

Biosystems Engineering Biofactories For Food Production In The Century Xxi Advances In Biochemical Engineering Biotechnology

Edible ectomycorrhizal mushrooms (EEMMs) comprise more than 1000 species and are an important food and forest resource. In this volume of Soil Biology, internationally recognized scientists offer their most recent research findings on these beguiling fungi. Topics covered include: complex ecological interactions between plants, EEMMs, and soil organisms; comparative genomics, high-throughput sequencing and modern research tools; genetic selection of fungal strains and techniques for inoculating plants; economic and social considerations surrounding wild collected EEMMs; and practical information concerning soil management and EEMM cultivation. The book will be a useful guide for anyone interested in soil ecology, forestry, or the genetics and cultivation of EEMMs, and provides an extensive knowledge base and inspirations for future studies on these ecologically and economically important fungi.

Publisher Description

Campus activities for sustainable development are

an effective way of learning and implementing sustainability in surrounding communities and industry. A college campus is an ideal place to practice and test new ideas and to learn valuable lessons from the results and mistakes. Sustainability Practice and Education on University Campuses and Beyond showcases many ideas and endeavors pursued on college campuses in the form of case studies. These case studies include past, current and projected activities to green college campuses. Specific topics covered in this book include student-driven and college-driven environmental sustainability programs in undergraduate and graduate classes, issues in teaching environmental sustainability, the LEED certification of universities, issues of shrinking cities, and a comparison of sustainable military bases with college campuses. Readers will be able to clearly understand the concept of sustainable development through a textbook approach to 'crazy' ideas presented in the book. In addition, the pedagogical challenges in sustainability education mentioned in the book address key issues arising due to the multidisciplinary nature of sustainability curricula. Sustainability Practice and Education on University Campuses and Beyond is a good resource on sustainability in environmental science courses for college students, faculty and sustainability-related researchers. Decision makers in government and

industry positions looking for ideas for promoting sustainable development can also benefit from the contents of this book.

This book presents new food production systems (for plants and animals) involving agrochemicals that increase in a controlled manner the bioactives content, under greenhouse conditions. Moreover, conception and design of new instrumentation for precision agriculture and aquiculture contributing in food production is also highlighted in this book.

Several nano-scale devices have emerged that are capable of analysing plant diseases, nutrient deficiencies and any other ailments that may affect food security in agro-ecosystems. It has been envisioned that smart delivery systems can be developed and utilised for better management of agricultural ecosystems. These systems could exhibit beneficial, multi-functional characteristics, which could be used to assess and also control habitat-imposed stresses to crops. Nanoparticle-mediated smart delivery systems can control the delivery of nutrients or bioactive and/or pesticide molecules in plants. It has been suggested that nanoparticles in plants might help determine their nutrient status and could also be used as cures in agro-ecosystems. Further, to enhance soil and crop productivity, nanotechnology has been used to create and deliver nano fertilizers, which can be defined as nano-particles that directly help supply

nutrients for plant growth and soil productivity. Nano-particles can be absorbed onto clay networks, leading to improved soil health and more efficient nutrient use by crops. Additionally, fertilizer particles can be coated with nano-particles that facilitate slow and steady release of nutrients, reducing loss of nutrients and enhancing their efficiency in agri-crops. Although the use of nanotechnology in agro-ecosystems is still in its early stages and needs to be developed further, nano-particle-mediated delivery systems are promising solutions for the successful management of agri-ecosystems. In this context, the book offers insights into nanotechnology in agro-ecosystems with reference to biogenic nanoparticles. It highlights the:

- occurrence and diversity of Biogenic Nanoparticles
- mechanistic approach involved in the synthesis of biogenic nanoparticles
- synthesis of nanoparticles using photo-activation, and their fate in the soil ecosystem
- potential applications of nanoparticles in agricultural systems
- application and biogenic synthesis of gold nanoparticles and their characterization
- impact of biogenic nanoparticles on biotic stress to plants
- mechanistic approaches involved in the antimicrobial effects and cytotoxicity of biogenic nanoparticles
- role of biogenic nanoparticles in plant diseases management
- relevance of biological synthesized nanoparticles in the longevity of agricultural crops
- design and synthesis of nano-biosensors for

monitoring pollutants in water, soil and plant systems

- applications of nanotechnology in agriculture with

special refer to soil, water and plant sciences A

useful resource for postgraduate and research

students in the field of plant and agricultural

sciences, it is also of interest to researchers working

in nano and biotechnology.

Epiphanius, monastic founder and bishop of Salamis

on Cyprus for almost 40 years of the fourth century,

threw heart and soul into the controversies of the

time and produced the "Panarion" or "Medicine

Chest", an historical encyclopedia of sects and

heresies and their refutations. Book I, concerned

chiefly with Gnostic and Jewish Christian groups,

deals with material which is also found in Nag

Hammadi and other Gnostic writings and in such

patristic authors as Irenaeus, Hippolytus et al, and

reproduces documents not available elsewhere. Its

translation has been found useful by students of Nag

Hammadi and Gnosticism, patrologists, historians of

religion, church historians, students of Judaism, and

the theologically minded public.

