

Narendra Tuteja -
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Crop Improvement Under Adverse Conditions

 Springer

Crop Improvement Under Adverse Conditions

**Sarvajeet Singh Gill, Narendra
Tuteja, Nafees A Khan, Ritu Gill**



Crop Improvement Under Adverse Conditions:

Crop Improvement Under Adverse Conditions Narendra Tuteja, Sarvajeet Singh Gill, 2012-12-09 Plant development and productivity are negatively regulated by various environmental stresses Abiotic stress factors such as heat cold drought and salinity represent key elements limiting agricultural productivity worldwide Thus developing crop plants with the ability to tolerate abiotic stresses is a critical need which demands modern novel strategies for the thorough understanding of plant response to abiotic stresses Crop Improvement under Adverse Conditions will serve as a cutting edge resource for researchers and students alike who are studying plant abiotic stress tolerance and crop improvement The book presents the latest trends and developments in the field including the impact of extreme events on salt tolerant forest species of Andaman Nicobar Islands the overlapping horizons of salicylic acid in different stresses and fast and reliable approaches to crop improvement through In Vitro haploid production Written by renowned experts and featuring useful illustrations and photographs Crop Improvement under Adverse Conditions is a concise and practical update on plant abiotic stress tolerance and crop improvement

Plant Acclimation to Environmental Stress Narendra Tuteja, Gill Sarvajeet Singh, 2012-12-09 The mechanisms underlying endurance and adaptation to environmental stress factors in plants have long been the focus of intense research Plants overcome environmental stresses by development of tolerance resistance or avoidance mechanisms adjusting to a gradual change in its environment which allows them to maintain performance across a range of adverse environmental conditions Plant Acclimation to Environmental Stress presents the latest ideas and trends on induced acclimation of plants to environmental stresses under changing environment Written by experts around the globe this volume adds new dimensions in the field of plant acclimation to abiotic stress factors Comprehensive and lavishly illustrated Plant Acclimation to Environmental Stress is a state of the art guide suited for scholars and researchers working in the field of crop improvement genetic engineering and abiotic stress tolerance

TOMATO (A complete guide on crop improvement, crop protection and crop management) Dr. C. Indu Rani, B. Swetha, P. Sowmya, K.R. Krishna Kumar, Tomato Onion and Potato TOP are the crops of major concern due to their versatile and indispensable nature Among these tomatoes consistently steal the spotlight due to the myriad challenges encountered from production to marketing It often faces a wide fluctuation in prices and demand intervention by the government officials and policy makers Despite being the second largest producer of tomatoes globally India grapples with substantial price inflation in this crop As a short duration and highly perishable crop tomatoes can bring both joy and distress to growers consumers and retailers alike This book A Complete Guide on Tomato is designed to benefit students research scholars or anyone studying agriculture botany nutrition or related fields It offers a comprehensive understanding for those engaged in research exam preparation or seeking to broaden their knowledge serving as an invaluable resource This book lays a solid foundation covering all aspects of tomato right from understanding cultivation to post harvest handling pest management and physiological disorders It also delves into breeding biotechnology

as they are important in crop improvement programmes To ensure at most quality this book is written in a straightforward and inclusive language We firmly believe that grasping the intricacies of tomatoes not only enriches academic learning but also creates curiosity ignite your passion for tomatoes and empower you to unleash the full potential of this remarkable crop We sincerely thank you for embarking on this tomato journey with us Regards Dr C Indu Rani B Swetha P Sowmya K R Krishna Kumar

