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MELINA KLEIN

Nanobiotechnology Applications in Plant Protection Springer Science & Business Media

This book introduces readers to both seed treatment and seedling pretreatments, taking into account various factors such as plant age, growing conditions and climate. Reflecting recent advances in seed priming and pretreatment techniques, it demonstrates how these approaches can be used to improve stress tolerance and enhance crop productivity. Covering the basic phenomena involved, mechanisms and recent innovations, the book offers a comprehensive guide for students, researchers and scientists alike, particularly Plant Physiologists, Agronomists, Environmental Scientists, Biotechnologists, and Botanists, who will find essential information on physiology and stress tolerance. The book also provides a valuable source of information for professionals at seed companies, seed technologists, food scientists, policymakers, and agricultural development officers around the world.

Silver Micro-Nanoparticles John Wiley & Sons

This book presents a collection of cross-disciplinary research, with contributions addressing all key features of the plant/microbe/ENP nexus in agro-ecosystems. The uptake, transport and transformation of nanoparticles in plants have attracted more and more attention in the past several years. Especially, the impact of Engineered Nanoparticles (ENPs) on bioprocesses; low-, medium- and high-level dose responses in the microbial community of soil; and long-, medium- and short-term exposure responses, particularly microbial nitrogen transformations, are just a few of the aspects involved. Since ENPs are used in many industries, including cosmetics, agriculture, medicine, food technology and waste management, their transport through biogeochemical cycles is an important focus of many studies today. Specifically, ENP-microbe interaction has been analysed with regard to disease treatment for plants; it plays a vital role in disease inhibition by releasing metal ions that act through many pathways - e.g. reactive oxygen species (ROS) generation, DNA transformation and disruption of the cell cycle - to stop cell growth in the pathogen. Due to these properties, ENPs are also used as slow release or

delayed release pesticides and fungicides, and as carrier systems for growth-promoting hormones. Despite their multiple uses in various industries, the negative effects of ENPs are still a major concern for the scientific community and consumers alike. For example, their transport to various food chains has been reported to have adverse effects. This raises a degree of doubt concerning a rapidly growing scientific field with major applications in many industries. From a sustainable development perspective and particularly to ensure food security in light of the uncertainty accompanying climate change, it is imperative to address this divergence by focusing on the plant/microbe/ENP nexus.

Nano-enabled Agrochemicals in Agriculture Academic Press
Nanobiotechnology Applications in Plant Protection: Volume 2 continues the important and timely discussion of nanotechnology applications in plant protection and pathology, filling a gap in the literature for nano applications in crop protection.

Nanobiopesticides and nanobioformulations are examined in detail and presented as powerful alternatives for eco-friendly management of plant pathogens and nematodes. Leading scholars discuss the applications of nanobiomaterials as antimicrobials, plant growth enhancers and plant nutrition management, as well as nanodiagnostic tools in phytopathology and magnetic and supramagnetic nanostructure applications for plant protection. This second volume includes exciting new content on the roles of biologically synthesized nanoparticles in seed germination and zinc-based nanostructures in protecting against toxigenic fungi. Also included is new research in phytotoxicity, nano-scale fertilizers and nanomaterial applications in nematology and discussions on Botrytis grey mold and nanobiocontrol. This book also explores the potential effects on the environment, ecosystems and consumers and addresses the implications of intellectual property for nanobiopesticides. Further discussed are nanotoxicity effects on the plant ecosystem and nano-applications for the detection, degradation and removal of pesticides.

The Role of Nanoparticles in Plant Nutrition under Soil Pollution
Elsevier

Discover the role of nanotechnology in promoting plant growth and protection through the management of microbial pathogens In *Nanotechnology in Plant Growth Promotion and Protection*, distinguished researcher and author Dr. Avinash P. Ingle delivers a rigorous and insightful collection of some of the latest developments in nanotechnology particularly related to plant growth promotion and protection. The book focuses broadly on the role played by nanotechnology in growth promotion of plants and their protection through the management of different microbial pathogens. You'll learn about a wide variety of topics, including the role of nanomaterials in sustainable agriculture, how nano-fertilizers behave as soil feed, and the dual role of nanoparticles in plant growth promotion and phytopathogen management. You'll also discover why nanotechnology has the potential to revolutionize the current agricultural landscape through the development of nano-based products, like plant growth promoters, nano-fertilizers, nano-pesticides, and nano-insecticides. Find out why nano-based products promise to be a cost-effective, economically viable, and eco-friendly approach to tackling some of the most intractable problems in agriculture today. You'll also benefit from the inclusion of: A thorough introduction to the prospects and impacts of using nanotechnology to promote the growth of plants and control plant diseases An exploration of the effects of titanium dioxide nanomaterials on plant growth and the emerging applications of zinc-based nanoparticles in plant growth promotion Practical discussions of nano-fertilizer in enhancing the production potentials of crops and the potential applications of