This book focuses on recent advances in our

understanding of wild edible mycorrhizal fungi, truffle

and mushrooms and their cultivation. In addition to

providing fresh insights into various topics, e.g.

taxonomy, ecology, cultivation and environmental

impact, it also demonstrates the clear but fragile link

between wild edible mushrooms and human

societies. Comprising 17 chapters written by 41 experts from 13 countries on four continents, it enables readers to grasp the importance of protecting this unique, invaluable, renewable resource in the context of climate change and unprecedented biodiversity loss. The book inspires professionals and encourages young researchers to enter this field to develop the sustainable use of wild edible mushrooms using modern tools and approaches. It also highlights the importance of protecting forested environments, saving species from extinction and generating a significant income for local populations, while keeping alive and renewing the link between humans and wild edible mushrooms so that in the future, the sustainable farming and use of edible mycorrhizal mushrooms will play a predominant role in the management and preservation of forested lands.

The tremendous progress in biology over the last half century - from Watson and Crick's elucidation of the structure of DNA to today's astonishing, rapid progress in the field of synthetic biology - has positioned us for significant innovation in chemical production. New bio-based chemicals, improved public health through improved drugs and diagnostics, and biofuels that reduce our dependency on oil are all results of research and innovation in the biological sciences. In the past decade, we have witnessed major advances made

possible by biotechnology in areas such as rapid, low-cost DNA sequencing, metabolic engineering, and high-throughput screening. The manufacturing of chemicals using biological synthesis and engineering could expand even faster. A proactive strategy - implemented through the development of a technical roadmap similar to those that enabled sustained growth in the semiconductor industry and our explorations of space - is needed if we are to realize the widespread benefits of accelerating the industrialization of biology. Industrialization of Biology presents such a roadmap to achieve key technical milestones for chemical manufacturing through biological routes. This report examines the technical, economic, and societal factors that limit the adoption of bioprocessing in the chemical industry today and which, if surmounted, would markedly accelerate the advanced manufacturing of chemicals via industrial biotechnology. Working at the interface of synthetic chemistry, metabolic engineering, molecular biology, and synthetic biology, Industrialization of Biology identifies key technical goals for next-generation chemical manufacturing, then identifies the gaps in knowledge, tools, techniques, and systems required to meet those goals, and targets and timelines for achieving them. This report also considers the skills necessary to accomplish the roadmap goals, and what training opportunities are required to produce

the cadre of skilled scientists and engineers needed.

This book provides up-to-date and comprehensive coverage of the research and application of Integrated Pest Management (IPM) in tropical regions. The first section explores the agro-ecological framework that represents the foundations of IPM, in addition to emerging technologies in chemical and biological methods that are core to pest control in tropical crops. The second section follows a crop-based approach and provides details of current IPM applications in the main tropical food crops (such as cereals, legumes, root and tuber crops, sugarcane, vegetables, banana and plantain, citrus, oil palm, tea, cocoa and coffee) and also fibre crops (such as cotton) and tropical forests. Bioactive compounds produced by natural sources, such as plants, microbes, endophytic fungi, etc., can potentially be applied in various fields, including agriculture, biotechnology and biomedicine. Several bioactive compounds have proved to be invaluable in mediating plant-microbe interactions, and promoting plant growth and development. Due to their numerous health-promoting properties, these compounds have been widely used as a source of medication since ancient times. However, there is an unprecedented need to meet the growing demand for natural bioactive compounds in the flavor and fragrance, food, and pharmaceutical industries. Moreover, discovering new lead molecules from natural sources is essential to overcoming the rising number of new diseases. In this regard, natural bioactive compounds hold tremendous potential for new drug discovery. Therefore, this field of

research has become a vital area for researchers interested in understanding the chemistry, biosynthetic mechanisms, and pharmacological activities of these bioactive metabolites. This book describes the basics of bioactive plant compounds, their chemical properties, and their pharmacological biotechnological properties with regard to various human diseases and applications in the drug, cosmetics and herbal industries. It offers a valuable asset for all students, educators, researchers, and healthcare experts involved in agronomy, ecology, crop science, molecular biology, stress physiology, and natural products.

"This book investigates machine learning (ML), one of the most fruitful fields of current research, both in the proposal of new techniques and theoretic algorithms and in their application to real-life problems"--Provided by publisher.

With contributions by numerous experts

A complete guide to the evolving methods by which we may recover by-products and significantly reduce food waste Across the globe, one third of cereals and almost half of all fruits and vegetables go to waste. The cost of such waste – both to economies and to the environment – is a serious and increasing concern within the food industry. If we are to overcome this crisis and move towards a sustainable future, we must do everything possible to utilize innovative new methods of extracting and processing valuable by-products of all kinds. Food Wastes and By-products represents a complete primer to this important and complex process. Edited and written by leading researchers, the text provides essential

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information on the supply of waste and its composition, identifies foods rich in valuable bioactive compounds, and explores revolutionary methods for creating by-products from fruit, vegetable, and seed waste. Other chapters discuss the nutraceutical properties of value-added by-products and their uses in the manufacturing of dietary fibers, food flavors, supplements, pectin, and more. This book: Explains how reconstituted by-products can best be used to radically reduce food waste Discusses the potential nutraceutical assets of recovered food waste Covers a broad range of by-product sources, such as mangos, cacao, flaxseed, and spent coffee grounds Describes novel extraction processes and the emerging use of nanotechnology A significant contribution to the field, Food Wastes and By-products is a timely and essential resource for food industry professionals, government agencies and NGOs involved in nutrition, agriculture, and food production, and university instructors and students in related areas.