Plant Growth Regulators Tariq Aftab, Khalid Rehman Hakeem, 2021-03-25 Agriculture faces many challenges to fulfil the growing demand for sustainable food production and ensure high quality nutrition for a rapidly growing population To guarantee adequate food production it is necessary to increase the yield per area of arable land A method for achieving this goal has been the application of growth regulators to modulate plant growth Plant growth regulators PGRs are substances in specific formulations which when applied to plants or seeds have the capacity to promote inhibit or modify physiological traits development and or stress responses They maintain proper balance between source and sink for enhancing crop yield PGRs are used to maximize productivity and quality improve consistency in production and overcome genetic and abiotic limitations to plant productivity Suitable PGRs include hormones such as cytokinins and auxins and hormone like compounds such as mepiquat chloride and paclobutrazol The use of PGRs in mainstream agriculture has steadily increased within the last 20 years as their benefits have become better understood by growers Unfortunately the growth of the PGR market may be constrained by a lack of innovation at a time when an increase in demand for new products will require steady innovation and discovery of novel cost competitive specific and effective PGRs A plant bio stimulant is any substance or microorganism applied to plants with the aim to enhance nutrition efficiency abiotic stress tolerance and or crop quality traits regardless of its nutrients content Apart from traditional PGRs which are mostly plant hormones there are a number of substances molecules such as nitric oxide methyl jasmonate brassinosteroids seaweed extracts strigolactones plant growth promoting rhizobacteria etc which act as PGRs These novel PGRs or bio stimulants have been reported to play important roles in stress responses and adaptation They can protect plants against various stresses including water deficit chilling and high temperatures salinity and flooding This book includes chapters ranging from sensing and signalling in plants to translational research In addition the cross talk operative in plants in response to varied signals of biotic and abiotic nature is also presented Ultimately the objective of this book is to present the current scenario and the future plan of action for the management of stresses through traditional as well as novel PGRs We believe that this book will initiate and introduce readers to state of the art developments and trends in this field of study

Achieving sustainable cultivation of maize
Volume 2 Dr Dave Watson, 2017-07-31 Summarises current good agricultural practice in maize cultivation from seed selection to nutrient management conservation agriculture rotations and intercropping Reviews advances in understanding and managing diseases and pests such as viruses nematodes and weeds Discusses ways maize cultivation can be made more climate smart

Organic Solutes, Oxidative Stress, and Antioxidant Enzymes Under Abiotic Stressors Arafat Abdel Hamed

Abdel Latef,2021-07-22 This book presents evidence based approaches and techniques used to diagnose and manage organic solutes oxidative stress and antioxidant enzymes in crop plants under abiotic stressors It discusses strategies in abiotic stress tolerance including osmoregulation osmoprotectants and the regulation of compatible solutes and antioxidant enzymes in plants With contributions from 49 scholars worldwide this authoritative guide is educational for scientists working with plants and abiotic stressors Provides comprehensive coverage of all aspects of abiotic stress from abiotic stresses effects on plant growth development and defense mechanisms to functionality of enzymatic and non enzymatic antioxidant enzymes in crop plants Outlines the dangers of reactive oxygen species Discusses using antioxidant enzymes and antioxidant molecules in plant protection mechanisms Edited by Arafat Abdel Hamed Abdel Latef Professor of Plant Physiology at South Valley University Egypt this book is written for graduate students and scholars researching abiotic plant stressors The book represents an excellent strategy to understand the mechanisms and techniques of antioxidant enzymes in the plant cell under stress conditions Professor Mostafa El sheekh Provides a thorough and detailed picture of the updated knowledge on the techniques used to manage organic solutes oxidative stress and stress related enzymes under abiotic stressors Bhoopander Giri Ph D Will serve as an imperative source of scientific literature in the plant stress biology field Narendra Singh Yadav Ph D The book has eighteen chapters written by scholars of international expertise in plant stress management Dr Sikander PAL Senior Assistant Professor *Water Stress and Crop Plants* Parvaiz Ahmad,2016-06-08 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 *Biostimulants in Alleviation of Metal Toxicity in Plants* Sarvajeet Singh Gill,Narendra Tuteja,Nafees A Khan,Ritu Gill,2023-08-01 Biostimulants in Alleviation