nanotechnology in plant nutrition and protection for sustainable agriculture A concise treatment of nanotechnology in seed science and soil feed Toxicological concerns of nanomaterials used in agriculture Perfect for undergraduate, graduate, and research students of nanotechnology, agriculture, plant science, plant physiology, and crops, *Nanotechnology in Plant Growth Promotion and Protection* will also earn a place in the libraries of professors and researchers in these areas, as well as regulators and policymakers.

Nanofertilizers: Challenges and Prospects Academic Press

This book describes the different methodologies for producing and synthesizing silver nanoparticles (AgNPs) of various shapes and sizes. It also provides an in-depth understanding of the new methods for characterizing and modifying the properties of AgNPs as well as their properties and applications in various fields. This book is a useful resource for a wide range of readers, including scientists, engineers, doctoral and postdoctoral fellows, and scientific professionals working in specialized fields such as medicine, nanotechnology, spectroscopy, analytical chemistry diagnostics, and plasmonics.

The Impact of Nanoparticles on Agriculture and Soil

Springer Nature

The brief is the first to focus exclusively on environmentally friendly delivery of pesticides (controlled-release nanoparticulate formulation of pesticides using biodegradable polymers as carriers). The brief also introduces pesticides like Chlorpyrifos and biodegradable polymers like guar-gum. The brief will be extremely useful to the researchers in the field of agrochemicals and will be equally useful for advanced professionals in the field of biology, chemistry, environmental biology, entomology and horticulture.

Nanotechnology in Plant Growth Promotion and Protection

Springer Nature

Since the publication of our monograph on seed physiology and biochemistry (*The Physiology and Biochemistry of Seeds in Relation to Germination*, Springer-Verlag, 1978, 1982), it has been suggested to us that a text covering the same subject area would be appropriate. This book is our response. Unlike the previous volumes, however, this text is not intended to be either a critical or a comprehensive account. Instead it is a more generalized consideration of the essential aspects of seed physiology and biochemistry as we see them. It also includes a substantial amount of new and different material. In a work of this sort it is inevitable that some simplifications must be made, but we hope, never theless, that we have presented the most reasonable conspectus of areas of controversy and uncertainty. In this respect, literature citations have been kept to a minimum and do not interrupt the text; they are placed at the end of each chapter and are intended to be used as a source for further references. We hope that this book will be of value to students and teachers in universities, colleges, and other institutes of higher learning whose courses include plant biology. Although it is particularly appropriate for studies of seed biology, it should also find broader applications in general plant physiology, agriculture, and horticulture.

Plant Responses to Nanomaterials Springer Science & Business Media

Refinement in sequencing technologies and potential of genomic research resulted in meteoric growth of biological information such as sequences of DNA, RNA and protein requiring databases for efficient storage, management and retrieval of the biological information. Also, computational algorithms for analysis of these colossal data became a vital aspect of biological sciences. The work aims to show the process of turning bioscience innovation into companies and products, covering the basic science, the

translation of science into technology. Due to rapid developments, there seems to be no basic difference between the pharmaceutical industry and the biotechnological industry. However, approved products in the pipeline and renewed public confidence make it one of the most promising areas of economic growth in the near future. India offers a huge market for the products as well as cheap manufacturing base for export. The book is a sincere work of compilation of new and recent advances in the topic of concern through various innovative researches and scientific opinion therefrom. The book is dedicated to the readers who will definitely find it interesting and knowledgeable in carrying out their respective researches in different aspects of applied microbiology and biotechnology.

