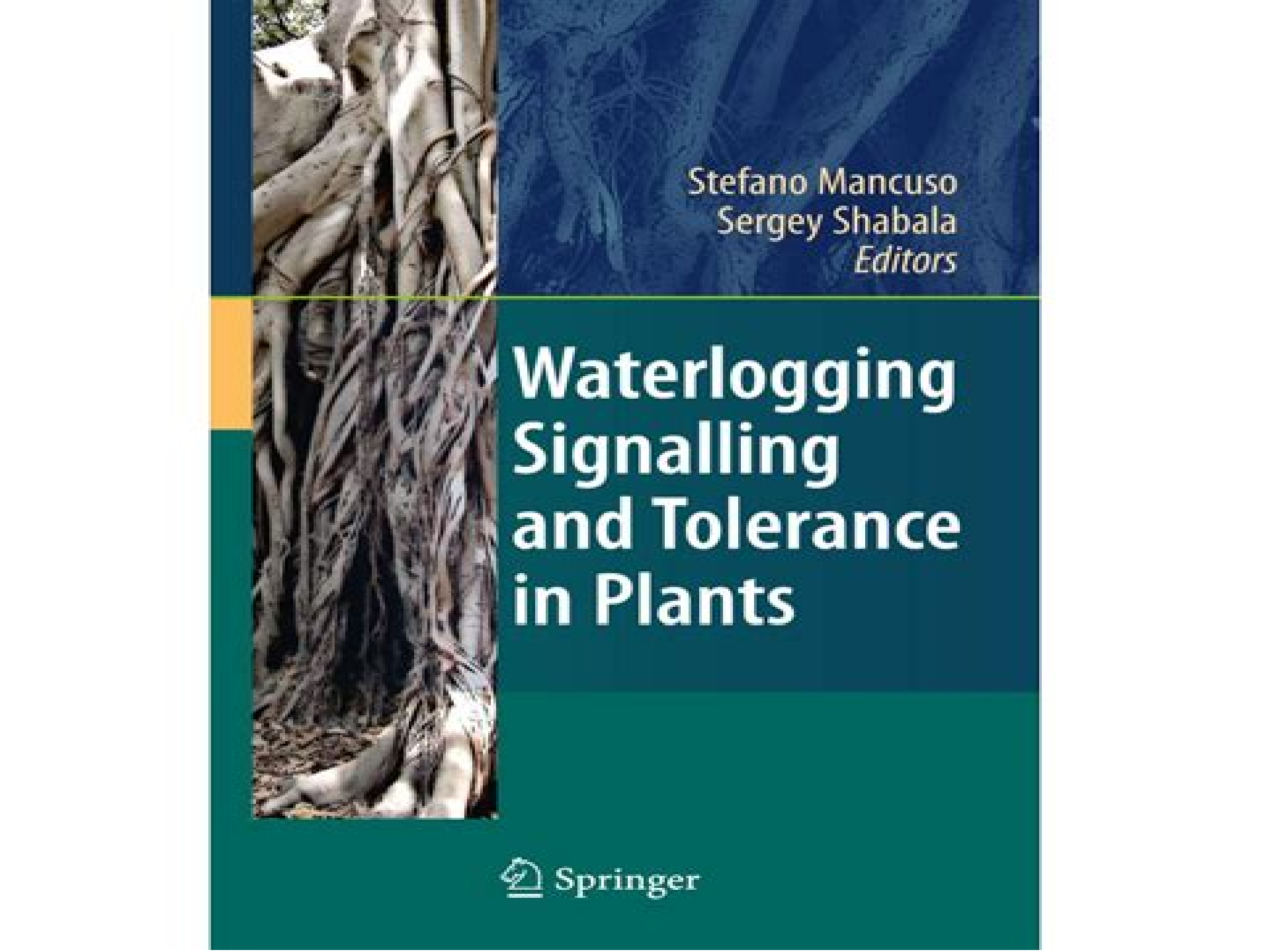




Stefano Mancuso
Sergey Shabala
Editors

Waterlogging Signalling and Tolerance in Plants

 Springer

Waterlogging Signalling And Tolerance In Plants

Amram Eshel, Tom Beeckman



Waterlogging Signalling And Tolerance In Plants:

