READ FREE EMERGING TECHNOLOGIES AND MANAGEMENT OF CROP STRESS TOLERANCE VOLUME 2 A SUSTAINABLE APPROACH

Emerging Technologies and Management of Crop Stress Tolerance

Emerging Technologies and Management of Crop Stress Tolerance: Volume II - A Sustainable Approach helps readers take technological measures to alleviate plant stress and improve crop production in various environmental conditions. This resource provides a comprehensive review of how technology can be implemented to improve plant stress tolerance to increase productivity and meet the agricultural needs of the growing human population. The book considers issues of deforestation, disease prevention, climate change and drought, water and land management, and more. It will help any scientist better understand environmental stresses to improve resource management within a world of limited resources. Includes the most recent advances methods and applications of biotechnology to crop science Promotes the prevention of potential diseases to inhibit bacteria postharvest quality of fruits and vegetable crops by advancing application and research Presents a thorough account of research results and critical reviews

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Emerging Technologies and Management of Crop Stress Tolerance: Volume 1 - Biological Techniques presents the latest technologies used by scientists for improvement the crop production and explores the various roles of these technologies for the enhancement of crop productivity and inhibition of pathogenic bacteria that can cause disease. This resource provides a comprehensive review of how proteomics, genomics, transcriptomics, ionomics, and micromics are a pathway to improve plant stress tolerance to increase productivity and meet the agricultural needs of the growing human population. This valuable resource will help any scientist have a better understanding of environmental stresses to improve resource management within a world of limited resources. Includes the most recent advances methods and applications of biotechnology to crop science Discusses different techniques of genomics, proteomics, transcriptomics and nanotechnology Promotes the prevention of potential diseases to inhibit bacteria postharvest quality of fruits and vegetable crops by advancing application and research Presents a thorough account of research results and critical reviews

Emerging Technologies and Management of Crop Stress Tolerance

This Volume comprises 14 chapters in an attempt to provide the reader with available information on safe and effective use of entomopathogens. Chapters in this book dealing with soil-borne entomopathogens and their phylogeny also provide a review on most updated information of their isolation and molecular identification. Employing fungal pathogens in biological control programmes plays a key role, and conidial thermotolerance and oxidative stress are examined in separate chapters. Entomopathogenic bacteria are able to kill their hosts quickly. An important contribution concerns informations provided upon bacterial cytotoxic factors on insect haemocytes. Nematodes are biological control agents safe to the environment. The information with respect to their direct and indirect effects on non-target organisms is provided. Viruses as highly specific, virulent candidates for use as biological insecticides are safe to non-target species. A separate chapter on the role of granuloviruses in IPM contributes a wealth of information. Biopesticides in

combination with synthetic insecticides are reported as effective, economic, and eco-friendly. Understanding their interactions will certainly promote their uses. Finally, emphasis has been given on reviewing synergistic and antagonistic interactions of microbial and chemical pesticides, in other chapters.

Microbes for Sustainable Insect Pest Management

\u200bThis book focuses on the existing knowledge regarding the effect of global climate change on tea plant physiology, biochemistry, and metabolism as well as economic and societal aspects of the tea industry. Specifically, this book synthesizes recent advances in the physiological and molecular mechanisms of the responses of tea plants to various abiotic and biotic stressors including high temperature, low temperature or freezing, drought, low light, UV radiation, elevated CO2, ozone, nutrient deficiency, insect herbivory, and pathogenic agents. This book also discusses challenges and potential management strategies for sustaining tea yield and quality in the face of climate change. Dr. Wen-Yan Han is a Professor and Dr. Xin Li is an Associate Professor at the Tea Research Institute of the Chinese Academy of Agricultural Sciences (TRI, CAAS), Hangzhou, PR China. Dr. Golam Jalal Ahammed is an Associate Professor at the Department of Horticulture, College of Forestry, Henan University of Science and Technology, Luoyang, PR China.

Stress Physiology of Tea in the Face of Climate Change

Agronomic crops have been a source of foods, beverages, fodders, fuels, medicines and industrial raw materials since the dawn of human civilization. Over time, these crops have come to be cultivated using scientific methods instead of traditional methods. However, in the era of climate change, agronomic crops are increasingly subjected to various environmental stresses, which results in substantial yield loss. To meet the food demands of the ever-increasing global population, new technologies and management practices are being adopted to boost yield and maintain productivity under both normal and adverse conditions. To promote the sustainable production of agronomic crops, scientists are currently exploring a range of approaches, which include varietal development, soil management, nutrient and water management, pest management etc. Researchers have also made remarkable progress in developing stress tolerance in crops through various approaches. However, finding solutions to meet the growing food demands remains a challenge. Although there are several research publications on the above-mentioned problems, there are virtually no comprehensive books addressing all of the recent topics. Accordingly, this book, which covers all aspects of production technologies, management practices, and stress tolerance of agronomic crops in a single source, offers a highly topical guide.