Agricultural Nanobiotechnology Elsevier

Chemical modelling covers a wide range of disciplines and this book is the first stop for any materials scientist, biochemist, chemist or molecular physicist wishing to acquaint themselves with major developments in the applications and theory of chemical modelling. Containing both comprehensive and critical reviews, it is a convenient reference to the current literature. Coverage includes, but is not limited to, boron clusters, molecular modeling of inclusion complexes, modelling of circular dichroism for DNA and proteins, and the interface effect of nanocomposites as electrode materials for Li/Na ion batteries.

Seeds Springer Nature

Proceedings of the International Symposium on 'Zinc in Soils and Plants', held at The University of Western Australia, Perth, Western Australia, 27--28 September 1993

Abiotic and Biotic Stress in Plants Springer

Molecular Impacts of Nanoparticles on Plants and Algae covers molecular mechanisms of plants/algae related to cellular uptake and translocation of nanoparticles, and genome, transcriptome, proteome, and metabolome responses against it. The book introduces readers to state-of-the-art developments and trends of nanoparticles and plants/algae including interaction of nanoparticles with biological compounds in vitro. Nanoscience and nanotechnology have rapidly been developed in the last few decades, and they have a wide range of applications in industry, medicine, food, and agriculture. In agriculture, nanoparticles (NPs) have successfully been used for growth regulation, crop protection and improvement. They are also employed to cope with plant nutrient deficiencies. A predicted significant increase in the output of NPs will cause the discharge of a remarkable number of NPs to ecosystems, creating a need to understand how to optimize or mitigate their impact depending on their potential impact. These include serious health concerns for living organisms in aquatic, terrestrial, and atmospheric environments as well as human health through their potential existence in plant-based foods. The impact of NPs on living organisms including plants and algae, and uptake, translocation and molecular response mechanisms should be carefully considered before producing and using nanoparticles in large amounts as NPs, when entered to the body, induce changes in gene expressions related to the photosystem, water transport, cell wall formation, and cell division. Further recent studies have showed that NPs are potential agents or stressors to alter proteome, transcriptome, genome and metabolome responses. Impacts of nanoparticles on molecular mechanisms of plants and algae presents the most recent findings on nanoparticle and plant/algae interaction by focusing to molecular response mechanisms at genome, transcriptome, proteome and metabolome levels. In addition, uptake and translocation mechanism of nanoparticles will be assessed both in plant and algae Throughout this book, the latest developments and discoveries will be highlighted as well as open problems and

future challenges in molecular mechanisms of plants/algae as a response of nanoparticles. Presents genome, transcriptome, proteome, and metabolome responses in plants/algae, along with cellular uptake and translocation mechanisms Illustrates nanoparticle-plant/algae interactions Covers both simple and higher organisms, addressing both algae and plant

Plant Nanotechnology Springer Nature

Chemistry of Nanomaterials: Fundamentals and Applications provides a foundational introduction to this chemistry. Beginning with an introduction to the field of nanoscience and technology, the book goes on to outline a whole range of important effects, interactions and properties. Tools used to assess such properties are discussed, followed by chapters putting this fundamental knowledge in context by providing examples of nanomaterials and their applications in the real world. Drawing on the experience of its expert authors, this book is an accessible introduction to the interactions at play in nanomaterials for both upper-level students and researchers. Highlights the foundational chemical interactions at play in nanomaterials Provides accessible insight for readers across multidisciplinary fields Places nanomaterial chemistry in the context of the broader field of nanoscale research

Plant Exposure to Engineered Nanoparticles Springer Nature

Advances in Phytonanotechnology: From Synthesis to Application guides readers through various applications of nanomaterials on plants by presenting the latest research related to nanotechnology and nanomaterials on plant systems. The book focuses on the effects of these applications on plant morphology, physiology, biochemistry, ecology and genetics. Sections cover the impact on plant yield, techniques, a review of positive and negative impacts, and an overview of current policies regarding the use of nanotechnology on plants. Additionally, the book offers insights into the appropriate application of nanoscience to plants and crops for improved outcome and an exploration of their bioavailability and toxicity in the environment. Discusses the morphological, physiological and biochemical responses of plants to nanomaterials and the ability of the nanomaterials in modifying the genetic constitution of plants Emphasizes new applications of nanomaterials, including nanosensors technology and nanomaterials as nanocarriers based antimicrobial phytochemicals Presents the role of nanotechnology as a novel technique for the remediation of heavy metals by plants

