

R.N. Kharwar · R.S. Upadhyay  
N.K. Dubey · Richa Raghuwanshi *Editors*

# Microbial Diversity and Biotechnology in Food Security

# Microbial Diversity And Biotechnology In Food Security

**Jen-Tsung Chen**



## **Microbial Diversity And Biotechnology In Food Security:**

**Microbial Diversity and Biotechnology in Food Security** R.N. Kharwar, R.S. Upadhyay, N.K. Dubey, Richa Raghuwanshi, 2014-06-11 The roles of microbes in agriculture industry and environment have been the point of interest since long time for their potential exploitation Although only a fraction of microbial diversity was accessed by microbiologists earlier for harnessing them owing to limited techniques available The molecular techniques have opened new vistas to access the wide field of the unexplored microbes and their exploitation for useful genes and novel metabolites Sincere efforts have been made in biotechnology using microbes leading to improve our life with respect to agriculture and people health This comprehensive volume covers different aspects of microbial biotechnology and its management in sustainable agriculture for food security and improved human health The book comprises four sections Endophytes and Mycorrhizae Microbial Diversity and Plant Protection Microbial Functions and Biotechnology and Microbes and the Environment which contain 53 chapters The book examines the aspects on endophytes and mycorrhizae bioactive compounds growth promoting microorganisms disease management with emphasis on biocontrol genetics of disease resistance microbial enzymes advances in potential of microbes and their industrial as well as pharmaceutical applications In addition the use of botanicals and the etiology and management of medicinal and aromatic plants in the post harvest management have been reviewed in greater depth for the benefit of teaching and research community The biotechnological developments using microbe potential have enabled us combat the environment and human health problems worldwide in ecofriendly manner We are sure that this volume will be highly useful to all those concerned with fungi bacteria viruses and their biology including environmental and public health officers and professionals in the field of interest The volume is an exhaustive coverage of almost all the aspects of microbial biology and biotechnology     *Diversity and Benefits of Microorganisms from the Tropics* João Lucio de Azevedo, Maria Carolina Quecine, 2017-06-10 This book addresses the diversity of tropical microorganisms and its applications in agriculture renewable energy production and environmental protection It covers several tropical habitats such as rain forests mangroves sea and river waters and describes how microorganisms isolated from these regions can be used to control insects and plant diseases to improve sugar cane and biofuels production among other applications The book also aims to bring researchers attention to the potential of tropical microorganisms for biotechnological purposes an area that is still far from being well explored     **Microbial Applications for Environmental Sustainability** Arun Karnwal, Abdel Rahman Mohammad Said Al-Tawaha, 2024-05-13 This book focuses on the various applications of microorganisms for sustainable environment and the reduction of hazardous pollutants released in various forms including xenobiotics e waste pesticides insecticides plastic heavy metals paper waste medical waste textile dyes and their impact on environmental and human health The book involves a series of research reports that explain the application of microbes used to solve real life issues raised due to changes happening in environment including pollution by covering applications including the use of bacteria fungi microalgae and

biofilm in the detection and degradation of crude oil pesticides dyes e waste heavy metals and other pollutants It also focuses on integrative strategies in the application of microbial nanomaterials for remediation of pollutant This material will help environmental scientists and microbiologists to learn about existing environmental problems and suggest novel ways to control or contain their effects by employing various treatment approaches

**Beneficial Microbes for Sustainable Agriculture and Environmental Management** Jeyabalan Sangeetha,Devarajan Thangadurai,Saher Islam,2020-03-27