Agronomic Crops

This issue of Veterinary Clinics: Exotic Animal Practice, Guest Edited by Dr. Minh Huynh in collaboration with Consulting Editor, Dr. Joerg Mayer, focuses on Technological Advances in Exotic Pet Practice. Topics covered in this issue include: Medical Applications for 3D Printing in Exotic Pet Medicine; Use of Bone Plates in Exotic Pet Medicine; Smartphone-based Devices for Medical Use in Exotic Pet Medicine; Technological Advances in Endoscopic Equipment and Endosurgery in Exotic Pet Medicine; Technological Advances in Surgical Equipment in Exotic Pet Medicine; Technological Advances in Diagnostic Imaging in Exotic Pet Medicine; Technological Advances in Exotic Pet Anesthesia; Advances in Exotic Pet Clinical Pathology; Technological Advances in Herpetology; Advances in Therapeutics and Delayed Drug Release; Permanent Implantable Devices in Exotic Pet Medicine; Technological Advances in Exotic Pet Wound Management; and Dissemination of Medical Information in Exotic Pet Practice.

Technological Advances in Exotic Pet Practice, An Issue of Veterinary Clinics of North America: Exotic Animal Practice

This volume comprehensively reviews recent advances in our understanding of the diversity of microbes in

various types of terrestrial ecosystems, such as caves, deserts and cultivated fields. It is written by leading experts, and highlights the culturable microbes identified using conventional approaches, as well as non-culturable ones unveiled with metagenomic and microbiomic approaches. It discusses the role of microbes in ecosystem sustainability and their potential biotechnological applications. The book further discusses the diversity and utility of ectomycorrhizal and entomopathogenic fungi and yeasts that dwell on grapes, it examines the biotechnological applications of specific microbes such as lichens, xylan- and cellulose-saccharifying bacteria and archaea, chitinolytic bacteria, methanogenic archaea and pathogenic yeasts.

Microbial Diversity in Ecosystem Sustainability and Biotechnological Applications

Plant Metal Interaction: Emerging Remediation Techniques covers different heavy metals and their effect on soils and plants, along with the remediation techniques currently available. As cultivable land is declining day-by-day as a result of increased metals in our soil and water, there is an urgent need to remediate these effects. This multi-contributed book is divided into four sections covering the whole of plant metal interactions, including heavy metals, approaches to alleviate heavy metal stress, microbial approaches to remove heavy metals, and phytoremediation. Provides an overview of the effect of different heavy metals on growth, biochemical reactions, and physiology of various plants Serves as a reference guide for available techniques, challenges, and possible solutions in heavy metal remediation Covers sustainable technologies in uptake and removal of heavy metals

Plant Metal Interaction

This book presents an inclusive approach to deal with plant stresses in light of recent technological advances. As we have entered into a new decade, researchers and scientists should review and evaluate the recent findings in the field of plant stress management and visualize what we need to focus upon in the near future to increase crop yield. Above all, global climate changes present the greatest challenges of all time for plant scientists. In this context, the book highlights the recent findings and future perspectives in crop improvement to the faculties, scientists, research scholars, and postgraduate students. Major features of the book include an inclusive approach in understanding the mechanism of stress tolerance; recent advances and innovations in the field of allied disciplines like microbiology, molecular biology, biotechnology, plant breeding, nanobiotechnology, etc., for improving plant stress tolerance; and illustrative sketches to convey the mechanism and strategies of stress alleviation.

Plant Stress: Challenges and Management in the New Decade

Since the publication of the third edition of the Handbook of Plant and Crop Stress, continuous discoveries in the fields of plant and crop environmental stresses and their effects on plants and crops have resulted in the compilation of a large volume of the latest discoveries. Following its predecessors, this fourth edition offers a unique and comprehensive collection of topics in the fields of plant and crop stress. This new edition contains more than 80% new material, and the remaining 20% has been updated and revised substantially. This volume presents 10 comprehensive sections that include information on soil salinity and sodicity problems; tolerance mechanisms and stressful conditions; plant/crop responses; plant/crop responses under pollution and heavy metal; plant/crop responses under biotic stress; genetic factors and plant/crop genomics under stress conditions; plant/crop breeding under stress conditions; empirical investigations; improving tolerance; and beneficial aspects of stressors. Features: Provides exhaustive coverage written by an international panel of experts in the field of agriculture, particularly in plant/crop stress areas Contains 40 new chapters and 10 extensively revised and expanded chapters Includes three new sections on plant breeding, stress exerted to weeds by plants, and beneficial aspects of stress on plants/crops Numerous case studies With contributions from 100 scientists and experts from 20 countries, this Handbook provides a comprehensive resource for research and for university courses, covering soil salinity/sodicity issues and plant/crop physiological responses under environmental stress conditions ranging from cellular aspects to whole plants. The content can be used to plan, implement, and evaluate strategies to mitigate plant/crop stress

problems. This new edition includes numerous tables, figures, and illustrations to facilitate comprehension of the material as well as thousands of index words to further increase accessibility to the desired information.

