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 Plant Microbiology

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FRANKLIN JAQUAN

[Symbiotic Nitrogen Fixation](#) Springer Science & Business Media

This book highlights the latest discoveries about the nitrogen cycle in the soil. It introduces the concept of nitrogen fixation and covers important aspects of nitrogen in soil and ecology such as its distribution and occurrence, soil microflora and fauna and their role in N-fixation. The importance of plant growth-promoting microbes for a sustainable agriculture, e.g. arbuscular mycorrhizae in N-fixation, is discussed as well as perspectives of metagenomics, microbe-plant signal transduction in N-ecology and related aspects. This book enables the reader to bridge the main gaps in knowledge and carefully presents perspectives on the ecology of biotransformations of nitrogen in soil.

Recent Developments in Applied Microbiology and Biochemistry Springer Science & Business Media

The Indian Nitrogen Assessment: Sources of Reactive Nitrogen, Environmental and Climate Effects, and Management Options and Policies provides a reference for anyone interested in Reactive N, from researchers and students, to environmental managers. Although the main processes that affect the N cycle are well known, this book is focused on the causes and effects of disruption in the N cycle, specifically in India. The book helps readers gain a precise understanding of the scale of nitrogen use, misuse, and release through various agricultural, industrial, vehicular, and other activities, also including discussions on its contribution to the pollution of water and air. Drawing upon the collective work of the Indian Nitrogen Group, this reference book helps solve the challenges associated with providing reliable estimates of nitrogen transfers within different ecosystems, also presenting the next steps that should be taken in the development of balanced, cost-effective, and feasible strategies to reduce the amount of reactive nitrogen. - Identifies all significant sources of reactive nitrogen flows and their contribution to the nitrogen-cycle on a national, regional, and global level - Covers nitrogen management across sectors, including the environment, food security, energy, and health - Provides a single reference on reactive nitrogen in India to help in a number of activities, including the evaluation, analysis, synthesis, documentation, and communications on reactive nitrogen

Nitrogen-fixing Bacteria in Nonleguminous Crop Plants Springer Science & Business Media

Sustainability has a major part to play in the global challenge of continued development of regions, countries, and continents all around the World and biological nitrogen fixation has a key role in this process. This volume begins with chapters specifically addressing crops of major global importance, such as soybeans, rice, and sugar cane. It continues with a second important focus, agroforestry, and describes the use and promise of both legume trees with their rhizobial symbionts and other nitrogen-fixing trees with their actinorhizal colonization. An over-arching theme of all chapters is the interaction of the plants and trees with microbes and this theme allows other aspects of soil microbiology, such as interactions with arbuscular mycorrhizal fungi and the impact of soil-stress factors on biological nitrogen fixation, to be addressed. Furthermore, a link to basic science occurs through the inclusion of chapters describing the biogeochemically important nitrogen cycle and its key relationships among nitrogen fixation, nitrification, and denitrification. The volume then provides an up-to-date view of the production of microbial inocula, especially those for legume crops.

History of Research on Nitrogen Fixation in Soybeans (1887-2018) Elsevier

Nitrogen Fixation in Bacteria and Higher Plants Springer Science & Business Media

Nitrogen Fixation in Bacteria and Higher Plants Springer Nature

The nitrogen-fixing organisms. Free-living heterotrophic nitrogen-fixing bacteria. Nitrogen-fixing bacteria in the rhizosphere. Nitrogen fixation in the phyllosphere. Photosynthetic bacteria. Blue-green algae. Associations with blue-green algae. Root-nodule symbioses with rhizobium. Root-nodule symbioses with actinomycete-like organisms. Development of root-nodule symbioses. Root-nodule morphogenesis. Formation and function of bacteroids. The endophytes of the root nodules in

nonleguminous plants. Leghemoglobin. Environmental effects on nodulation and symbiotic nitrogen fixation. Putative nitrogen fixation in other symbioses. The nitrogen-fixing system. The enzyme system. Genetics of N₂-fixing organisms.

Nitrogen Fixation BoD – Books on Demand

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 occurred at the end of 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.

