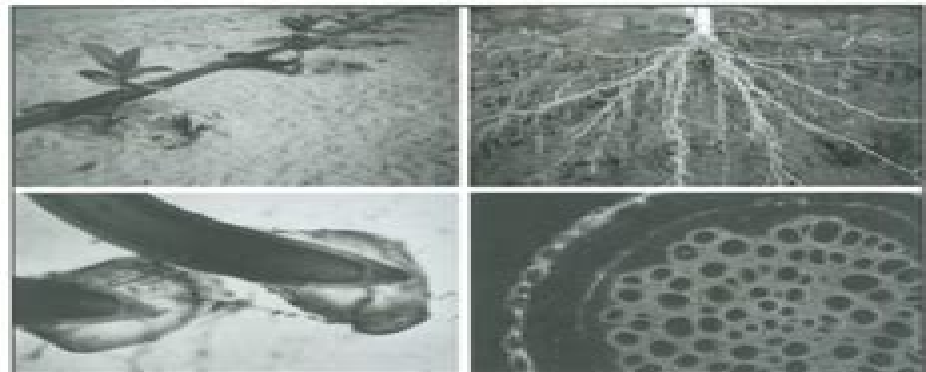


DEVELOPMENTS IN PLANT AND SOIL SCIENCES

# Roots: The Dynamic Interface between Plants and the Earth

The 6th Symposium of the International Society of Root Research, 11–15 November 2001, Nagoya, Japan

Jun Abe  
editor



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# Roots The Dynamic Interface Between Plants And The Earth

**Javid Ahmad Parray, Mohammad  
Yaseen Mir, Nowsheen Shameem**



## **Roots The Dynamic Interface Between Plants And The Earth:**

*Roots*, 2003      *Roots* Jun J. Abe, 2014-01-15      **Roots** International Society of Root Research. Symposium, 2003-11-30

The root is the organ that functions as the interface between the plant and the earth environment Many human management practices involving crops forests and natural vegetation also affect plant growth through the soil and roots Understanding the morphology and function of roots from the cellular level to the level of the whole root system is required for both plant production and environmental protection This book is at the forefront of plant root science rhizology catering to professional plant scientists and graduate students It covers root development stress physiology ecology and associations with microorganisms The chapters are selected papers originally presented at the 6th Symposium of the International Society of Root Research where plant biologists ecologists soil microbiologists crop scientists forestry scientists and environmental scientists among others gathered to discuss current research results and to establish rhizology as a newly integrated research area      **Roots: the Dynamic Interface Between Plants and the Earth** Jun Abe, 2003      Roots: the Dynamic Interface Between Plants and the Earth Jun Abe, 2003      *Roots* Jun J. Abe, 2013-04-17 The root is the organ that functions as the interface between the plant and the earth environment Many human management practices involving crops forests and natural vegetation also affect plant growth through the soil and roots Understanding the morphology and function of roots from the cellular level to the level of the whole root system is required for both plant production and environmental protection This book is at the forefront of plant root science rhizology catering to professional plant scientists and graduate students It covers root development stress physiology ecology and associations with microorganisms The chapters are selected papers originally presented at the 6th Symposium of the International Society of Root Research where plant biologists ecologists soil microbiologists crop scientists forestry scientists and environmental scientists among others gathered to discuss current research results and to establish rhizology as a newly integrated research area      **Special Issue: Roots** Jun Abe, 2003      *Gravitational Biology II* Wolfgang Hanke, Florian P.M. Kohn, Maren Neef, Rüdiger Hampp, 2018-12-30 This volume of the series Space Life Sciences provides insights into the latest findings of gravity research and the effect of gravity on biological systems specifically on a cellular and molecular level It starts by explaining the underlying physics of gravity and presenting some novel ideas on the basic principles of gravity perception It then goes on to discuss how in response to gravity perception secondary messengers such as calcium and hydrogen peroxide might control responses further downstream like gene and protein expression and modulation Further it describes the consequences for animal and plant cells as well as for metabolism Written by experts in the field this book is a valuable resource for students and researchers in biochemistry medicine and biomedicine wanting to gain a solid understanding of membrane biology secondary messenger function and gene and protein expression specifically in the context of gravity      **Plant Microbe Interactions**, 2015-11-27 Advances in Botanical Research publishes in depth and up to date reviews on a wide range of