Handbook of Plant and Crop Stress, Fourth Edition

Agriculture is considered as a backbone of developing nations as it caters the needs of the people, directly or indirectly. The global agriculture currently faces enormous challenges like land degradation and reduced soil fertility, shrinking of land, low production yield, water accessibility and a dearth of labor due to evacuation of individuals from farming. Besides, the global population increases at an exponential rate and it is predicted that the global population will be 9 billion by 2050 that in turn leads to food crisis in near future. Although, green revolution revolutionizes the agriculture sector by enhancing the yield but it was not considered as a sustainable approach. Exorbitant use of chemical fertilizers and pesticides to boost the crop yield is definitely not a convenient approach for agriculture sustainability in the light of the fact that these chemical fertilizers are considered as double-edged sword, which on one hand enhance the crop yield but at the same time possess deleterious effect on the soil microflora and thus declines its fertility. Besides, it cause irreversible damage to the soil texture and disrupts the equilibrium in the food chain across ecosystem, which might in turn lead to genetic mutations in future generations of consumers. Thus, the increased dependence on fabricated agricultural additives during and post green revolution has generated serious issues pertaining to sustainability, environmental impact and health hazards. Therefore, nano-biotechnology has emerged as a promising tool to tackle the above problems especially in the agriculture sector. Nano-agribusiness is an emerged field to enhance crop yield, rejuvenate soil health, provide precision farming and stimulate plant growth. Nano-biotechnology is an essential tool in modern agriculture and is considered as a primary economic driver in near future. It is evaluated that joining of cutting edge nanotechnology in agribusiness would push the worldwide monetary development to approximately US$ 3.4 trillion by 2020 which clearly indicates that how agri-nanobiotechnology plays a pivotal role in the agricultural sector, without any negative impact on the environment and other regulatory issues of biosafety. Agri-nanobiotechnology is an innovative green technology, which provides the solution to global food security, sustainability and climate change. The current book is presenting the role of nano-biotechnology in modern agriculture and how it plays a pivotal role to boost the agri-business.

Nanobiotechnology in Agriculture

Agricultural Systems, Second Edition, is a comprehensive text for developing sustainable farming systems. It presents a synthetic overview of the emerging area of agroecology applications to transforming farming systems and supporting rural innovation, with particular emphasis on how research can be harnessed for sustainable agriculture. The inclusion of research theory and examples using the principles of cropping system design allows students to gain a unique understanding of the technical, biological, ecological, economic and sociological aspects of farming systems science for rural livelihoods. This book explores topics such as: re-inventing farming systems; principles and practice of agroecology; agricultural change and low-input technology; ecologically-based nutrient management; participatory breeding for developing improved and relevant crops; participatory livestock research for development; gender and agrarian inequality at the local scale; the nature of agricultural innovation; and outreach to support rural innovation. The extensive coverage of subjects is complemented with integrated references and a companion website, making this book essential reading for courses in international agricultural systems and management, sustainable agricultural management, and cropping systems. This book will be a valuable resource for students of agricultural science, environmental engineering, and rural planning; researchers and scientists in agricultural development agencies; and practitioners of agricultural development in government extension programs, development agencies, and NGOs. Provides students with an enhanced understanding of how research can be harnessed for sustainable agriculture Incorporates social, biological, chemical, and geographical aspects important to agroecology Addresses social and development issues related to farming systems

Agricultural Systems: Agroecology and Rural Innovation for Development

Key features: Describes the effects and responses of the macro and micro levels of crops under the different components of climate change Reports on the adaptation and resilience of food production systems within the changing climate Covers how plants cope with the changing climate including physiological, biochemical, phenotype, and ecosystem responses Provides an in-depth discussion on the importance of agricultural education connected to climate change Presenting an overview of agroecology within the framework of climate change, this book looks at the impact of our changing climate on crop production and agroecosystems, reporting on how plants will cope with these changes, and how we can mitigate these negative impacts to ensure food production for the growing population. It explores the ways that farmers can confront the challenges of climate change, with contributed chapters from around the world demonstrating the different challenges associated with differing climates. Examples are provided of the approaches being taken right now to expand the ecological, physiological, morphological, and productive potential of a range of crop types. Giving readers a greater understanding of the mechanisms of plant resilience to climate change, this book provides new insights into improving the productivity of an individual crop species as well as bringing resistance and resiliency to the entire agroecosystem. It offers a strong foundation for changing research and education programs so that they build the resistance and resilience that will be needed for the uncertain climate future ahead.

