harvest seed spoilage of cereals and prevalence of mycotoxin contamination
— *Y.P. Sharma and Geeta Sumbali* 215
16. Proper storage conditions for maintaining seed viability and germination of certain leguminous tree seeds
— *Chitra Arya and Arun Arya* 239

Part II

STUDIES ON CONTROL OF WILT AND FOLIAR DISEASES

17. Nonpathogenic *Fusarium* isolates from Carnation suppressing wilt caused by *F. oxysporum* f. sp. *dianthi*
— *Cecilia Monaco* 249

18. Soil solarization to control wilt disease of pigeon pea	
	— Arun Arya 265
19. Eco-friendly approaches in the management of <i>Fusarium oxysporum</i> f.sp. <i>gladioli</i> responsible for corm rot and wilt in gladiolus.	
	— Sunita Chandel and Manica Tomar 271
20. Status and progress of biological control of wheat foliar diseases in Argentina	
	— Analia E. Perello and Cecilia Monaco 283
Subject Index	323

Part I

**SEED BORNE DISEASES:
ECOFRIENDLY MANAGEMENT**