of Metal Toxicity in Plants Emerging Trends and Opportunities focuses on the role of substances or micro organisms whose presence can address issues of metal contamination in soils seeds and plants Including a range of biostimulant tools the book highlights both endogenous and exogenous application Written and edited by a global team of experts this book presents an overview on biostimulants in determining metal toxicity As plants encounter a wide range of environmental challenges during their lifecycle among which metal toxicity is a common form of abiotic stress this book thoroughly covers important topics on the subject matter Once inside a plant system toxic metals may initiate a variety of physiological alterations in plants including adversely impacted seed germination root and shoot growth chloroplasts ultrastructure and photosynthesis nutrients assimilation carbohydrates metabolism and plant hormonal status which collectively results in reduced plants yields In addition to several naturally occurring physiological and metabolic re programming responses plants may also modify their root and shoot systems in order to dilute entered amount of toxic metals As an additional tool biostimulants have emerged as one of the important plant protectors under adverse conditions Includes endogenous and exogenous application of biostimulants Focuses on use based on specific metal contamination Presents forward looking prospects for the use of biostimulants in plant health protection **Bamboo Science and Technology** Felipe Luis Palombini,Fernanda Mayara Nogueira,2023-03-14 Bamboo is one of the most sustainable materials in nature due to its fast growth rapid regeneration outstanding mechanical properties and applications in numerous industries Latest technological advances have been allowing the plant to be studied and applied to exciting new projects Being bamboo an icon of sustainable development this book approaches the latest developments in the study of the plant either as a natural resource or as a source of inspiration for more efficient designs With the global urging demand for more sustainable practices innovations in bamboo science and technology are key to the development of environmentally sound solutions *Approaches for Enhancing Abiotic Stress Tolerance in Plants* Mirza Hasanuzzaman,Kamrun Nahar,Masayuki Fujita,Hirosuke Oku,Tofazzal Islam,2019-01-10 Plants are frequently exposed to unfavorable and adverse environmental conditions known as abiotic stressors These factors can include salinity drought heat cold flooding heavy metals and UV radiation which pose serious threats to the sustainability of crop yields Since abiotic stresses are major constraints for crop production finding the approaches to enhance stress tolerance is crucial to increase crop production and increase food security This book discusses approaches to enhance abiotic stress tolerance in crop plants on a global scale Plants scientists and breeders will learn how to further mitigate plant responses and develop new crop varieties for the changing climate Drought Stress Tolerance in Plants, Vol 1 Mohammad Anwar Hossain,Shabir Hussain Wani,Soumen Bhattacharjee,David J Burritt,Lam-Son Phan Tran,2016-05-25 Abiotic stress adversely affects crop production worldwide decreasing average yields for most of the crops to 50% Among various abiotic stresses affecting agricultural production drought stress is considered to be the main source of yield reduction around the globe Due to an increasing world population drought stress will lead to a serious food shortage by 2050 The situation may

become worse due to predicated global climate change that may multiply the frequency and duration and severity of such abiotic stresses Hence there is an urgent need to improve our understanding on complex mechanisms of drought stress tolerance and to develop modern varieties that are more resilient to drought stress Identification of the potential novel genes responsible for drought tolerance in crop plants will contribute to understanding the molecular mechanism of crop responses to drought stress The discovery of novel genes the analysis of their expression patterns in response to drought stress and the determination of their potential functions in drought stress adaptation will provide the basis of effective engineering strategies to enhance crop drought stress tolerance Although the in depth water stress tolerance mechanisms is still unclear it can be to some extent explained on the basis of ion homeostasis mediated by stress adaptation effectors toxic radical scavenging osmolyte biosynthesis water transport and long distance signaling response coordination Importantly complete elucidation of the physiological biochemical and molecular mechanisms for drought stress perception transduction and tolerance is still a challenge to the plant biologists The findings presented in volume 1 call attention to the physiological and biochemical modalities of drought stress that influence crop productivity whereas volume 2 summarizes our current understanding on the molecular and genetic mechanisms of drought stress resistance in plants

Microorganisms in Saline Environments: Strategies and Functions Bhoopander Giri,Ajit Varma,2019-07-25 This book gathers the latest findings on the microbial ecology of saline habitats plant microbe interactions under saline conditions and saline soil reclamation for agricultural use The content is divided into four main parts Part I outlines the definition of salinity its genesis and impacts and microbial diversity in saline habitats Part II deals with impact of salinity on microbial and plant life health Part III highlights plant microbe interactions in saline environments and Part IV describes strategies for mitigation and reclamation of saline soils The salinization of arable land is steadily increasing in many parts of the world An excessive concentration of soluble salts salinity in soils or irrigation water adversely affects plant growth and survival This problem is exacerbated in arid and semiarid areas due to their low precipitation and high evaporation rates In turn poor management practices and policies for using river water forthe irrigation of agriculture crops often lead to the secondary salinization of soils Considering the growing demands of a constantly expanding population understanding the microbial ecology and interactions under saline conditions and their implications for sustainable agriculture is of utmost importance Providing both an essential review of the status quo and a future outlook this book represents a valuable asset for researchers environmentalists and students working in microbiology and agriculture