Waterlogging Signalling and Tolerance in Plants Stefano Mancuso, Sergey Shabala, 2010-03-10 In the last half century because of the raising world population and because of the many environmental issues posed by the industrialization the amount of arable land per person has declined from 0.32 ha in 1961 to 0.21 ha in 1997 and is expected to drop further to 0.16 ha by 2030 and therefore is a severe menace to food security FAO 2006 At the same time about 12 million ha of irrigated land in the developing world has lost its productivity due to waterlogging and salinity Waterlogging is a major problem for plant cultivation in many regions of the world The reasons are in part due to climatic change that leads to the increased number of precipitations of great intensity in part to land degradation Considering India alone the total area suffering from waterlogging is estimated to be about 3.3 million ha Bhattacharya 1992 the major causes of waterlogging include superfluous irrigation supplies seepage losses from canal impeded sub surface drainage and lack of proper land development In addition many irrigated areas are subjected to yield decline because of waterlogging due to inadequate drainage systems Worldwide it has been estimated that at least one tenth of the irrigated cropland suffers from waterlogging

Reactive Oxygen Species and Antioxidant Systems in Plants: Role and Regulation under Abiotic Stress M. Iqbal R. Khan, Nafees A. Khan, 2017-08-02 The present edited book is an attempt to update the state of art of the knowledge on metabolism of ROS and antioxidants and their relationship in plant adaptation to abiotic stresses involving physiological biochemical and molecular processes The chapters are much focused on the current climate issues and how ROS metabolism can manipulate with antioxidant system to accelerate detoxification mechanism It will enhance the mechanistic understanding on ROS and antioxidants system and will pave the path for agricultural scientists in developing tolerant crops to achieve sustainability under the changing environmental conditions The increase in abiotic stress factors has become a major threat to sustainability of crop production This situation has led to think ways which can help to come out with potential measures for which it is necessary to understand the influence of abiotic stress factors on crops performance and the mechanisms by which these factors impact plants It has now become evident that abiotic stress impacts negatively on plant growth and development at every stage of plant's life Plants adapt to the changing environment with the adjustment at physiological biochemical and molecular levels The possible mechanisms involved in the negative effects of abiotic stress factors are excess production of reactive oxygen species ROS They alter physiological and molecular mechanisms leading to poor performance of plants Plants however are able to cope with these adverse effects by inducing antioxidant systems as the priority Nevertheless the dual role of ROS has now been ascertained which provides an evidence for regulation of plant metabolism positively on a concentration dependent manner Under conditions of high ROS production the antioxidant system plays a major role in diminishing the effects of ROS Thus ROS production and antioxidant system are interwoven with abiotic stress conditions The antioxidants have the capacity to hold the stability in metabolism in order to avoid disruption due to

environmental disturbances **Abiotic Stress Adaptation in Plants** Ashwani Pareek, S.K. Sopory, Hans J.

Bohnert, Govindjee, 2009-12-12 Environmental insults such as extremes of temperature extremes of water status as well as deteriorating soil conditions pose major threats to agriculture and food security Employing contemporary tools and techniques from all branches of science attempts are being made worldwide to understand how plants respond to abiotic stresses with the aim to help manipulate plant performance that will be better suited to withstand these stresses This book on abiotic stress attempts to search for possible answers to several basic questions related to plant responses towards abiotic stresses Presented in this book is a holistic view of the general principles of stress perception signal transduction and regulation of gene expression Further chapters analyze not only model systems but extrapolate interpretations obtained from models to crops Lastly discusses how stress tolerant crop or model plants have been or are being raised through plant breeding and genetic engineering approaches Twenty three chapters written by international authorities integrate molecular details with overall plant structure and physiology in a text book style including key references Microbes and Signaling

