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Editorial

Recent Advances in Biological Nitrogen Fixation

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Nitrogen is essential for the growth and functioning of all living organisms; however, only 2% of Earth's nitrogen is available for them [1]. It can mostly be found in the atmosphere as N_2, which can be assimilated only by a small group of microorganisms called diazotrophs, which are able to reduce dinitrogen into NH_3 [2]. This process, referred to as biological nitrogen fixation, is most effective in symbiotic systems formed between soil saprophytic bacteria called rhizobia and legume plants, and can provide considerable amounts of reduced nitrogen for agricultural systems and uncultivated areas [3]. New discoveries and concepts related to biological nitrogen fixation often result in useful improvements in agronomy; therefore, new ideas focusing on enhancing or broadening its application still need to be developed.

The papers in this Special Issue include a review and original research articles covering different aspects of biological nitrogen fixation and organisms associated with this phenomenon. In their extensive review, Santos et al. [4] focused on the demand for environmentally friendly technologies based on microorganisms and their plant hosts that can be used instead of chemical fertilizers and pesticides. In this paper, (a) standards for inoculant production, (b) ways to deliver inoculants to the crop, (c) compatibility between inoculants and pesticides, and (d) detrimental effects of pesticides on inoculants were thoroughly discussed. Maitra et al. [5] proposed new nontoxic polymers that considerably enhance bacterial survival ability, which can be used in preparation of rhizobial liquid inoculants. This might be an interesting finding, since improvement of inoculant formulas are still needed to ensure longer storage with high viability of cells and better competitive properties of strains introduced as biofertilizers. Siczek et al. [6] and Helios [7] described solutions related to sustainable agriculture based on legume–rhizobia symbiotic systems. One of these studies focused on the dynamics of bacterial and fungal communities studied after enrichment of soil with different crop residues in a field trial, and showed that application of legumes as a forecrop not only increased the soil nutrient pool but also had a strong impact on fungal community, acting against phytopathogens, which may result in lower fungicide requirements in the following growing seasons [6]. The second paper presented the use of white clover as undersowing for basket willow (*Salix viminalis* L.), which resulted in reduced weed infestation of young plantations of willow, thus lowering the need for herbicide treatment [7]. As the growth of willow undersown with clover was comparable with plants fertilized with nitrogen, this practice can be assumed as a good alternative for mineral N fertilization of short-rotation woody crops. Radzka et al. [8] focused on maximization of profits of biological nitrogen fixation by plants and described how different sowing densities of soybean could affect the amount of nitrogen obtained from symbiotic reduction of atmospheric N_2. Smytkiewicz et al. [9] described the effect of rhizobial metabolites called chitolipooligosaccharides on the growth, development, and yielding of peas, and demonstrated that such a preparation could be an efficient growth stimulator for legumes. Finally, Marzec-Grządziel et al. [10] described a symbiotic system emerging between ruddy clover (*Trifolium ruberis* L.), an endemic species which is considered endangered in European countries) and their microsymbionts, and showed the perspective for development of an inoculant formulation for this valuable nectariferous plant.

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Recent Advances In Biological Nitrogen Fixation

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Recent Advances In Biological Nitrogen Fixation:

Recent Advances in Biological Nitrogen Fixation N. S. Subba Rao,1980 Recent Advances in Biological Nitrogen Fixation Nanjappa Shamanna Subba Rao,1980 **Current Developments in Biological Nitrogen Fixation** N. S. Subba Rao,1984 This volume discusses the most recent advances in biological nitrogen fixation with chapters written by experts on the ecology physiology biochemistry and genetics of biological nitrogen fixation **The Nitrogen Fixation and its Research in China** Guo-Fan Hong,2013-03-09 Nitrogen Fixation by symbiotic organisms is considered an important contribution to the solution of food problems throughout the world For manyyears Chinese scientists have focused their research in this area Today more than half of the total nitrogen fertilizers applied are from biological fixation sources The editor is an international renowned scientist at the Chinese Academy of sciences He has brought together contributions from various research fields in China and Europe Together they present the state of the art in nitrogen fixation research The studies range from actino mycete fixation induced in various genera andspecies of plants mechanisms and chemical modeling of enzyme systems togenetical engineering of organisms Recent Advances in Ecobiological Research M. P. Sinha,1997 Contributed articles with reference to India commemoration volume for Prof P N Mehrotra **Recent Advancements in Microbial Diversity** Surajit de Mandal,Pankaj Bhatt,2020-06-02 Microorganisms are a major part of the Earth s biological diversity Although a lot of research has been done on microbial diversity most of it is fragmented This book creates the need for a unified text to be published full of information about microbial diversity from highly reputed and impactful sources Recent Advancements in Microbial Diversity brings a comprehensive understanding of the recent advances in microbial diversity research focused on different bodily systems such as the gut Recent Advancements in Microbial Diversity also discusses how the application of advanced sequencing technologies is used to reveal previously unseen microbial diversity and show off its function Gives insight into microbial diversity in different bodily systems Explains novel approaches to studying microbial diversity Highlights the use of omics to analyze the microbial community and its functional attributes Discusses the techniques used to examine microbial diversity including their applications and respective strengths and weaknesses *Recent Advances in Biotechnology* F. Vardar-Sukan,S.S. Sukan,2012-12-06 In last decades rapid scientific and engineering developments have been occuring within the context of Biotechnology If the World Economy is to benefit fully from the advances in biosciences and biochemical engineering it must be able to focus new knowledge on commercially appropriate targets Modern Biotechnology is a mixture of far reaching innovation superimposed on an industrial background and it represents a means of production with bright prospects challenging problems and stimulating competition This NATO Advanced Study Institute on RECENT ADVANCES IN INDUSTRIAL APPLICATIONS OF BIOTECHNOLOGY held between September 16 27 1991 in Ku Etdasl was the first ASI on Biotechnology Ln Turkey t was aiming to provide an updated overview of the fundamental principles novel application areas and impact of Biotechnology on international economy Recent

developments in the field of Biotechnology have been thoroughly discussed concentrating on various interdisciplinary aspects The illain lectures presented at the Institute covered both scientific and commercial aspects of new developments in biotechnology and discussed the possible ways of meeting the challenges of the industry The main lectures were supplemented by Oral 2nd Poster Presentations Thus this volume is comprised of three sections Part I contains the i vited lectures and Part II oral presentations Exte ded abstracts of poster presentations have been included in Part III to provide a more comprehensive coverage of the ASI **CRC Handbook of Plant Science in Agriculture** B.R. Christie,2023-01-06 First published in 1987 this two volume set is an exhaustive compilation of the most recent data on economically important crops Volume I presents information on genetics botany and growth of crop plants while Volume II covers the production of Crops and their utilization *Plant-Microbe Interaction - Recent Advances in Molecular and Biochemical Approaches* Prashant Swapnil,Mukesh Meena,Harish,Avinash Marwal,Selvakumar Vijayalakshmi,Andleeb Zehra,2023-04-17 Plant Microbe Interaction Recent Advances in Molecular and Biochemical Approaches Agricultural Aspects of Microbiome Leading to Plant Defence Volume Two continues the work of Volume One covering the role of these plant microbes and their interaction between plants and microbes These beneficial microbes such as bacteria and fungi are also known as plant growth promoting rhizobacteria PGPR through a biochemical reaction that may improve induced systemic resistance in the plant host via indirectly against phytopathogens or directly the solubilization of mineral nutrients by producing phytohormones and specific enzymes such as 1 aminocyclopropane 1 carboxylate deaminase The book covers biochemical processes such as physiological metabolic etc of plant and microbe interactions the biochemistry of biological systems the interaction of biological systems above ground or within the rhizosphere and the history of growth promoting microbiomes their roles in phytoremediation efficiency physiological and biochemical studies chemical communication and signaling mechanisms Covers agricultural aspects in which the biochemistry in between plants and microbes helps us understand interactions in the rhizosphere Helps readers understand the molecular and biochemical approaches of plant microbe interactions Enables an understanding of plant microbe interactions which will help to improve crop production