Nanopesticides Elsevier

Compiled by a well-known expert in the field, Liquid Biofuels provides a profound knowledge to researchers about biofuel technologies, selection of raw materials, conversion of various biomass to biofuel pathways, selection of suitable methods of conversion, design of equipment, selection of operating parameters, determination of chemical kinetics, reaction mechanism, preparation of bio-catalyst: its application in bio-fuel industry and characterization techniques, use of nanotechnology in the production of biofuels from the root level to its application and many other exclusive topics for conducting research in this area. Written with the objective of offering both theoretical concepts and practical applications of those concepts, Liquid Biofuels can be both a first-time learning experience for the student facing these issues in a classroom and a valuable reference work for the veteran engineer or scientist. The description of the detailed characterization methodologies along with the precautions required during analysis are extremely important, as are the detailed description about the ultrasound assisted biodiesel production techniques, aviation biofuels and its characterization techniques, advance in algal biofuel techniques, pre-treatment of biomass for biofuel production, preparation and characterization of bio-catalyst, and various methods of

optimization. The book offers a comparative study between the various liquid biofuels obtained from different methods of production and its engine performance and emission analysis so that one can get the utmost idea to find the better biofuel as an alternative fuel. Since the book covers almost all the field of liquid biofuel production techniques, it will provide advanced knowledge to the researcher for practical applications across the energy sector. A valuable reference for engineers, scientists, chemists, and students, this volume is applicable to many different fields, across many different industries, at all levels. It is a must-have for any library.

Nanotechnology in Sustainable Agriculture Academic Press
This updated and much revised third edition of *Seeds: Physiology of Development, Germination and Dormancy* provides a thorough overview of seed biology and incorporates much of the progress that has been made during the past fifteen years. With an emphasis on placing information in the context of the seed, this new edition includes recent advances in the areas of molecular biology of development and germination, as well as fresh insights into dormancy, ecophysiology, desiccation tolerance, and longevity. Authored by preeminent authorities in the field, this book is an invaluable resource for researchers, teachers, and students interested in the diverse aspects of seed biology.

Sustainable Agriculture Reviews 41 CRC Press
The Impact of Nanoparticles on Agriculture and Soil, part of the *Nanomaterials-Plant Interaction* series, contributes the most recent insights into understanding the cellular interactions of nanoparticles in an agricultural setting, focusing on current applications and means of evaluating future prospects. In order to ensure and improve the biosafety of nanoparticles, it is a primary concern to understand cellular bioprocess like nanomaterial's cellular uptake and their influence on cellular structural, functional and genetic components. This book addresses these and other important aspects in detail along with showcasing their applications in the area of agriculture. With an international team of authors, and experienced editors, this book will be valuable to those working to understand and advance nanoscience to benefit agricultural production and human and environmental welfare. In-depth knowledge of these bioprocess will enable researchers to engineer nanomaterials for enhanced biosafety. Guides the assessment of nanomaterials' impact on agricultural and soil cellular metabolism and physiological characteristics Provides in-depth insights into potential risks and hazards of nanoparticles Builds a foundation for further research and development

Plant Biotechnology: Progress in Genomic Era John Wiley & Sons

This book highlights the implications of nanotechnology and the effects of nanoparticles on agricultural systems, their interactions with plants as well as their potential applications as fertilizers and pesticides. It also discusses how innovative, eco-friendly approaches to improve food and agricultural systems lead to increased plant productivity. Further, it offers insights into the current trends and future prospects of nanotechnology along with the benefits and risks and their impact on agricultural ecosystems. Nanomaterials in agriculture reduce the amount of chemical products sprayed by means of smart delivery of active ingredients; minimize nutrient losses in fertilization; and increase yields through optimized water and nutrient management. There is also huge potential for nanotechnology in the provision of state-of-the-art solutions for various challenges faced by agriculture and society, both today and in the future.

Engineered Nanoparticles in Agriculture Springer Nature
Plants are subjected to numerous environmental stresses, which can be classified into two broad areas: abiotic and biotic stresses.