Microbes are the most abundant organisms in the biosphere and regulate many critical elemental and biogeochemical phenomena Because microbes are the key players in the carbon cycle and in related biological reactions microbial ecology is a vital research area for understanding the contribution of the biosphere in global warming and the response of the natural environment to climate variations The beneficial uses of microbes have enabled constructive and cost effective responses that have not been possible through physical or chemical methods This new volume reviews the multifaceted interactions among microbes ecosystems and their pivotal role in maintaining a more balanced environment in order to help facilitate living organisms coexisting with the natural environment With extensive references tables and illustrations this book provides valuable information on microbial utilization for environmental sustainability and provides fascinating insights into microbial diversity Key features include Looks at enhancing plant production through growth promoting arbuscular mycorrhizae endophytic bacteria and microbiome networks Considers microbial degradation and environmental management of e wastes and azo dyes Explores soil plant microbe interactions in metal contaminated soils Examines radiation resistant thermophiles for engineered bioremediation Describes potential indigenous effective microbes for wastewater treatment processes Presents research on earthworms and microbes for organic farming

Fungal diversity, ecology and control management Vijay Rani Rajpal,Ishwar Singh,Shrishail S. Navi,2022-06-02 This edited volume provides comprehensive and latest information on the fungal biodiversity in its morphological characters bioactive molecules pathogenicity and virulence and its impacts on crop production and sustainable management of agricultural productivity towards resolving global food security issues The increasing number of infectious fungal diseases are regarded as threats to agricultural productivity and global food security The efforts done by scientists to inventories the fungal diversity and identification of fungal species contributing as pathogens towards many plant and human diseases have been compiled in the present volume The identification of the potential fungal pathogens is a prerequisite for an effective disease control management program Also important is to understand the complex interactions between the host pathogen and the environment The book dwells on insights on the aforementioned aspects The book also includes articles on ecological significance of fungi and fungal antagonists used as biocontrol agents on other pathogens This compilation is useful to scientists working in similar areas as well as to undergraduate and graduate students keen on getting updated information on the subject Scientists involved in agricultural research crop management and industries that manufacture agrochemicals may also find it useful read

Recent Advances in Postharvest Technologies, Volume 1 Nouredine Benkeblia, 2024-09-09 The elapsing time from producer to consumer has significantly increased as a result of food marketing and trade globalization. Consequently, maintaining quality along the food value chain is becoming a significant challenge. Postharvest losses are considered a major component of food loss and waste in the supply chain from farmers to consumers due to improper handling, storage, transport, preservation techniques, and spoilage. Postharvest science aims to extend the shelf life of fresh and perishable commodities and to reduce heavy losses, thereby contributing to food security. While significant progresses have been made in postharvest preservation and shelf life extension, the continuous development of emerging technologies has changed our vision on postharvest science. Furthermore, recent advancements in molecular engineering of horticultural crops for quality improvement, the development of genomics, transcriptomics, proteomics, and metabolomics have led to a better understanding of the physiology and the biochemistry of the senescence processes, resulting in better preservation and improved production of fresh crops. This two-volume work focuses on innovative technologies that extend and preserve shelf life of fruits and vegetables. Volume 1 offers a review on the state of the art modern technologies in the postharvest field. The accompanying Volume 2 explores advanced and novel technologies after harvest, particularly the application of nanotechnologies to packaging materials.

**Applications of Biotechnology for Sustainable Development** Kunal Mukhopadhyay, Ashish Sachan, Manish Kumar, 2017-10-06 This book discusses different bioprocesses to produce value-added compounds, the science behind their production, the economics of their introduction to the marketplace, their environmental impacts, and their implications for world agriculture. It also provides insights into various technologies and protocols used. The major strength of biotechnology is its multidisciplinary nature and broad range of scientific approaches. Recent advances in various biotechnological fields are facilitating the production of fine chemicals, recombinant proteins, biomaterials, and pharmaceuticals. Biotechnology plays an important role, especially in the fields of food production, renewable raw materials, and energy, pollution prevention, and bioremediation. Biotechnology's greatest contribution is in agriculture, in making crops more efficient. Resource recovery, recycling, and hazardous waste disposal are other environmentally beneficial facets of biotechnology. Thus, biotechnology is a pivotal tool for sustainable development, which has become a priority for the world's policy makers. The concept of sustainable development is based on the goal of increasing the basic standard of living of the world's growing population without depleting finite natural resources and degrading the environment. Emerging biotechnologies offer novel approaches with the potential to achieve the goal of sustainability and striking a balance between developmental needs and environmental conservation.