Biomolecules Against Plant Stress Anita Sharma, 2020-11-06 This book sheds new light on ways to alleviate biotic and abiotic stress in plants using signaling molecules of plant growth promotory rhizobacteria Further it elaborates on the different types of stress and strategies used by plants under various stress conditions The respective sections describe the importance of the microbiome for the overall health of plants and how exploring plant microbe communication and signaling pathways could offer a promising avenue for future research The book also discusses how rhizobacteria could be exploited in stress alleviation and sustainable agriculture and addresses omics strategies for stress response and mitigation Thanks to clearly annotated references the book also supports and encourages readers to further explore the topics discussed Genetic Manipulation in Plants for Mitigation of Climate Change Pawan Kumar Jaiwal, Rana Pratap Singh, Om Parkash

Dhankher, 2016-01-07 This book presents a detailed overview and critical evaluation of the state of the art and latest approaches in genetic manipulation studies on plants to mitigate the impact of climate change on growth and productivity Each chapter has been written by experts in plant stress biology and highlights the involvement of a variety of genes pathways and their regulation in abiotic stress recent advances in molecular breeding identification of tightly linked markers QTLs genes transgenesis introduction of exogenous genes or changing the expression of endogenous stress responsive genes and genomics approaches that have made it easier to identify and isolate several key genes involved in abiotic stress such as drought water lodging flooding extreme temperatures salinity and heavy metal toxicity Food and nutritional security has emerged as a major global challenge due to expanding populations and cultivated areas becoming less productive as a result of extreme climatic changes adversely affecting the quantity and quality of plants Hence there is an urgent need to develop crop varieties resilient to abiotic stress to ensure food security and combat increased input costs low yields and the marginalization of land The role of GM crops in poverty alleviation nutrition and health in developing countries and their

feasibility in times of climate change are also discussed Recent advances in gene technologies have shown the potential for faster more targeted crop improvements by transferring genes across the sexual barriers The book is a valuable resource for scientists researchers students planners and industrialists working in the area of biotechnology plant agriculture agronomy horticulture plant physiology molecular biology plant sciences and environmental sciences

Plant Flooding Riyazuddin Riyazuddin,Ravi Gupta,Pramod W. Ramteke,Riyaz Sayyed,2025-05-25 The issue of flooding has become a significant challenge on a global scale especially in rain fed ecosystems having soils with poor drainage This significantly diminishes crop yield Therefore it is imperative to address the issue of flood stress including the potential strategies for mitigating its adverse effects on crop yield in order to ensure the continued provision of food for the growing global population This book aims at bringing out a comprehensive collection of information on flooding stress on plants such as morphological physiological and molecular responses of plants to flood stress omics studies to understand the molecular mechanism underlying flooding stress tolerance and transgenic and microbial strategies to overcome flood stress It also deals with the use of new technologies to understand flood stress and plant responses The chapters included in this book are the compilation of latest information and data on the flood stress its effect on the physiology growth and development of crop plants as well as mechanisms adapted by plants to overcome this stress This book will help Researchers Professors Agri Entrepreneurs and Technologists understand the detrimental effects of flood stress to develop newer approaches to mitigate flood stress The book will help fill in designing new dimensions in the Flood Stress research and development of methods and technologies to overcome the flood induced losses in crop yield

Anoxia Alexander Altenbach,Joan M. Bernhard,Joseph Seckbach,2011-10-20 ANOXIA defines the lack of free molecular oxygen in an environment In the presence of organic matter anaerobic prokaryotes produce compounds such as free radicals hydrogen sulfide or methane that are typically toxic to aerobes The concomitance of suppressed respiration and presence of toxic substances suggests these habitats are inhospitable to Eukaryota Ecologists sometimes term such environments Death Zones This book presents however a collection of remarkable adaptations to anoxia observed in Eukaryotes such as protists animals plants and fungi Case studies provide evidence for controlled beneficial use of anoxia by for example modification of free radicals use of alternative electron donors for anaerobic metabolic pathways and employment of anaerobic symbionts The complex interwoven existence of oxic and anoxic conditions in space and time is also highlighted as is the idea that eukaryotic inhabitation of anoxic habitats was established early in Earth history