Biological Nitrogen Fixation for the 21st Century Claudine Elmerich,Adam Kondorosi,William E. Newton,1997-11-30 Nitrogen availability is one of the most critical factors that limits plant productivity The largest reservoir of nitrogen is the atmosphere but this gaseous molecular nitrogen only becomes available to plants through the biological nitrogen fixation process which only prokaryotic cells have developed The discovery that microbes were providing fixed nitrogen to legumes and the isolation of the first nitrogen fixing bacteria occured at the end the 19th Century in Louis Pasteur s time We are now building on more than 100 years of research in this field and looking towards the 21st Century The International Nitrogen Fixation Congress series Started more than 20 years ago The format of this Congress is designed to gather scientists from very diverse origins backgrounds interests and scientific approaches and is a forum where fundamental knowledge is

discussed alongside applied research This confluence of perspectives is we believe extremely beneficial in raising new ideas questions and concepts **Microbiology of Tropical Soils and Plant Productivity** Y.R. Dommergues,G.H. Diem,2012-12-06 It is an established fact that we must continually increase and improve agricultural production if we are to meet even the minimum requirements of a growing popu lation for food shelter and fuel In recent years the introduction of new plant varieties and the extensive use of fertilizers have effectively increased crop yields but intensifying agricultural methods has often led to depleting soil fertility Two examples of the harmful consequences of intensive farming practices are the loss of up to 2 5 cm of topsoil every 15 years in the United States through erosion and the alarming rise in environmental pollution through widespread use of pesticides Countless other processes affecting the activity of soil micro flora and the inter actions between microorganisms and plants may pose an equal danger to soil equilibrium but their potential hazards are often overlooked because of an insufficient understanding of soil microbiology on the part of scientists In the first published study of its kind the authors of this book have attempted to address major aspects of the microbial activity of soil in the tropics Tropical conditions serve as an ideal context for a discussion of soil microbiology since biological processes in the soil are particularly active in tropical environments in comparison to other settings and in relation to physical and chemical processes **Cumulated Index Medicus** ,1969 **Applications of Genetic Engineering to Crop Improvement** G.B. Collins,Joseph F. Petolino,2012-12-06 The contributions of plant genetics to the production of higher yielding crops of superior quality are well documented These successes have been realized through the application of plant breeding techniques to a diverse array of genetically controlled traits Such highly effective breeding procedures will continue to be the primary method employed for the development of new crop cultivars however new techniques in cell and molecular biology will provide additional approaches for genetic modification There has been considerable speculation recently concerning the potential impact of new techniques in cell and molecular biology on plant improvement These genetic engineering techniques should offer unique opportunities to alter the genetic makeup of crops if applied to existing breeding procedures Many questions must be answered in order to identify specific applications of these new technologies This search for applications will require input from plant scientists working on various aspects of crop improvement This volume is intended to assess the interrelationships between conventional plant breeding and genetic engineering **Advances in Agricultural Microbiology** N.S. Subba Rao,2016-06-06 Advances in Agricultural Microbiology is a collection of papers about the progresses in the field of agricultural microbiology The said papers are contributions of different experts in related fields The book is divided into three sections Section A covers topics related to the role of microorganisms in the mobilization of nutrients for plant growth such as the relationship of microbial genetics and biological nitrogen plant surface microflora and plant nutrition and developments in grass bacteria associations Section B discusses the use of microorganisms in the management of pathogens pests and weeds and includes topics such as the microbial control of insect pests microbial