Microorganisms for Sustainable Environment and Health Pankaj Chowdhary, Abhay Raj, Digvijay Verma, Yusuf Akhter, 2020-07-21 Microorganisms for Sustainable Environment and Health covers hazardous pollutants released from natural as well as anthropogenic activities and implications on environmental and human health. This book serves as a valuable source of basic knowledge and recent developments in the clean technologies.

and pollution associated diseases and abnormalities in the context of microorganisms Focused on current solutions to various environmental problems in the field of bioremediation it provides a detailed knowledge on the various types of toxic environmental pollutants discharged from different sources their toxicological effects in environments humans animals and plants as well as their biodegradation and bioremediation approaches This book helps environmental scientists and microbiologists learn about existing environmental problems and suggests ways to control or contain their effects by employing various treatment approaches Provides information on waste treatment approaches using microbes Includes applications in biofuel and bioenergy production Covers green belt development hydroponics phytoremediation wetland treatment technology and common effluent treatment plants CETPs Discusses dissemination of antibiotic resistance among pathogenic microbes and strategies to combat multi drug resistance MDR

**Relationship Between Microbes and the Environment for Sustainable Ecosystem Services, Volume 1** Jastin Samuel,Ajay Kumar,Joginder Singh

Panwar,2022-05-18 Relationship Between Microbes and Environment for Sustainable Ecosystem Services Volume One Microbial Products for Sustainable Ecosystem Services promotes advances in sustainable solutions value added products and fundamental research in microbes and the environment Topics include advanced and recent discoveries in the use of microbes for sustainable development Users will find reference information ranging from the description of various microbial applications for sustainability in different aspects of food energy the environment and social development Volume One includes the direct and indirect role of bacteria fungi actinomycetes viruses mycoplasma and protozoans in the development of products contributing towards sustainable The book provides a holistic approach to the most recent advances in the application of various microbes as a biotechnological tool for a vast range of sustainable applications modern practices exploring futuristic strategies to harness its full potential Covers the latest developments recent applications and future research avenues in microbial biotechnology for sustainable development Includes expressive tables and figures with concise information about sustainable ecosystem services Provides a wide variety of applications and modern practices of harnessing the potential of microbes in the environment

*Endophytic Microbes: Isolation, Identification, and Bioactive Potentials* A. Sankaranarayanan,Natarajan Amaresan,Mitesh Kumar Dwivedi,2022-11-25 This volume provides basic insight and protocols relating to endophytic microbes Chapter are divided into five major sections detailing basic isolation bioactive metabolites production endophytism isolation and identification of endophytes bioactive potentials and screening of metabolites Authoritative and cutting edge Endophytic Microbes Isolation Identification and Bioactive Potentials aims to provide comprehensive and accessible methods to undergraduate graduate and established scientist

*Mycology and Microbiology (A Textbook for UG and PG Courses)* C. Manoharachary,K.V.B.R. Tilak,K.V. Mallaiah,I.K. Kunwar,2016-05-01 Fungi and microbes have predominant influence in our lives They are directly or indirectly involved in generating the food we eat and drink besides providing life saving pharmaceutical products including the sources of enzymes They play a vital role in

recycling of organic matter and several ecological processes Both fungi and microbes have contributed several billion dollars worth of technological products For instance yeast is used in brewing and bakery Lactobacillus ferments milk to yoghurt and a number of edible mushrooms are rich in nutrients besides possessing many medicinal properties Bacteria and fungi serve as key organisms in understanding life processes genetic engineering and as experimental organisms Therefore it is necessary to study the biology and biotechnology of these organisms It is a humble attempt of the authors to make the readers understand the biology and biotechnology of fungi and microbes in a simpler way and also to communicate the recent developments