Managing Reactive Oxygen Species In Sports Turf Jeff Haag,2019-02-07 Reactive oxygen species can have detrimental effects on sports turf This book describes the causes of reactive oxygen species its photosynthetic targets and nutrients and compounds that can manage and prevent them

Plant Responses to Hypoxia Elena Loreti,Gustavo Striker,2021-03-02 Molecular oxygen deficiency leads to altered cellular metabolism and can dramatically reduce crop productivity Nearly all crops are negatively affected by a lack of

oxygen hypoxia due to adverse environmental conditions such as excessive rain and soil waterlogging Extensive efforts to fully understand how plants sense oxygen deficiency and their ability to respond using different strategies are crucial to increase hypoxia tolerance Progress in our understanding has been significant in recent years This topic certainly deserves more attention from the academic community therefore we have compiled a series of articles reflecting the advancements made thus far

Plant Electrophysiology Alexander G. Volkov, 2012-05-03 This book compiles new findings from the work of internationally renowned experts in plant electrophysiology biophysics bioelectrochemistry ion channels membrane transport imaging of water transport photosynthesis mechanosensors osmotic motors sensing and actuation in plants First volume covers modern methods in plant electrophysiology and cell electrophysiology Second volume deals with signal transduction and responses in plants

Arbuscular Mycorrhizal Fungi in Sustainable Agriculture: Nutrient and Crop Management Manoj Parihar, Amitava Rakshit, Alok Adholeya, Yinglong Chen, 2024-06-03 This 2 volume book is an up to date overview of current progress in Arbuscular Mycorrhizal Fungal AMF technique development inoculum production and its quality regulations application in agriculture horticulture agroforestry and other ecosystems along with nutrient management for sustainable food production It offers new insight and cutting edge information for novices and experts such as students academicians researchers environmentalists industrialists and other individuals interested in the field of mycorrhiza AMF provides favorable rhizospheric environment to the plant with numerous direct and indirect mechanisms in exchange of soil nutrients and photosynthetically fixed carbon Other than the species composition and diversity determination of natural ecosystem AMF play a vital role in maintaining the soil quality agricultural sustainability and environmental integrity The second volume provide comprehensive knowledge on AMF role in nutrient cycling nutrient exchange and their acquisition under normal and stress condition

Biostimulants for Crop Production and Sustainable Agriculture Mirza Hasanuzzaman, Barbara Hawrylak-Nowak, Tofazzal Islam, Masayuki Fujita, 2022-09-14 Agricultural biostimulants are a group of substances or microorganisms based on natural resources that are applied to plants or soils to improve nutrient uptake and plant growth and provide better tolerance to various stresses Their function is to stimulate the natural processes of plants or to enrich the soil microbiome to improve plant growth nutrition abiotic and or biotic stress tolerance yield and quality of crop plants Interest in plant biostimulants has been on the rise over the past 10 years driven by the growing interest of researchers and farmers in environmentally friendly tools for improved crop performance Improved crop production technologies are urgently needed to meet the growing demand for food for the ever increasing global population by addressing the impacts of changing climate on agriculture This book is of interest to researchers in agriculture agronomy crop and plant science soil science and environmental science

Biochar in Mitigating Abiotic Stress in Plants Arafat Abdel Hamed Abdel Latef, 2024-10-31 Biochar for Mitigating Abiotic Stress in Plants provides a unique and leading resource for utilizing biochar to address specific plant health challenges including osmotic ionic and oxidative stress With a focus on

crop yielding plants the book provides targeted application insights to improve plant health and resulting crop production Readers will find important tools toward the identification treatment and management of a variety of abiotic stressors through the effective and appropriate application of biochar This is an important reference for those seeking to apply current knowledge and an inspiration for further research in the area Biochar is a carbon rich organic substance produced by the pyrolysis of organic materials in the absence or presence of oxygen It is an organic matter conditioner that can boost carbon sequestration and organic and inorganic pollutant immobilization It is a crucial method for soil regeneration Additionally biochar facilitates increasing mineral supply and soil organic matter resulting in soils with increased nutritional content Covers the latest evidence based approach in the diagnosis and management of plants under abiotic stress Includes easy to follow algorithms and key points Proposes options for sustaining crop production under the effects of climate change