Nitrogen Fixation in Agriculture, Forestry, Ecology, and the Environment Elsevier

The Flagellar World is a unique publication. The product of years of research and data collection by the author, this book is a pictorial guide to flagella in a variety of organisms. Each EM image is accompanied by a short description of the system in each organism. These never-before-seen pictures represent a wide variety of flagella, including Legionella pneumophila, Escherichia coli, Pseudomonas aeruginosa, and many others. Researchers in microbiology, immunology, and parasitology will find this a fascinating and useful resource. - A unique publication with many never before seen EM images of flagella - A historical document of years of research on flagella - Fills a specific niche that shows flagella in several varied organisms

Biological Nitrogen Fixation for the 21st Century National Academies

During the past three decades there has been a large amount of research on biological nitrogen fixation, in part stimulated by increasing world prices of nitrogen-containing fertilizers and environmental concerns. In the last several years, research on plant-microbe interactions, and symbiotic and asymbiotic nitrogen fixation has become truly interdisciplinary in nature, stimulated to some degree by the use of modern genetic techniques. These methodologies have allowed us to make detailed analyses of plant and bacterial genes involved in symbiotic processes and to follow the growth and persistence of the root-nodule bacteria and free-living nitrogen-fixing bacteria in soils. Through the efforts of a large number of researchers we now have a better understanding of the ecology of rhizobia, environmental parameters affecting the infection and nodulation process, the nature of specificity, the biochemistry of host plants and microsymbionts, and chemical signalling between symbiotic partners. This volume gives a summary of current research efforts and knowledge in the field of biological nitrogen fixation. Since the research field is diverse in nature, this book presents a collection of papers in the major research area of physiology and metabolism, genetics, evolution, taxonomy, ecology, and international programs.

Nitrogen Fixation by Free-Living Micro-Organisms Soyinfo Center

This book covers aspects of biological nitrogen fixation along with the unique signaling and interaction between the diazotrophic bacteria and plants, especially the non-legumes. Nitrogen is the most important growth-limiting nutrient in the ecosystems and biological nitrogen fixation involving microbial symbionts, mainly rhizobia and legumes holds enormous interest across the globe. However, free-living rhizobacteria of non-legumes especially cereals, also establish themselves within the root system, fixing nitrogen and contributing to plant productivity, soil fertility, and agricultural sustainability. These non-symbiotic nitrogen fixers additionally exhibit various plant growth-promoting traits elevating productivity, fortifying nutrient content, and managing water stress in plants. The recent perspectives highlighting the mechanisms and

background of non-symbiotic nitrogen fixation provide answers to unravel the potential of nitrogenase and various spectra of habitats of rhizobia and other diazotrophic bacteria. Further, the application of genetic engineering and the development of nitrogen-fixing cereals can provide a possible solution to the problem of food shortage. The book includes various scientific inputs providing comprehensive knowledge about the emergence of agricultural sustainability through nitrogen-fixing bacteria. The book illustrates the systematic mechanisms involved in biological nitrogen fixation through various illustrations, schematic drawings, and flow charts aiding in better understanding. The chapters elaborate on the physiology and metabolism of plant-bacteria interaction in different crops under diverse environmental conditions. Thus, the volume will provide a holistic scenario helping in advancing the novel plant-microbe interactions, cell-signaling, and plant-molecular interactions. The book will assist the agronomists, microbiologists, ecologists, plant pathologists, molecular biologists, environmentalists, policymakers, conservationists, and NGOs to develop biofertilizers and bioinoculants using various genera of microbes and contribute to the targets of sustainable goals in an eco-friendly manner.

Recent Advancement in Microbial Biotechnology Elsevier

The book summarizes the achievements of the past decade in the biochemistry, bioenergetics, structural and molecular biology of respiratory processes in selected genera of the domain Bacteria along with an extensive coverage of the redox chains of extremophiles belonging to the Archaeal domain. The volume is a unique piece of work since it contains a series of chapters dealing with metabolic features having important microbiological and ecological relevance such as the use of ammonium, iron, methane, sulfur and hydrogen as respiratory substrates or nitrous compounds in denitrification processes. Particular attention is also dedicated to peculiar groups of prokaryotes such as Gram positives, acetic acid bacteria, pathogens of the genera *Helicobacter* and *Campylobacter*, nitrogen fixing symbionts and free-living species, oxygenic phototrophs (Cyanobacteria) and anoxygenic (purple non-sulfur) phototrophs. The book is intended to be a long-term source of information for Ph.D. students, researchers and undergraduates from disciplines such as microbiology, biochemistry and ecology, studying basic and applied sciences, medicine and agriculture.