Climate Change and Crop Production

Using accessible farming practices to meet the growing demands on agriculture is likely to result in more intense competition for natural resources, increased greenhouse gas emissions, and further deforestation and land degradation, which will in turn produce additional stress in the soil-water-plant-animal continuum. Stress refers to any unfavorable force or condition that inhibits customary functioning in plants. Concurrent manifestations of different stresses (biotic and abiotic) are very frequent in the environment of plants, which consequently reduces yield. Better understanding stress not only changes our perspective on the current environment, but can also bring a wealth of benefits, like improving sustainable agriculture and human beings' living standards. Innovative systems are called for that protect and enhance the natural resource base, while increasing productivity via 'holistic' approaches, such as agroecology, agro-forestry, climate-smart agriculture and conservation agriculture, which also incorporate indigenous and traditional knowledge. The book 'New Frontiers in Stress Management for Durable Agriculture' details the current state of knowledge and highlights scientific advances concerning novel aspects of plant biology research on stress, biotic and abiotic stress responses, as well as emergent amelioration and reclamation technologies to restore normal functioning in agroecology.

New Frontiers in Stress Management for Durable Agriculture

Increasing world population, unpredictable climate and various kind of biotic and abiotic stresses necessitate the sustainable increase in crop production through developing improved cultivars possessing enhanced genetic resilience against all odds. An exploration of these challenges and near possible solution to improve yield is addressed in this book. It comprehensively and coherently reviews the application of various aspect of rapidly growing omics technology including genomics, proteomics, transcriptomics and metabolomics for crop development. It provides detailed examination of how omics can help crop science and introduces the benefits of using these technologies to enhance crop production, resistance and other values. It also provides platform to ponder upon the integrative approach of omics to deal with complex biological problems. The book highlights crop improvement such as yield enhancement, biotic and abiotic resistance, genetic modification, bioremediation, food security etc. It explores how the different omics technology independently and collectively would be used to improve the quantitative and qualitative traits of crop plants. The book is useful for graduate and post-graduate students of life science including researchers who are keen to know about the application of omics technologies in the different area of plant science. This book is also an asset to the modern plant breeders, and agriculture biotechnologist.

Omics Technologies for Sustainable Agriculture and Global Food Security Volume 1

This book presents field studies on crop production in developing countries such as Vietnam, Kenya, Namibia, Colombia, Afghanistan and Sudan. Further, it examines the achievements of SATREPS, a development assistance program sponsored by the Japanese government that promotes international joint research to address these global issues. In this context, multidisciplinary research teams consisting of breeders, physiologists, soil scientists, agronomists, and other scientists related to agricultural development worked together to tackle the challenges involved in enhancing the capacity of crop production in the respective regions. In addition to presenting novel scientific findings, this book highlights practical field studies that verify the effectiveness of the scientific findings in actual environments. The achievements will help to improve crop production worldwide, and the lessons learnt will be useful in re-designing strategies to address global issues in crop production, particularly in developing regions. Lastly, the outcomes discussed will be useful to policymakers and professionals engaged in crop production and food security in developing countries, as well as researchers and students.

Crop Production under Stressful Conditions

This book provides an overview of the essential disciplines required for sustainable crop production in unpredictable environments. Chapters include discussions of adapting to biotic and abiotic stresses, sustainable and resource-conserving technologies and new tools for enhancing crop adaptation. Examples of successful applications as well as future prospects of how each discipline can be expected to evolve over the next 30 years are also presented. Laying out the basic concepts needed to adapt to and mitigate changes in crop environments, this is an essential resource for researchers and students in crop and environmental science as well as policy makers.

Climate Change and Crop Production

Crop Production Technologies for Sustainable Use and Conservation:Physiological and Molecular Advances presents an abundance of research on important and new production technologies for the successful sustainable production of major crops. The volume covers most of the major crops used the production of food, sugar, and commercial fiber. With the focus on sustainability and conservation issues in crop production, the chapters present molecular and physiological research and innovations for increasing yield, quality, and safety while also taking into considering increasing demand, diminishing water and land resources, and the agricultural consequences of climate change on crop production. The major crops discussed include wheat, mungbean, cotton, jute, sugarcane, eggplant, Solanum (such as potatoes and tomatoes), peppers, okra, fruits such as apples and pears, and more. The chapters report on new developments and research on production techniques related to various fertilizers, biosystematics and molecular biology of various crops, and building resistance to climatic change, including drought tolerance, salinity stresses, and more.