Managing Plant Production Under Changing Environment Mirza Hasanuzzaman, Golam Jalal Ahammed, Kamrun Nahar, 2022-02-22 This comprehensive edited volume collects the most recent information with up to date citations on the decrease in plant productivity under climatic changes and its link with global food security The book emphasis on the crop management practices and recent advancement in the techniques for mitigating the negative effects of climate induced biotic and abiotic stress It brings together 19 chapters developed by eminent researchers in the area of plant and environmental sciences Global climate change is increasingly becoming a concern for future of agriculture High levels of inorganic and organic pollutants and climatic stress adversely affects the sensitive and complex equation of natural resources and ecosystem services To meet the increased food demand plant productivity needs to be enhanced therefore this book fills in the gap and brings together information on the physiological and molecular approaches for improving crop productivity The book is resourceful reading material for researchers faculty members graduate and post graduate students of plant science agriculture agronomy soil science botany Molecular biology and environmental science

The Biology of Aquatic and Wetland Plants Gary N. Ervin, 2023-04-26 Aquatic plants play a critically important role in maintaining ecosystem health They are natural biological filters in freshwater and estuarine wetlands they contribute to the reproductive success of many organisms some of which are harvested for food they assist in flood control and they are prominent elements in the aesthetics and recreational use of freshwater and estuarine habitats Despite this globally recognized importance wetlands have faced and continue to face threats from the encroachment of human activities The Biology of Aquatic and Wetland Plants is a thorough and up to date textbook devoted to these plants and their interactions with the environment The focus is on botanical diversity from the perspective of evolutionary relationships emphasizing the role of evolution in shaping adaptations to the aquatic environment By incorporating recent findings on the phylogeny of green plants with special emphasis on the angiosperms the text is broadly useful for courses in plant biology physiology and ecology Additionally a chapter on population biology and evolutionary ecology complements the evolutionary backdrop of hydrophyte biology by

examining the details of speciation and applications of modern genetic approaches to aquatic plant conservation Key Features Synthesizes recent and seminal literature on aquatic and wetland plants Emphasizes evolutionary history as a factor influencing adaptations to the wetland environment Provides a global perspective on plant diversity and threats facing wetland ecosystems Highlights research needs in the field of aquatic and wetland plant biology Includes 280 figures with more than 300 color photographs and 41 tables to provide ease of access to important concepts and information

Marschner's Mineral Nutrition of Higher Plants Horst Marschner, 2012 Respected and known worldwide in the field for his research in plant nutrition Dr Horst Marschner authored two editions of Mineral Nutrition of Higher Plants His research greatly advanced the understanding of plant nutrition ranging from rhizosphere processes to nutrient uptake and utilization by plants in the field While visiting field experiments in West Africa in 1996 Dr Marschner contracted malaria and passed away and until now this legacy title went unrevised Despite the passage of time it remains the definitive reference on plant mineral nutrition Since the last edition great progress has been made in the understanding of various aspects of plant nutrition In recent years the perspective on the mode of action of nutrients in plant metabolism and yield formation has shifted Much progress has been made in the molecular aspects of nutrient uptake and transport within plants as well as the responses of plants to nutrient deficiency or toxicity These and many other developments are covered in this long awaited new edition P 4 of cover