Descriptive Inorganic Chemistry Academic Press

The Biology of Frankia and Actinorhizal Plants provides a comprehensive review of Frankia and the actinorhizal plants. It reviews the state of knowledge on all aspects from molecular genetics through ecology to practical applications; describes methods used in research and practical applications; and is a guide to the literature. The book begins with overviews of Frankia and the actinorhizal plants, and developments in the field prior to the first confirmed isolation of Frankia. Next is a series of authoritative chapters on the biology of Frankia, the symbiosis, and actinorhizal plants. Although methods used in research and in practical applications are included throughout the book, they are given special emphasis in the middle section. The final section of the book concerns the ecology and current and potential uses of actinorhizal plants in both the temperate regions and the tropics. This work is intended as a reference text and handbook of methods for a wide audience including established workers and students of Frankia and actinorhizal plants, specialists and students in other areas of nitrogen fixation (including the Rhizobium-legume symbiosis), soil microbiologists, plant physiologists, ecologists, general biologists, foresters, specialists in land reclamation, and managers requiring an authoritative overview of this rapidly developing field.

Properties and Management of Soils in the Tropics Academic Press

Long-awaited second edition of classic textbook, brought completely up to date, for courses on tropical soils, and reference for scientists and professionals.

The Biology of Nitrogen Fixation Springer

Our knowledge of the biochemistry and biophysics of dinitrogen fixation has developed rapidly in the 15 years since the first N₂-fixing enzyme system was successfully extracted from a bacterium. This period has produced a literature that now describes the N₂ fixation reaction and the nitrogenase enzyme itself in sophisticated terms, though a detailed reaction mechanism at the chemical level has not yet emerged. It is the purpose of the present monograph to present an in-depth review, analysis, and integration of this research as is possible with a non-contributed publication and to relate this work to considerations of N₂ fixation that reach beyond the confines of the biochemist's laboratory. The first section is directed as much toward the general science reader as toward the specialist. It covers the agricultural origins of man's interest in N₂ fixation and also pertinent areas of taxonomy, physiology, and evolution. Ecological aspects of the subject include a comprehensive evaluation of the nitrogen cycle leading to a substantially greater estimate of the rate of global N₂ fixation than previous ones. The treatment is of a survey fashion, in part to provide a general over-view of N₂ fixation and in part to provide context for the biochemistry and biophysics that follow in the second section.

Inanimate Life Academic Press

Phylogenetic classification of nitrogen-fixing organisms. Physiology of nitrogen fixation in free-living heterotrophs. Nitrogen fixation by photosynthetic bacteria. Nitrogen fixation in cyanobacteria. Nitrogen fixation by methanogenic bacteria. Associative nitrogen-fixing bacteria. Actinorhizal symbioses. Ecology of bradyrhizobium and rhizobium. The rhizobium infection process. Physiology of nitrogen-fixing legume nodules: compartments, and functions. Hydrogen cycling in symbiotic bacteria. Evolution of nitrogen-fixing symbioses. The rhizobium symbiosis of the nonlegume

parasponia. Genetic analysis of rhizobium nodulation. Nodulins in root nodule development. Plant genetics of symbiotic nitrogen fixation. Molecular genetics of bradyrhizobium symbioses. The enzymology of molybdenum-dependent nitrogen fixation. Alternative nitrogen fixation systems. Biochemical genetics of nitrogenase. Regulation of nitrogen fixation genes in free-living and symbiotic bacteria. Isolated iron-molybdenum cofactor of nitrogenase.