Nanotechnology in Agriculture and Environmental Science Sunil K. Deshmukh,Mandira Kochar,Pawan Kaur,Pushplata Prasad Singh,2022-11-17 This book provides examples applications of nanotechnology in addressing problems and challenges in agriculture as well as environmental sciences and provides an overview of innovations in nanopesticides nanofertilizers bionanosensors and nano based delivery system for improving different aspects of plant productivity including pre harvest and post harvest strategies

as well detection of contaminants that could be useful for enhancing soil health Recycling of agricultural waste to beneficial products using nanotechnologies bionanosensors fate of nanomaterials and the ecological consequences of their delivery into the environment safety and nanotoxicity issues are other topics being dealt with in this book Chapters have been written by internationally recognized researchers and experts with special reference to the innovations and latest developments in the mentioned areas of nanobiotechnology that have applications and commercial importance especially for crop fields and post harvest management Despite the research and development used to promote the use of nanotechnology in agriculture and the environmental knowledge gaps and uncertainties about how to fill the gaps are more prevalent than scientific certainties about the public health and environmental effects of nanomaterials The book thus addresses the issue of toxicity of nanomaterials in agricultural nanotechnology products The book will be useful for active researchers and scientists in the agricultural sector academia as well as industry including nanotechnologists plant pathologists agronomists agrochemists environmental technologists and all scientists working for sustainability in agriculture The book will encourage future and active researchers and scientists in the agriculture sector academia as well as industry *Biogenic Nanomaterials*

Devarajan Thangadurai, Saher Islam, Jeyabalan Sangeetha, Natália Cruz-Martins, 2022-08-18 Nanotechnology is believed to be the next great revolution in biology medicine and agriculture This new volume *Biogenic Nanomaterials Structural Properties and Functional Applications* explores that trend by providing in a global way updated information on the use and applications of nanobiotechnology starting from a careful characterization and introduction to the various uses of nanoparticles and nanomaterials their nanomechanical properties in bacteria and biomedical applications The book goes on to present nanobiotechnology applications in targeted therapy for multiple pathologies such as cancer obstructive pulmonary diseases chronic infectious diseases as well as its impact on the modulation of the intestinal microbiota A special emphasis is also given to the potential of nanobiotechnology in terms of promoting sustainability such as the ability to improve plant systems in terms of tissue culture its added value in the transfer of macromolecules to plants and also in triggering the sustainable exploitation of agriculture forestry and food residues ultimately promoting green nanotechnology This book offers a unique perspective and overview of the influences of nanobiotechnology researchers and scientists It delivers an important resource for existing applications and imminent developments of nanobiotechnology *Plants Under Metal and Metalloid Stress*

Mirza Hasanuzzaman, Kamrun Nahar, Masayuki Fujita, 2018-11-30 In the industrial era the most important potential threat to crop production is abiotic stress including toxic metal metalloid stress Growing populations and rapid industrialization lead to the generation and release of huge amounts of toxic metals metalloids into the environment altering plant physiological processes and reducing yields In the last few decades there has been extensive research to elucidate the mechanisms of tolerance to metal metalloid toxicity and ways to improve the defense system in plants Use of exogenous photoprotectants such as osmoprotectants plant nutrients phytohormones signaling molecules antioxidants amino acids and organic acids are

widely being used to improve plants tolerance to metal metalloid stress Recently phytoremediation approaches have been effectively employed to remediate metal metalloid pollution This book presents the latest insights into plant responses and tolerance in plants grown under metal metalloids stress to provide a better understanding of the topic and the future outlook