Genomic Designing for Abiotic Stress Resistant Vegetable Crops Chittaranjan Kole, 2022-08-21 This book presents deliberations on molecular and genomic mechanisms underlying the interactions of crop plants to the abiotic stresses caused by heat cold drought flooding submergence salinity acidity etc important to develop resistant crop varieties Knowledge on the advanced genetic and genomic crop improvement strategies including molecular breeding transgenics genomic assisted breeding and the recently emerging genome editing for developing resistant varieties in vegetable crops is imperative for addressing FHNEE food health nutrition energy and environment security Whole genome sequencing of these crops followed by genotyping by sequencing has provided precise information regarding the genes conferring resistance useful for gene discovery allele mining and shuttle breeding which in turn opened up the scope for designing crop genomes with resistance to abiotic stresses The nine chapters each dedicated to a vegetable crop or crop group in this volume elucidate on different types of abiotic stresses and their effects on and interaction with the crop enumerate on the available genetic diversity with regard to abiotic stress resistance among available cultivars illuminate on the potential gene pools for utilization in interspecific gene transfer present brief on classical genetics of stress resistance and traditional breeding for transferring them to their cultivated counterparts depict the success stories of genetic engineering for developing abiotic stress resistant crop varieties discuss on molecular mapping of genes and QTLs underlying stress resistance and their marker assisted introgression into elite varieties enunciate on different genomics aided techniques including genomic selection allele mining gene discovery and gene pyramiding for developing adaptive crop

varieties with higher quantity and quality of yields and also elaborate some case studies on genome editing focusing on specific genes for generating abiotic stress resistant crops

Low-Oxygen Stress in Plants Joost T. van Dongen, Francesco Licausi, 2014-01-17 During the last ten years knowledge about the multitude of adaptive responses of plants to low oxygen stress has grown immensely The oxygen sensor mechanism has been discovered the knowledge about the interaction network of gene expression is expanding and metabolic adaptations have been described in detail Furthermore morphological changes were investigated and the regulative mechanisms triggered by plant hormones or reactive oxygen species have been revealed This book provides a broad overview of all these aspects of low oxygen stress in plants It integrates knowledge from different disciplines such as molecular biology biochemistry ecophysiology and agricultural horticultural sciences to comprehensively describe how plants cope with low oxygen stress and discuss its ecological and agronomical consequences This book is written for plant scientists biochemists and scientists in agriculture and ecophysiology

Plant Roots Amram Eshel, Tom Beeckman, 2013-04-17 The decade since the publication of the third edition of this volume has been an era of great progress in biology in general and the plant sciences in particular This is especially true with the advancements brought on by the sequencing of whole genomes of model organisms and the development of omics techniques This fourth edition of *Plant Root*

Essential Minerals in Plant-Soil Systems Azamal Husen, 2024-04-29 *Essential Minerals in Plant Soil Systems* Coordination Signaling and Interaction Under Adverse Conditions is the first book to encompass these key aspects of plant science biochemistry soil science and fertilizer development in a single volume Describing the micro and macronutrients in the plant soil system with the help of suitable illustrations the book connects all the pieces enabling comprehensive and connected understanding Terrestrial plants are sessile in nature They face various adverse environmental conditions including soil nutrient deficiency signals which influence overall plant growth and development Some of the essential nutrients are unreachable to roots due to their low solubility and relative immobilization Thus the soil plant system has evolved signaling communication and coordination responses for survival under multiple adverse situations By evolving highly sophisticated mechanisms at the cellular as well as whole plant scale these plants have developed ways to co regulate these stresses in order to maintain homeostasis *Essential Minerals in Plant Soil Systems* covers recent advances in the understanding of how plants coordinate the acquisition transport signaling and interaction cross talks between macro and micro nutrients in adverse environmental situations These points are key to understanding the significance of essential as well as beneficial elements for sustainable plant growth and production This book is a valuable reference for those putting research into practice in addressing stress situations as well as providing important foundational insights for further research Provides a comprehensive overview of micro and macronutrients and their interaction with phytohormones under stress conditions Explores proteomic and genomic research into deficiencies and toxicities in plant systems Highlights the use of nanobiotechnology for controlled release of micro and macronutrients in the

plant soil systems

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