*Emerging Technologies in Environmental Bioremediation* Maulin P. Shah, Susana Rodriguez-Couto, S. Sevinc Sengor, 2020-04-18 Emerging Technologies in Environmental Bioremediation introduces emerging bioremediation technologies for the treatment and management of industrial wastes and other environmental pollutants for the sake of environmental sustainability Emerging bioremediation approaches such as nano bioremediation technology electro bioremediation technology microbial fuel cell technology Modified Ludzack Ettinger Process Modified Activated Sludge Process and phytotechnologies for the remediation of industrial wastes pollutants are discussed in a comprehensive manner not found in other books Furthermore the book includes updated information as well as future directions for research in the field of bioremediation of industrial wastes This book will be extremely useful to students researchers scientists and professionals in the field of microbiology and biotechnology Bio chemical engineers environmental researchers eco toxicology and many more Includes the recovery of resources from wastewater Describes the importance of microorganisms in environmental bioremediation technologies Points out the reuse of treated wastewater through emerging technologies Pays attention to the occurrence of novel micro pollutants Emphasizes the role of nanotechnology in pollutant bioremediation

Agriculturally Important Microorganisms Harikesh Bahadur Singh, Birinchi Kumar Sarma, Chetan Keswani, 2016-11-18 The main focus of this book is to survey the current status of research development and use of agriculturally important microorganisms in Asian countries and develop a strategy for addressing critical issues various policy constraints due to which bio pesticides have found limited applications In this book the editors have tried to develop a consensus on issues of such as quality requirements quality control regulatory management commercialization and marketing of agriculturally important microorganisms in Asian countries All these issues are discussed at national level by competent authorities of Asian countries including India China Malaysia Iran Taiwan Israel Sri Lanka Vietnam and Philippines

Phoma: Diversity, Taxonomy, Bioactivities, and Nanotechnology Mahendra Rai, Beata Zimowska, György János Kövics, 2021-11-19 The book covers the taxonomy diversity bioactivity and nanotechnology involved in the study of the genus Phoma It presents the most recent molecular taxonomic approach secondary metabolites different bioactivities combating microbial threats and its use in nanotechnology from a basic research to an applied perspective Expert contributors provide the latest research and applications to present thorough coverage of this important genus in human and plant pathology and

the disease management      Endophytes of the Tropics Adeline Su Yien Ting, 2020-07-20 Endophytes of the Tropics Diversity Ubiquity and Applications is a presentation of consolidated information on endophytes from the tropical region It provides a glimpse of the various species of endophytes in the tropics their host plants their applications in the various field and some of the challenges in endophytic research In short this book presents an overview of and the future of endophyte research in the tropics The book offers comprehensive coverage of the most essential topics including Diversity of endophytes in the tropics Beneficial application of tropical endophytes or their derivatives Highlights on some valuable endophytic species from the tropics Some commercialized products based on tropical endophytes Challenges in researching endophytes Remedial strategies to advance research on tropical endophytes This books stands apart from others as it highlights on endophytes of the tropical regions associating the uniqueness of tropical endophytes with the rich plant diversity and ethnobotanical history There is therefore greater possibility that novel metabolites can be isolated from the endophytes which can be explored and harnessed for the benefit of mankind

**Ligands for Targeted Drug Delivery** Vikas Pandey, Rajeew Sharma, Tanweer Haider, Dinesh Kumar Mishra, 2025-05-23 Ligands for Targeted Drug Delivery Basic Fundamentals and Applications is a comprehensive reference focused on the many ways drug carriers can be functionalized to target specific organs tissues cells and sub cellular compartments Chapters cover the basic concepts of targeted drug delivery describing multiple levels of targets and challenges along with approaches for target specific drug delivery and a thorough overview of the challenges in design and application of ligands Following sections discuss nanoparticles and the main ligand classes with their respective applications The final chapters discuss future prospects of the technology and clinical aspects of ligand modified drug delivery systems This is a key reference to drug delivery researchers dealing with the application of ligands to overcome challenges in delivering their active principles to the target structure Biomedical engineers materials scientists and chemists can also benefit from the through description of ligand classes and their potential to improve drug delivery efficiency Provides foundational information on targeted drug delivery at organ tissue cellular and sub cellular levels Compares active and passive targeting and their applications Summarizes the wider classes of ligands used for drug delivery Presents a strategic thinking framework for pairing nanocarriers with appropriate ligands for enhanced therapeutic efficacy