herbicides and agricultural antibiotics Section C tackles strategies in bioconversion such as the production of biogas from agricultural wastes bioconversion of lignocelluloses into protein rich food and feed and ethanol fuel from biomass The text is recommended for biologists and agriculturists who would like to know more about the importance of microorganisms in the field of agriculture **Recent advances in crop protection** P.Parvatha Reddy,2012-09-14 In the recent years the need to increase food production to meet the demands of rapidly increasing population from a limited land resource necessitated the use of intensive farming systems with the inputs like narrow genetic base high dose of fertilizers pesticides irrigation monocropping etc which led to the development of diseases and pest The effect of changing global climate particularly the sharp increase in CO2 concentration has increased the susceptibility of plants to pathogens and pests Because of the chemicalization of agriculture the age old eco friendly pest management practices like sanitation crop rotation mixed cropping adjustment of date of planting fallowing summer ploughing green manuring composting etc are not being practiced affecting the crops adversely This has encouraged researchers to look for eco friendly and novel approaches for pest management The information on recent advances in crop protection involving bacteria fungi nematodes insects mites and weeds is scattered The book delves upon the most latest developments in crop protection such as avermectins bacteriophages biofumigation biotechnological approaches bio priming of seeds disguising the leaf surface use of non pathogenic strains plant defense activators plant growth promoting rhizobacteria pathogenesis related proteins strobilurin fungicides RNA interference and variety of mixtures cultivar mixtures multilines soil solarization biointensive integrated pest management among several others fusion protein based biopesticides seed mat technology and environmental methods This book is a ready reference for students policy makers scientists researchers and extension workers **Synergistic Approaches for Bioremediation of Environmental Pollutants: Recent Advances and Challenges** Riti Thapar Kapoor,Maulin P. Shah,2022-11-21 Synergistic Approaches for Bioremediation of Environmental Pollutants Recent Advances and Challenges focuses on the exploitation of various biological treatment technologies and their use to treat toxic contaminants present in industrial effluent and in restoring contaminated sites which lacks in a more comprehensive manner in existing titles on similar topics available on the global market The book comprises advanced biotechnologies and updated information along with sustainable waste management developments and future directions for researchers and scientists working in the field of microbiology Provides wide information to readers on the state of the art in the application of biochar microbes and their synergistic use for wastewater industrial effluent treatment and environment protection Summarizes current knowledge on the use of biochar and microbes even dead biomass for dye decolorization degradation and removal of heavy metals which may play a key role in achieving a more productive and sustainable environment Explores different aspects of biological methods for contaminants removal for better insights into basic and advanced biotechnological applications Includes supplemented tables and figures **Microbial Biotechnology in Agriculture and Aquaculture,**

Vol. 1 R C Ray,2005-01-06 In agriculture microbial biotechnology covers a wide array of subjects ranging from biofertilizers to biological control of pests and diseases from biological N 2 fixation to lignocellulose degradation from production of biomass and biofuels to genetically engineered plants Similarly microbial biotechnology in aquaculture touches several aspe

Soil Science: Fundamentals to Recent Advances Amitava Rakshit,S.K Singh,P.C. Abhilash,Asim Biswas,2021-07-30 This compilation has been designed to provide a comprehensive source of theoretical and practical update for scientists working in the broad field of soil science The book explores all possible mechanisms and means to improve nutrient use efficiencies involving developing and testing of nanofertilizers developing consortia based microbial formulations for mobilization of soil nutrients and engineering of nutrient efficient crops using molecular biology and biotechnological tools This is an all inclusive collection of information about soil science This book is of interest to teachers researchers soil scientists capacity builders and policymakers Also the book serves as additional reading material for undergraduate and graduate students of soil science quantitative ecology earth sciences GIS and geodetic sciences as well as geologists geomorphologists hydrologists and landscape ecology National and international agriculture and soil scientists policy makers will also find this to be a useful read **An Introduction to Agroforestry** P. K. Ramachandran Nair,B. Mohan Kumar,Vimala D. Nair,2022-01-12 Agroforestry the practice of growing trees and crops in interacting combinations is recognized the world over as an integrated approach to sustainable land use Agroforestry systems being multifunctional facilitate not only the production of food and wood products but also provide a variety of ecosystem services such as climate change mitigation biodiversity conservation and soil quality improvement Agroforestry research has made rapid strides since organized efforts started in the late 1970s Today a vast body of scientific knowledge and an impressive array of publications on agroforestry are available Four World Congresses on Agroforestry conducted once every five years since 2004 have brought together the global community of agroforestry professionals and practitioners to share and discuss the emerging trends and paradigm shifts in this field The fifth Congress is scheduled to be held in Qu bec Canada However a comprehensive college level textbook incorporating these research findings did not exist until this book was first published The first edition of this book in 1993 Nair P K R 1993 is out of print and somewhat dated This revised edition with emphasis on the scientific developments during the past more than four decades addresses this long felt need 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

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In a world used by monitors and the ceaseless chatter of quick interaction, the melodic beauty and emotional symphony produced by the published word often fade into the background, eclipsed by the relentless sound and disruptions that permeate our lives. However, located within the pages of **Recent Advances In Biological Nitrogen Fixation** a marvelous fictional value overflowing with raw emotions, lies an immersive symphony waiting to be embraced. Crafted by an elegant musician of language, that fascinating masterpiece conducts visitors on an emotional trip, skillfully unraveling the hidden songs and profound impact resonating within each cautiously constructed phrase. Within the depths of the moving assessment, we shall explore the book is main harmonies, analyze their enthralling publishing type, and submit ourselves to the profound resonance that echoes in the depths of readers souls.

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