While the first is considered the damage done to an organism by other living organisms, the latter occurs as a result of a negative impact of non-living factors on the organisms. In this scenario, the current most accepted opinion of scientists is that both biotic and abiotic factors in nature and agroecosystems are affected by climate change, which may lead to significant crop yield decreases worldwide. We should take into consideration not only this environmental concern but also the fact that 20 years from now the earth's population will need 55% more food than it can produce now. Therefore, it is crucial to address such concerns and bring about possible solutions to future plant stress-related outcomes that might affect global agriculture. This book intends to provide the reader with a comprehensive overview of both biotic and abiotic stresses through 10 chapters that include case studies and literature reviews about these topics. There will be a particular focus on understanding the physiological, biochemical, and molecular changes observed in stressed plants as well as the mechanisms underlying stress tolerance in plants.

Chemistry of Nanomaterials Springer

This book discusses the latest developments in plant-mediated fabrication of metal and metal-oxide nanoparticles, and their characterization by using a variety of modern techniques. It explores in detail the application of nanoparticles in drug delivery, cancer treatment, catalysis, and as antimicrobial agent, antioxidant and the promoter of plant production and protection. Application of these nanoparticles in plant systems has started only recently and information is still scanty about their possible effects on plant growth and development. Accumulation and translocation of nanoparticles in plants, and the consequent growth response and stress modulation are not well understood. Plants exposed to these particles exhibit both positive and negative effects, depending on the concentration, size, and shape of the nanoparticles. The impact on plant growth and yield is often positive at lower concentrations and negative at higher ones. Exposure to some nanoparticles may improve the free-radical scavenging potential and antioxidant enzymatic activities in plants and alter the micro-RNAs expression that regulate the different morphological, physiological and metabolic processes in plant system, leading to improved plant growth and yields. The nanoparticles also carry out genetic reforms by efficient transfer of DNA or complete plastid genome into the respective plant genome due to their miniscule size and improved site-specific penetration. Moreover, controlled application of nanomaterials in the form of nanofertilizer offers a more synchronized nutrient fluidity with the uptake by the plant exposed, ensuring an increased nutrient availability. This book addresses these issues and many more. It covers fabrication of different/specific nanomaterials and their wide-range application in agriculture sector, encompassing the controlled release of nutrients, nutrient-use efficiency, genetic exchange, production of secondary metabolites, defense mechanisms, and the growth and productivity of plants exposed to different manufactured nanomaterials. The role of nanofertilizers and nano-biosensors for improving plant production and protection and the possible toxicities caused by certain nanomaterials, the aspects that are little explored by now, have also been generously elucidated.

Liquid Biofuels Springer Nature

Miniaturized Analytical Devices An in-depth overview of integrating functionalized nanomaterials with mass spectrometry, spectroscopy, electrophoresis, and other important analytical techniques *Miniaturized Analytical Devices: Materials and Technology* is an up-to-date resource exploring the analytical applications of miniaturized technology in areas such as clinical microbiology, pharmaceuticals, agriculture, and environmental analysis. The book covers the integration of functional

nanomaterials in mass spectrometry, microscopy, electrophoresis, and more—providing the state-of-the-art information required for successfully implementing a range of chemical analysis techniques on microchips. Featuring contributions from a panel of international experts in the field, the book begins with an introduction to selected miniaturized devices, nanomaterials, and analytical methods. Subsequent sections describe functionalized nanomaterials (FNMs) for miniaturized devices and discuss techniques such as miniaturized mass spectrometry for bioassays and miniaturized microscopy for cell imaging. The book concludes by exploring a variety of applications of miniaturized devices in areas including metal analysis, bioimaging, DNA separation and analysis, molecular

biology, and more. This timely volume: Surveys the current state of the field and provides a starting point for developing faster, more reliable, and more selective analytical devices Focuses on the practical applications of miniaturized analytical devices in materials science, clinical microbiology, the pharmaceutical industry, and environmental analysis Covers a wide range of materials and analytical techniques such as microvolume UV-VIS spectroscopy, microchip and capillary electrophoresis, and matrix assisted laser desorption ionization-mass spectrometry (MALDI-MS) analysis Discusses the role of miniaturized analytical devices in securing a green and sustainable future Miniaturized Analytical Devices: Materials and Technology is essential reading for analytical chemists, analytical laboratories, materials scientists, biologists, life scientists, and advanced students in related fields.

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