Associative and Endophytic Nitrogen-fixing Bacteria and Cyanobacterial Associations

Springer Nature

Nitrogen fixation research is presented as a rapidly developing, synergistic area of modern science, using the methods of, and accumulating data from, many fundamental branches of biology and chemistry. These include catalytic mechanisms, protein structure and function, molecular organization of genes and the regulation of their activities, biochemistry of plants and microorganisms, the signalling and surface interactions between organisms, microbial taxonomy and evolution, formal and population genetics, and ecology. The relationships between biological nitrogen fixation research and different branches of applied biology are addressed and analyzed, such as: the monitoring of genetically engineered microorganisms, selection of plant-associated microbes, plant breeding, increasing the protein content of crops, providing ecologically safe food production, and diminishing the chemical pollution of the environment. Immediate impacts and long-term prospects for nitrogen fixation research are presented: both fundamentals and applications.

Regulation of Nitrogen-Fixing Symbioses in Legumes Elsevier

This is the world's most comprehensive, well documented, and well illustrated book on this subject. With extensive subject and geographical index. 91 photographs and illustrations - mostly color, Free of charge.

Biological Nitrogen Fixation and Beneficial Plant-Microbe Interaction Springer Science & Business Media

This 1976 volume provides information, presented at an international symposium in Edinburgh, on the free-living nitrogen-fixing bacteria and blue-green algae. In addition to information on the distribution of the nitrogenase enzyme within these groups, their role in the soil and in aquatic systems is considered, as are the methods of measuring nitrogen fixation.

The Biology of Frankia and Actinorhizal Plants Elsevier

Nitrogen in the Marine Environment provides information pertinent to the many aspects of the nitrogen cycle. This book presents the advances in ocean productivity research, with emphasis on the role of microbes in nitrogen transformations with excursions to higher trophic levels. Organized into 24 chapters, this book begins with an overview of the abundance and distribution of the various forms of nitrogen in a number of estuaries. This text then provides a comparison of the nitrogen cycling of various ecosystems within the marine environment. Other chapters consider chemical distributions and methodology as an aid to those entering the field. This book discusses as well the enzymology of the initial steps of inorganic nitrogen assimilation. The final chapter deals with the philosophy and application of modeling as an investigative method in basic research on nitrogen dynamics in coastal and open-ocean marine environments. This book is a valuable resource for plant biochemists, microbiologists, aquatic ecologists, and bacteriologists.

Marine Nitrogen Fixation Nitrogen Fixation: Origins, Applications, and Research Progress

This book covers the most recent advances in all the topics with which researchers and professionals need to be familiar in order to obtain a better understanding of, and to better exploit, beneficial plant-microbe interactions. The use of microorganisms for agriculture and environmental applications is gaining importance worldwide to improve crop performance, but also for other environmental applications, such as bioremediation in chemically polluted soils. The search for an equilibrium between fundamental and applied aspects makes this book useful for professionals at various levels in the value chain of the "microbial biofertilizers". Challenges of commercializing biofertilizers involve efficiency of the products and safety for human health and the environment, topics that have paid central attention in this book. Students, scientists and biofertilizers developers will find updated and comprehensive information about the different aspects to be considered to address a successful introduction of biofertilizers in sustainable agriculture and environmental actions.

Nitrogen Fixation in Agriculture, Forestry, Ecology, and the Environment Springer

The rapid increase in microbial resources along with the development of biotechnological methods has revolutionized the field of microbial biotechnology. Genome characterization methods and metagenomic approaches further illustrate the role of microorganisms in various fields of research. Recent Advancement in Microbial Biotechnology: Agricultural and Industrial Approach provides an overview on the recent application of the microorganisms in agricultural and industrial improvements. The purpose of this book is to integrate all these diverse areas of research in a common platform. Recent advancement in Microbial Biotechnology targets researchers from both academia and industry, professors and graduate students working in molecular biology, microbiology and biotechnology. - Gives insight in the exploration of microbial functional diversity in different systems - Highlights important microbes and their role in enhancing agricultural productivity - Provides understanding to the basics with advance information of microbial biotechnology - Explores the importance of microbial genomes studies in agricultural and industrial applications

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