topics in plant sciences Currently in its 75th volume the series features several reviews by recognized experts on all aspects of plant genetics biochemistry cell biology molecular biology physiology and ecology Publishes in depth and up to date reviews on a wide range of topics in plant sciences Contains commentary by recognized experts on all aspects of plant genetics biochemistry cell biology molecular biology physiology and ecology This volume features reviews of the fast moving field of plant microbe interactions **Oil Shale** ,2004 *The Model Legume Medicago truncatula, 2 Volume Set* Frans J. de Bruijn,2020-01-29 Fully covers the biology biochemistry genetics and genomics of Medicago truncatula Model plant species are valuable not only because they lead to discoveries in basic biology but also because they provide resources that facilitate translational biology to improve crops of economic importance Plant scientists are drawn to models because of their ease of manipulation simple genome organization rapid life cycles and the availability of multiple genetic and genomic tools This reference provides comprehensive coverage of the Model Legume Medicago truncatula It features review chapters as well as research chapters describing experiments carried out by the authors with clear materials and methods Most of the chapters utilize advanced molecular techniques and biochemical analyses to approach a variety of aspects of the Model The Model Legume Medicago truncatula starts with an examination of M truncatula plant development biosynthesis of natural products stress and M truncatula and the M truncatula Sinorhizobium meliloti symbiosis Symbiosis of Medicago truncatula with arbuscular mycorrhiza comes next followed by chapters on the common symbiotic signaling pathway CSSP or SYM and infection events in the Rhizobium legume symbiosis Other sections look at hormones and the rhizobial and mycorrhizal symbioses autoregulation of nodule numbers AON in M truncatula Medicago truncatula databases and computer programs and more Contains reviews original research chapters and methods Covers most aspects of the M truncatula Model System including basic biology biochemistry genetics and genomics of this system Offers molecular techniques and advanced biochemical analyses for approaching a variety of aspects of the Model Legume Medicago truncatula Includes introductions by the editor to each section presenting the summary of selected chapters in the section Features an extensive index to facilitate the search for key terms The Model Legume Medicago truncatula is an excellent book for researchers and upper level graduate students in microbial ecology environmental microbiology plant genetics and biochemistry It will also benefit legume biologists plant molecular biologists agrobiologists plant breeders bioinformaticians and evolutionary biologists

**Recent Trends in Mycological Research** Ajar Nath Yadav,2021-02-04 Fungi range from being microscopic single celled yeasts to multicellular and heterotrophic in nature Fungal communities have been found in vast ranges of environmental conditions They can be associated with plants epiphytically endophytically or rhizospherically Extreme environments represent unique ecosystems that harbor novel biodiversity of fungal communities Interest in the exploration of fungal diversity has been spurred by the fact that fungi perform numerous functions integral in sustaining the biosphere ranging from nutrient cycling to environmental detoxification which involves processes like augmentation supplementation