**Organic Amendments and Soil Suppressiveness in Plant Disease Management** Mukesh K. Meghvansi, Ajit Varma, 2015-11-05 This book provides a timely review of concepts in plant disease management involving microbial soil suppressiveness and organic amendments Topics discussed include the impact of suppressive soils on plant pathogens and agricultural productivity the enhancement of soil suppressiveness through the application of compost and the development of disease suppressive soils through agronomic management Further chapters describe diseases caused by phytopathogens such as Pythium Fusarium and Rhizoctonia interaction of rhizobia with soil suppressiveness factors biocontrol of plant parasitic nematodes by fungi and soil suppressive microorganisms

**Progress in Mycology** Tulasi Satyanarayana, Sunil



Kumar Deshmukh, Mukund V. Deshpande, 2021-08-20 Indian mycologists have extensively studied various groups of fungi such as soil fungi aquatic fungi marine fungi endophytic fungi fungi associated with man and animals Though several books on various aspects of fungi are published this is the first account of the history and developments in mycology in India It discusses at length various stages of development of mycology including both classical and biotechnological aspects It begins with a historical account of Indian mycology followed by a description of research on fossil fungi Further chapters cover the latest updates on different taxonomic groups of fungi A dedicated section describes the roles and applications of fungal endophytes The book also includes research in other important areas such as mushrooms and wood rotting fungi Different chapters are written by leading mycologists This book is useful to students teachers and researchers in botany microbiology biotechnology and life sciences agriculture and industries using fungi to produce various valuable products

**New and Future Developments in Microbial Biotechnology and Bioengineering** Jay Shankar Singh, DP Singh, 2019-03-19 New and Future Developments in Microbial Biotechnology and Bioengineering Microbial Biotechnology in Agro environmental Sustainability describes in detail the various roles of microbial resources in the management of crop diseases and how microbes can be used as a source of income for biomass and bioenergy production In addition the book covers microbial inoculants as bio fertilizers to enhance crop productivity along with degraded land restoration Users will find the latest information in the field of microbial biotechnology and its further applications in bio fertilizers bio pesticides its generation as an alternative source of energy restoration degraded and marginal lands the mitigation of global warming gases and more Describes microbial biotechnology and its applications in sustainable agriculture Provides information on the use of a variety of microbes for crop production Outlines microbe based separation techniques for the removal of metal contaminants from soil Describes the role of microbial agents in the generation of alternative sources of energy Includes microbial tools and technologies for the restoration of degraded and marginal lands the mitigation of global warming gases and the bioremediation of polluted sites

**Orchid Biochemistry** Jen-Tsung Chen, 2021-08-18 Orchids are fascinating with attractive flowers that sell in the markets and an increasing demand around the world Additionally some orchids are edible or scented and have long been used in preparations of traditional medicine This book presents recent advances in orchid biochemistry including original research articles and reviews It provides in depth insights into the biology of flower pigments floral scent formation bioactive compounds pollination and plant microbial interaction as well as the biotechnology of protocorm like bodies in orchids It reveals the secret of orchid biology using molecular tools advanced biotechnology multi omics and high throughput technologies and offers a critical reference for the readers This book explores the knowledge about species evolution using comparative transcriptomics flower spot patterning involving the anthocyanin biosynthetic pathways the regulation of flavonoid biosynthesis which contributes to leaf color formation gene regulation in the biosynthesis of secondary metabolites and bioactive compounds the mechanism of pollination involving the biosynthesis of

semiochemicals gene expression patterns of volatile organic compounds the symbiotic relationship between orchids and mycorrhizal fungi techniques using induction proliferation and regeneration of protocorm like bodies and so on In this book important or model orchid species were studied including *Anoectochilus roxburghii* *Bletilla striata* *Cymbidium sinense* *Dendrobium officinale* *Ophrys insectifera* *Phalaenopsis* *Panda* *Pleione limprichtii*

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