Crop Production Technologies for Sustainable Use and Conservation

This book offers a state-of-the-art overview of on abiotic stresses in terms of the challenges; scope and opportunities; copping strategies for adaptation and mitigation using novel tools for building resilience in agricultural crops and livestock; as well as for policy implementation. Divided into four major parts: advances and prospects for understanding stress environments; adaptation and mitigation options; crop-based mitigation strategies; and mitigation options in animal husbandry, the book focuses on problem-solving approaches and techniques that are essential for the medium to long-term sustainability of agricultural production systems The synthesis and integration of knowledge and experiences of specialists from different disciplines offers new perspectives in the versatile field of abiotic stress management, and as such is useful for various stakeholders, including agricultural students, scientists, environmentalists, policymakers, and social scientists.

Abiotic Stress Management for Resilient Agriculture

Taking a sustainable approach, this volume explores the various soil management techniques. It begins with an overview of the elementary concepts of soil management and then delves into new research and novel soil management tools and techniques. Topics include: * Clays as a critical component in sustainable agriculture with respect to carbon sequestration in conjunction with its interaction with soil enzymes * The potential utilization of microbes to mitigate crop stress * Resource conservation technologies and prospective carbon management strategies * The use of smart tools for monitoring soils * Effective nutrient management approaches * Nanotechnological interventions for soil management * Techniques for the remediation of soils contaminated by metals and pesticides

Soil Management for Sustainable Agriculture

Emerging Technologies and Management of Crop Stress Tolerance: Volume 1 - Biological Techniques presents the latest technologies used by scientists for improvement the crop production and explores the various roles of these technologies for the enhancement of crop productivity and inhibition of pathogenic bacteria that can cause disease. This resource provides a comprehensive review of how proteomics, genomics, transcriptomics, ionomics, and micromics are a pathway to improve plant stress tolerance to increase productivity and meet the agricultural needs of the growing human population. This valuable resource will help any scientist have a better understanding of environmental stresses to improve resource management within a world of limited resources. Includes the most recent advances methods and applications of biotechnology to crop science Discusses different techniques of genomics, proteomics, transcriptomics and nanotechnology Promotes the prevention of potential diseases to inhibit bacteria postharvest quality of fruits and vegetable crops by advancing application and research Presents a thorough account of research results and critical reviews

Emerging Technologies and Management of Crop Stress Tolerance

The basic concept of this book is to examine the use of innovative methods augmenting traditional plant breeding towards the development of new crop varieties under different environmental conditions to achieve sustainable food production. This book consists of two volumes: Volume 1 subtitled Breeding, Biotechnology and Molecular Tools and Volume 2 subtitled Agronomic, Abiotic and Biotic Stress Traits. This is volume 2 which contains 18 chapters highlighting breeding strategies for specific plant traits including improved nutritional and pharmaceutical properties as well as enhanced tolerance to insects, diseases, drought, salinity and temperature extremes expected under predicted global climate change.

Advances in Plant Breeding Strategies: Agronomic, Abiotic and Biotic Stress Traits

The book covers the latest development in the biosciences field covering key topics in crop improvement including ‘omic approaches to improving sustainable crop production, advancement in marker technology, strategies in genetic manipulation, crop quality and sustainability and plant microbe interaction detailing on proven technologies to address critical issue for agricultural sustainability which are beneficial for researchers and students. The book also includes aspects of preserving crops after harvest as this is a key factor in promoting sustainable crop quality in terms of addressing waste, choosing the appropriate packaging and moving crops through the food and industrial supply chain. An important strategy to overcome the challenges in providing food for the world population in a sustainable manner is through concerted efforts by crop scientists to embrace new technologies in increasing yield, quality and improving food safety while minimizing adverse environmental impact of the agricultural activities. Most of the proven molecular and genetic technologies in crop science have been tested and verified in model plants such as Arabidopsis and tomato. The technologies, when deployed on various plant species of importance for human nutrition and industrial applications, including cereals, vegetables, fruits, herbs, fibre and oil crops, face many challenges,

not only due to their longer life cycle but many other physiological and environmental factors affecting yield and quality of plant products. Furthermore, major impacts on crop production due to catastrophic diseases and global climate change needs urgent and innovative solutions. Therefore a systematic approach, employing various leading-edge technologies that enable the functional elucidation of key pathway genes via ‘omics tools, genome wide association with desired phenotypes and development of cost effective and practicable molecular tools for selection, is vital. The International Conference on Crop Improvement was held to address these and other pressing issues. This volume summarizes the keynote presentations from the meeting and highlights addition discussions that are critical to crop improvement in a challenging time.

Crop Improvement

This book will cover several topics to elaborate how proteomics may contribute in our understanding of mechanisms involved in stress adaptation. The knowledge being accumulated by a wide range of proteomics technologies may eventually be utilized in breeding programs to enhance stress tolerance. This book presents comprehensive reviews about responses of crop and farm animals to environmental stresses. Challenges related to stress phenotyping and integration of proteomics and other omics data have also been addressed.