Nanoagronomy Sumera Javad,2020-05-12 In this age of population explosion and depleting natural resources this book offers new techniques to produce more from agricultural crops at a lower cost The field of agronomy addresses this issue and interacts with the fields of agriculture botany and economics Nanotechnology and nanoparticles play a role in agronomy This book will join the techniques from both fields to construct one comprehensive book Students of agriculture physics nanotechnology and plant sciences will benefit equally from this work

Salinity Tolerance in Plants:Methods, Mechanisms and Management 2nd Ed B. K. Garg,I.C. Gupta,2019-03-01 Salinity tolerance in plants is a complex problem encompassing numerous morphological physiological and biochemical processes and adaptations at the cellular sub cellular and whole plant levels The book comprising eleven chapters deals with diverse aspects of salt tolerance including plant response to salinity and sodicity crop tolerance at different growth stages and criteria for evaluating the same The mechanism of salt injury viz osmotic ionic and nutrient imbalance has been dealt with adopting an integrated approach Likewise the recent information on photosynthesis respiration carbohydrate nitrogen and protein metabolism enzyme dynamics and plant hormones as well as nodulation and symbiotic nitrogen fixation in legumes has been elaborated comprehensively Special attention has been given to the interaction between essential nutrients and salinity as it is vital for alleviation of adverse effects of salt stress The synthesis of knowledge on different mechanisms of salt resistance including osmoregulation with organic and inorganic solutes has also been presented Various methods of introducing salt tolerance in plants such as breeding genetic variations physiological approaches tissue culture somaclonal variation somatic hybridation and recombinat DNA technology have been discussed The nature and properties of salt affected soils and groundwaters and principles for amelioration and management of these critical problems have been included in this book Furthermore Afforestation and Agroforestry techniques for salt affected soils with emphasis on salt tolerant tree species and suitable tree crop combinations also find their much needed due space in the present book

Advancing Agroecology in International Law Rob Amos,2023-10-30 Producing enough food is a basic human priority and a critical challenge in the face of a growing population and the deteriorating ecological health of the planet Modern agricultural practices promise to maximise the productive efficiency of available land but are one of the main drivers of agro and biodiversity loss Agroecology which places ecological sustainability and diversity at the heart of agriculture is one response to these challenges It presents agriculture not only as the process through which food is produced but as a dynamic socioecological phenomenon that exists through networks comprising natural and human stakeholders at global national and subnational levels Drawing on a combination of agroecological and legal literature this book explores where there is space in international law to pursue agroecology Using a

range of case studies it demonstrates how concepts mechanisms and regulatory approaches in the law advance and can be reformed to further advance an agroecological legal framework that allows humanity to meet its agricultural needs in a way that protects the natural and cultural diversity that is fundamental to the ecological integrity of the planet *Plant*

Adaptation to Environmental Change Naser A. Anjum, Sarvajeet Singh Gill, Ritu Gill, 2014-01-10 Plants constantly cope with unfavourable ecosystem conditions which often prevent them reaching their full genetic potential in terms of growth development and productivity This book covers plants responses to these environmental changes namely the modulation of amino acids peptides and amines to combat both biotic and abiotic stress factors Bringing together the most recent developments this book is an important resource for researchers and students of crop stress and plant physiology

Molecular Dynamics of Plant Stress and its Management Muhammad Shahid, Rajarshi Gaur, 2024-06-25 This edited volume focuses on the study of stress in plants and how it can be effectively managed With the growing global population the importance of crop yield and stress management has become a critical issue and this book offers solutions to these challenges The book explores the impact of abiotic and biotic stressors on plant growth and development including drought salinity temperature stress pests and diseases It also examines the role of genetic engineering and biotechnology in developing stress tolerant plants It offers insights on the latest research and advancements in plant breeding genomics and proteomics which are essential in developing crops that can withstand harsh environmental conditions It offers solutions for managing these challenges including genetic engineering proteomics and genomics The book provides a detailed overview of the latest research and advancements in plant stress management and offers practical advice on how to apply these findings in real world scenarios It explores the impact of climate change on agricultural production and provides insights on how to develop stress tolerant crops that can withstand changing environmental conditions With its comprehensive coverage of the latest research and practical insights the book is an invaluable guide for students researchers and professionals looking to develop sustainable agricultural practices and ensure food security for future generations

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