and recycling of plant nutrients a particularly important process in sustainable agriculture Fungal communities from natural and extreme habitats help promote plant growth enhance crop yield and enhance soil fertility via direct or indirect plant growth promoting PGP mechanisms of solubilization of phosphorus potassium and zinc production of ammonia hydrogen cyanides phytohormones Fe chelating compounds extracellular hydrolytic enzymes and bioactive secondary metabolites These PGP fungi could be used as biofertilizers bioinoculants and biocontrol agents in place of chemical fertilizers and pesticides in eco friendly manners for sustainable agriculture and environments Along with agricultural applications medically important fungi play a significant role for human health Fungal communities are useful for sustainable environments as they are used for bioremediation which is the use of microorganisms metabolism to degrade waste contaminants sewage domestic and industrial effluents into non toxic or less toxic materials by natural biological processes Fungi could be used as mycoremediation for the future of environmental sustainability Fungi and fungal products have the biochemical and ecological capability to degrade environmental organic chemicals and to decrease the risk associated with metals semi metals and noble metals either by chemical modification or by manipulating chemical bioavailability The two volumes of Recent Trends in Mycological Research aim to provide an understanding of fungal communities from diverse environmental habitats and their potential applications in agriculture medical environments and industry The books are useful to scientists researchers and students involved in microbiology biotechnology agriculture molecular biology environmental biology and related subjects

Sustainable Agriculture: Biotechniques in Plant Biology Javid Ahmad Parray, Mohammad Yaseen Mir, Nowsheen Shameem, 2019-11-06 This book will be of immense helpful to the students of plant biotechnology Agricultural sciences Microbiology of both undergraduate and postgraduate levels in universities colleges and Research institutes Besides the book will be quite supportive researchers who work in the field of plant biotechnology and agricultural sciences In this book the main focus will be on advanced genome editing approaches for the production of GM crops besides their socioeconomic ethical and risk biosafety assessments Nanotechnology is the new emerging and fascinating field of science finds its application in almost all the major research areas and its uses in agriculture and food sectors are incipient The books seems to be first in summarizing the two way interactive approach in the field of plant biotechnology and setting of a new arena in shaping the new bio techniques towards the sustainable cause

*Commercial Scale Tissue Culture for Horticulture and Plantation Crops* Shubhpriya Gupta, Preeti Chaturvedi, 2022-06-16 This edited book is focusing on the novel and innovative procedures in tissue culture for large scale production of plantation and horticulture crops It is bringing out a comprehensive collection of information on commercial scale tissue culture with the objective of producing high quality disease free and uniform planting material Developing low cost commercial tissue culture can be one of the best possible way to attain the goal of sustainable agriculture Tissue culture provides a means for rapid clonal propagation of desired cultivars and a mechanism for somatic hybridization and in vitro selection of novel genotypes

Application of plant tissue culture technology in horticulture and plantation crops provides an efficient method to improve the quality and nutrition of the crops This book includes a description of highly efficient low cost in vitro regeneration protocols of important plantation and horticulture crops with a detailed guideline to establish a commercial plant tissue culture facility including certification packaging and transportation of plantlets The book discusses somatic embryogenesis virus elimination genetic transformation protoplast fusion haploid production coculture of endophytic fungi effects of light and ionizing radiation as well as the application of bioreactors This book is useful for a wide range of readers such as academicians students research scientists horticulturists agriculturists industrial entrepreneurs and agro industry employees

*Medicinal Plant Responses to Stressful Conditions* Arafat Abdel Hamed Abdel Latef, 2023-05-11 Medicinal Plant Responses to Stressful Conditions discusses the effects of multiple biotic and abiotic stressors on medicinal plants It features information on biochemical molecular and physiological strategies used to mitigate or alleviate detrimental effects of biotic and abiotic stressors The book contains chapters featuring medicinal plants of importance covering subjects including genomics functional genomics metabolomics phenomics proteomics and transcriptomics under biotic and abiotic stress of medicinal plants and their molecular responses It suggests exogenous application of different types of stimulants to enhance medicinal plant production in such conditions Features Details all aspects of biotic and abiotic stressors in various important medicinal plant species Chapters cover evidence based approaches in the diagnosis and management of medicinal plants under stressful conditions Includes information on ways to mitigate effects from biotic stress diseases and pests or abiotic stress high salinity drought temperature extremes waterlogging wind high light intensity UV radiation heavy metals and mineral deficiencies A volume in the Exploring Medicinal Plants series this book is an essential resource for plant scientists botanists environmental scientists and anyone with an interest in herbal medicine