Agricultural Proteomics Volume 2

This book presents an inclusive approach to deal with plant stresses in light of recent technological advances. As we have entered into a new decade, researchers and scientists should review and evaluate the recent findings in the field of plant stress management and visualize what we need to focus upon in the near future to increase crop yield. Above all, global climate changes present the greatest challenges of all time for plant scientists. In this context, the book highlights the recent findings and future perspectives in crop improvement to the faculties, scientists, research scholars, and postgraduate students. Major features of the book include an inclusive approach in understanding the mechanism of stress tolerance; recent advances and innovations in the field of allied disciplines like microbiology, molecular biology, biotechnology, plant breeding, nanobiotechnology, etc., for improving plant stress tolerance; and illustrative sketches to convey the mechanism and strategies of stress alleviation.

Plant Stress: Challenges and Management in the New Decade

This book covers an array of issues on emerging agricultural engineering and technology, featuring new research and studies. The volume is broken into three parts: emerging technologies, energy management in agriculture, and management of natural resources, in which particular attention is paid to water management, a necessary consideration for successful crop production, especially in water-scarce regions. Topics include: alleviating drainage congestion solar energy for agriculture anaerobic digestion by inoculation with compost self-propelled inter-cultivators agrobiodiversity watershed development and management This volume offers academia, engineers, technologists, students, and others from different disciplines information to gain knowledge on the breadth and depth of this multifaceted field of agricultural engineering. There is an urgent need to explore and investigate the current shortcomings and challenges of the current innovations and challenges.

Emerging Technologies in Agricultural Engineering

This book outlines comprehensive information on the global trends, policies, research priorities and frontier innovations made in the research domain of breeding, biotechnology, biofortification and quality enhancement of wheat and barley. With contributions by international group of leading wheat and barley researchers, this book offers data-based insights along with a holistic view of the subject and serve as a vital resource of information for scientists engaged in breeding future high-yielding biofortified varieties. It catalogs both conventional as well as modern tools for gene identification and genome editing interventions for enhancing the yield, grain quality, disease and pest resistance, nutrient-use efficiency and abiotic stress

tolerance. The prospects of processing high quality wheat end-products with long term storage and high nutritional quality are also discussed. This book is of interest to teachers, researchers, molecular breeders, cereal biochemists and biotechnologist, policymakers and professionals working in the area of wheat and barley research, food and cereal industry. Also, the book serves as an additional reading material for the undergraduate and graduate students of agriculture and food sciences. National and international agricultural scientists, policy makers will also find this book to be a useful read. Volume 2 of New Horizons in Wheat and Barley Research covers topics in crop protection and resource management.

New Horizons in Wheat and Barley Research

This 4-volume set focuses on the use of microbial bioremediation and phytoremediation to clean up pollutants in soil, such as pesticides, petroleum hydrocarbons, metals, and chlorinated solvents, which reduce the soil's fertility and renders it unfit for plant growth. Volume 2: Microbial Approaches and Recent Trends focuses on new and emerging techniques and approaches to address soil pollution. These include the use of rhizobacteria, archaea, cyanobacteria, and microalgae as biofertilizers and for soil bioremediation efforts. New technologies for assessment of soil bioremediation are explored also. The chapters provide in-depth coverage of the mechanisms, advantages, and disadvantages of the technologies used and highlight the use of different microbial enzymes that are used in the process of bioremediation and phytoremediation to clean up different pollutants without causing damage to the natural environment. Other volumes in the 4-volume set: • Volume 1: Fundamental Aspects and Contaminated Sites • Volume 3: Inventive Techniques, Research Methods, and Case Studies • Volume 4: Degradation of Pesticides and Polychlorinated Biphenyls Together, these four volumes provide in-depth coverage of the mechanisms, advantages, and disadvantages of the bioremediation and phytoremediation technologies for safe and sustainable soil management. The diverse topics help to arm biologists, agricultural engineers, environmental and soil scientists and chemists with the information and tools they need to address soil toxins that are a dangerous risk to plants, wildlife, humans and, of course, the soil itself.

Bioremediation and Phytoremediation Technologies in Sustainable Soil Management

This book presents recent developments involving the role of nanoparticles on stress tolerance. In particular, nanoparticles have the potential to provide effective solutions to the multiple agriculture-related problems. Nanoparticles present enhanced reactivity and thus better effectiveness when compared to their bulkier counterparts due to their higher surface-to-volume ratio.