**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

Global Newsletter of Underutilized Crops (Jan. 2001) , **Omics and its Integration: A Systems Biology Approach to Understanding Plant Physiology** Kashif Ali, Milen I. Georgiev, 2023-11-27 Due to the complexity and interconnectivity of many biological processes

an integrative systems biology approach is required to better understand them The integration of various omics data including genomics proteomics transcriptomics and metabolomics data will provide a holistic view that highlights the relationship among the various biomolecules and their functions in plant growth resistance quality and many other important traits Recent advances in analytical power and in the ability to process large data sets has enabled researchers to integrate multi omics data and have a much deeper knowledge of the cell tissue organ or even an entire organism being studied The goal of this Research Topic is not only to publish high quality and reliable omics data but also to answer the bigger question of how to integrate and correlate different data sets from multiple omics studies Can one omics data set be used as a primary data set for the design and execution of another omics study If so then how it can be done What are its pre requisites How can we plan research involving multi omics approach to reach a meaningful conclusion These are the questions that need our attention and their answers are critical for the future of omics based research For this Research Topic we welcome contributors to submit manuscripts related to the following themes Studies on plant based genomics transcriptomics proteomics and metabolomics Development of new analytical methods for omics utilizing in plants Advancements in the current analytical methods for utilizing omics in plants Integration of multi omics data sets Development of new statistical methods for data analysis

**Sugar Beet Cultivation, Management and Processing** Varucha Misra,Santeshwari Srivastava,Ashutosh Kumar Mall,2022-08-21 This book is a compilation of advancements and achievements in the field of sugar beet cultivation It covers recent research and up to date information on this crop It discusses essential aspects for high production and good yield development and crop management such as origin breeding seed production physiology pathology entomology biotechnology and post harvest technology Sugar beet is known as an alternative crop for sugar production A versatile crop having numerous uses besides being raw material for sugar production its molasses contain high amount of betaine which is used as a feed supplement Due to its value profile it has attracted the millers and farmers alike This book is of interest to teachers researchers agriculture scientists capacity builders and policymakers Also the book serves as additional reading material for graduate students of agriculture forestry ecology and soil science National and international agricultural scientists policy makers will also find this to be a useful read

**The Root Systems in Sustainable Agricultural Intensification** Zed Rengel,Ivica Djalovic,2021-04-19 Explore an in depth and insightful collection of resources discussing various aspects of root structure and function in intensive agricultural systems The Root Systems in Sustainable Agricultural Intensification delivers a comprehensive treatment of state of the art concepts in the theoretical and practical aspects of agricultural management to enhance root system architecture and function The book emphasizes the agricultural measures that enhance root capacity to develop and function under a range of water and nutrient regimes to maximize food feed and fibre production as well as minimize undesirable water and nutrient losses to the environment This reference includes resources that discuss a variety of soil plant agronomy farming system breeding molecular and modelling

aspects to the subject It also discusses strategies and mechanisms that underpin increased water and nutrient use efficiency and combines consideration of natural and agricultural systems to show the continuity of traits and mechanisms Finally the book explores issues related to the global economy as well as widespread social issues that arise from or are underpinned by agricultural intensification Readers will also benefit from the inclusion of A thorough introduction to sustainable intensification including its meaning the need for the technology components and the role of root systems Exploration of the dynamics of root systems in crop and pasture genotypes over the last 100 years Discussion of the interplay between root structure and function with soil microbiome in enhancing efficiency of nitrogen and phosphorus acquisition Evaluation of water uptake in drying soil including balancing supply and demand Perfect for agronomists horticulturalists plant and soil scientists breeders and soil microbiologists The Root Systems in Sustainable Agricultural Intensification will also earn a place in the libraries of advanced undergraduate and postgraduate students in this field who seek a one stop reference in the area of root structure and function



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