Sustainable Agriculture Reviews 53

Plants are subjected to a variety of abiotic stresses such as drought, temperature, salinity, air pollution, heavy metals, UV radiations, etc. To survive under these harsh conditions plants are equipped with different resistance mechanisms which vary from species to species. Due to the environmental fluctuations agricultural and horticultural crops are often exposed to different environmental stresses leading to decreased yield and problems in the growth and development of the crops. Drought stress has been found to decrease the yield to an alarming rate of some important crops throughout the globe. During last few decades, lots of physiological and molecular works have been conducted under water stress in crop plants. Water Stress and Crop Plants: A Sustainable Approach presents an up-to-date in-depth coverage of drought and flooding stress in plants, including the types, causes and consequences on plant growth and development. It discusses the physiobiochemical, molecular and omic approaches, and responses of crop plants towards water stress. Topics include nutritional stress, oxidative stress, hormonal regulation, transgenic approaches, mitigation of water stress, approaches to sustainability, and modern tools and techniques to alleviate the water stress on crop yields. This practical book offers pragmatic guidance for scientists and researchers in plant biology, and agribusinesses and biotechnology companies dealing with agronomy and environment, to mitigate the negative effects of stress and improve yield under stress. The broad coverage also makes this a valuable guide enabling students to understand the physiological, biochemical, and molecular mechanisms of

environmental stress in plants.

Water Stress and Crop Plants

This volume focuses on breeding new varieties with desirable traits such as drought tolerance and improved nutritional value as well as how such innovations can be successfully deployed in the developing world.

Achieving Sustainable Cultivation of Maize Volume 2

Plant stresses are serious threats to the sustainability of crop yields accounting for more crop productivity losses than any other factor in rainfed agriculture. Post-harvest losses mean surplus crops do not reach market, affecting the livelihoods of farming families, and too often these families are left with no other option than to eat contaminated stored food. These constraints impact the food security of these farming families as well as the communities and countries in which they live. This book is the demonstration of a clear synergistic effect of stresses, an effect that was unexpectedly as important as either stress applied alone. This book will add to our current knowledge of abiotic stress response in plants and will provide the groundwork necessary to build future strategies for crop enhancement. The fundamental principles that underpin all biotechnology are explained and a full range of examples discussed to show how these principles are applied; from starting substrate to final product. It will be beneficial to both plant breeders and molecular biologists, because it combines the topics of physiology, tolerance genes, and breeding methods. When these topics are presented together, it is easy to compare all aspects of tolerance mechanisms and breeding methods for abiotic stresses. These comparisons are useful to understand which pathways or which genes are important for rendering more tolerance to a certain abiotic stress, and to bring forward new ideas for improving the tolerance. Features •Cover both plant biotic and abiotic stresses •Important factors in managing crops for water stress conditions •Substantially increase the sustainable productivity of smallholder farmers in developing countries •Genetic and biochemical approaches – if those approaches constitute a substantial improvement on current practices.

Approaches to Plant Stress and their Management

Microbial communities and their functions play a crucial role in the management of ecological, environmental and agricultural health on the Earth. Microorganisms are the key identified players for plant growth promotion, plant immunization, disease suppression, induced resistance and tolerance against stresses as the indicative parameters of improved crop productivity and sustainable soil health. Beneficial belowground microbial interactions with the rhizosphere help plants mitigate drought and salinity stresses and alleviate water stresses under the unfavorable environmental conditions in the native soils. Microorganisms that are inhabitants of such environmental conditions have potential solutions for them. There are potential microbial communities that can degrade xenobiotic compounds, pesticides and toxic industrial chemicals and help remediate even heavy metals, and thus they find enormous applications in environmental remediation. Microbes have developed intrinsic metabolic capabilities with specific metabolic networks while inhabiting under specific conditions for many generations and, so play a crucial role. The book Microbial Interventions in Agriculture and Environment is an effort to compile and present a great volume of authentic, high-quality, socially-viable, practical and implementable research and technological work on microbial implications. The whole content of the volume covers protocols, methodologies, applications, interactions, role and impact of research and development aspects on microbial interventions and technological outcomes in prospects of agricultural and environmental domain including crop production, plan-soil health management, food & nutrition, nutrient recycling, land reclamation, clean water systems and agro-waste management, biodegradation & bioremediation, biomass to bioenergy, sanitation and rural livelihood security. The covered topics and sub-topics of the microbial domain have high implications for the targeted and wide readership of researchers, students, faculty and scientists working on these areas along with the agri-activists, policymakers, environmentalists, advisors etc. in the Government, industries and non-government level for reference and knowledge generation.

Microbial Interventions in Agriculture and Environment

This book focuses on the soil and environmental resources and how to utilize them under Egyptian conditions to achieve tolerance to environmental abiotic stresses, i.e., drought, heat, salt, pollutants, and biotic stresses such as disease resistance. Further, it explores ways to increase productivity, improve the quality of field crops, and reduce the food gap. The application of modern technologies is an essential mechanism for improving crops' productivity through laser, seed technology, mycorrhiza, and biotechnology to enhance the yield of genotypes in sustainable farming systems. Therefore, this book discusses fundamental ways to increase productivity under various environmental circumstances. The book reflects the enormous potential held by horizontal expansion in the newly reclaimed lands in Egypt. Tapping that potential depends on developing crops that are highly tolerant to environmental stresses and mitigating the impacts of climate changes around the world to help Egypt and countries with similar weather and water deficits achieve the 2030 sustainability agenda for agriculture. Given its profundity and scope, the book offers a valuable asset for stakeholders, policy planners, decision-makers, researchers, and scientists in Egypt and worldwide.

Mitigating Environmental Stresses for Agricultural Sustainability in Egypt

Nanomaterials: Application in Biofuels and Bioenergy Production Systems looks at how biofuels and bioenergy can be part of the \"sustainable\" solution to the worlds energy problems. By addressing bioenergy products compared to their fossil energy counterparts, covering research and development in biofuels applied with nanomaterials this book analyzes the future trends and how biofuels and bioenergy can contribute to its optimization. Starting from fundamentals up to synthesis, characterization and applications of nanomaterials in biofuels and bioenergy production systems, the chapters include the procedures needed for introducing nanomaterials in these specific sectors along with the benefits derived from their applications. Including the hazards and environmental effects of nanomaterials in bioenergy applications, sustainability issues and a techno-economic analysis of the topic, this book provides researchers in bioscience, energy & environment and bioengineering with an up to date look at the full life cycle assessment of nanomaterials in bioenergy. Provides a one stop solution manual for applications of nanomaterials in bioenergy and biofuels Includes biofuel applications with compatible global application case studies Addresses the demand for environmental and techno-economic analysis of nanomaterials applications

Nanomaterials

This book provides an overall perspective on the current progress being made in the area of abiotic stresses and their management for sustainable agriculture. It contains 15 chapters divided into three sections: (i) temperature, water and salinity stress; (ii) heavy metals and ozone; and (iii) general abiotic stresses and their alleviation by microbes (such as beneficial soil microbes including Trichoderma harzianum). This book takes a holistic approach from basics to advanced technologies, with the main objective being to put together sufficient information on how to take forward sustainable agriculture in the face of mild to extreme environmental changes occurring in nature. The book offers insights into the various factors reducing crop productivity and highlights different mechanisms of resistance and approaches that could be used in sustainable agriculture. It is hoped that this book will be of use to agricultural scientists, the agro-industry, academicians and researchers working in the area of abiotic stress and its management.

Abiotic Stresses in Crop Plants

Advances in Rice Research for Abiotic Stress Tolerance provides an important guide to recognizing, assessing and addressing the broad range of environmental factors that can inhibit rice yield. As a staple food for nearly half of the world’s population, and in light of projected population growth, improving and increasing rice yield is imperative. This book presents current research on abiotic stresses including extreme temperature variance, drought, hypoxia, salinity, heavy metal, nutrient deficiency and toxicity stresses. Going

further, it identifies a variety of approaches to alleviate the damaging effects and improving the stress tolerance of rice. Advances in Rice Research for Abiotic Stress Tolerance provides an important reference for those ensuring optimal yields from this globally important food crop. Covers aspects of abiotic stress, from research, history, practical field problems faced by rice, and the possible remedies to the adverse effects of abiotic stresses Provides practical insights into a wide range of management and crop improvement practices Presents a valuable, single-volume sourcebook for rice scientists dealing with agronomy, physiology, molecular biology and biotechnology

Advances in Rice Research for Abiotic Stress Tolerance

This volume is the second of the new two-volume Plant Biotechnology set. This volume covers many recent advances in the development of transgenic plants that have revolutionized our concepts of sustainable food production, cost-effective alternative energy strategies, microbial biofertilizers and biopesticides, and disease diagnostics through plant biotechnology. With the advancements in plant biotechnology, many of the customary approaches are out of date, and an understanding of new updated approaches is needed. This volume presents information related to recent methods of genetic transformation, gene silencing, development of transgenic crops, biosafety issues, microbial biotechnology, oxidative stress, and plant disease diagnostics and management. Key features: Provides an in-depth knowledge of various techniques of genetic transformation of plants, chloroplast, and fungus Describes advances in gene silencing in plants Discusses transgenic plants for various traits and their application in crop improvement Looks at genetically modified foods and biodiesel production Describes biotechnological approaches in horticultural and ornamental plants Explores the biosafety aspect associated with transgenic crops Considers the role of microbes in sustainable agriculture

Endophytic Fungi: Secondary Metabolites and Plant Biotic and Abiotic Stress Management

Plant Biotechnology, Volume 2