Biosystems Engineering: Biofactories for Food Production in the Century XXI Springer Science & Business Media

Christoph Herwig is founder of Exputec GmbH. Recent changes in the pattern of agricultural practices from use of hazardous pesticides to natural (organic) cultivation has brought into focus the use of agriculturally important microorganisms for carrying out analogous functions. The reputation of plant growth promoting rhizomicroorganisms (PGPRs) is due to their antagonistic mechanisms against most of the fungal and bacterial phytopathogens. The biocontrol potential of

agriculturally important microorganisms is mostly attributed to their bioactive secondary metabolites. However, low shelf life of many potential agriculturally important microorganisms impairs their use in agriculture and adoption by farmers. The focal theme of this book is to highlight the potential of employing biosynthesized secondary metabolites (SMs) from agriculturally important microorganisms for management of notorious phytopathogens, as a substitute of the currently available whole organism formulations and also as alternatives to hazardous synthetic pesticides. Accordingly, we have incorporated a comprehensive rundown of sections which particularly examine the SMs synthesized, secreted and induced by various agriculturally important microorganisms and their applications in agriculture. Section 1 includes discussion on biosynthesized antimicrobial secondary metabolites from fungal biocontrol agents. This section will cover the various issues such as development of formulation of secondary metabolites, genomic basis of metabolic diversity, metabolomic profiling of fungal biocontrol agents, novel classes of antimicrobial peptides. The section 1 will also cover the role of these secondary metabolites in antagonist-host interaction and application of biosynthesized antimicrobial secondary metabolites for management of plant diseases. Section 2 will discuss the biosynthesized secondary metabolites from bacterial PGPRs, strain dependent effects on plant metabolome profile, bio-prospecting various isolates of bacterial PGPRs for potential secondary metabolites and non-target effects of PGPR on microbial community structure

and functions. Section 3 encompasses synthesis of antimicrobial secondary metabolites from beneficial endophytes, bio-prospecting medicinal and aromatic hosts and effect of endophytic SMs on plants under biotic and biotic stress conditions.

Genetically Modified Organisms in Food focuses on scientific evaluation of published research relating to GMO food products to assert their safety as well as potential health risks. This book is a solid reference for researchers and professionals needing information on the safety of GMO and non-GMO food production, the economic benefits of both GMO and non-GMO foods, and includes in-depth coverage of the surrounding issues of genetic engineering in foods. This is a timely publication written by a team of scientific experts in the field who present research results to help further more evidence based research to educate scientists, academics, government professionals about the safety of the global food supply. Provides the latest on research and development in the field of GMOs and non-GMO safety issues and possible risk factors incorporating evidence based reviews for a better understanding of these issues Covers various aspects of GMO production, analysis and identification to better understand GMO development and use Includes definitions, a brief overview and history of GM foods from a global perspective and concise summaries with recommendations for actions for each chapter In biotechnology and bioengineering, small molecules can be used to increase the efficiency reduce the cost and damage to the environment of certain bioprocesses.

This book introduces readers to the important field of chemically promoted biotechnology and bioengineering and presents the theory behind the biotechnology of enzymatic reactions and how they can be chemically enhanced. The book covers chemical modulators for enzymatic reactions, chemically promoted biotechnology in plant cell cultures, chemically promoted biotechnology for plant protection and future prospects for the field. Knowledge gained allows both chemists to make use of biotechnology to solve chemical problems in an environmentally-friendly way, and biologists to make use of chemistry to increase biotechnological efficiency. This book is useful for scientists in a broad range of disciplines, including agricultural chemistry, pesticide science, medicinal chemistry, biochemistry, bio-organic chemistry, cell and molecular biology. Students and researchers in both academia and industry will find it a useful handbook.

Systems Metabolic Engineering: The Creation of Microbial Cell Factories by Rational Metabolic Design and Evolution, by Chikara Furusawa, Takaaki Horinouchi, Takashi Hirasawa, Hiroshi Shimizu
Impacts of Quorum Sensing on Microbial Metabolism and Human Health, by Yang-Chun Yong, Jian-Jiang Zhong
CHO Glycosylation Mutants as Potential Host Cells to Produce Therapeutic Proteins with Enhanced Efficacy, by Peiqing Zhang, Kah Fai Chan, Ryan Haryadi, Muriel Bardor, Zhiwei Song
Cell-Free Biosystems for Biomanufacturing, by Chun You, Y.-H. Percival Zhang
Lipid Bilayer Membrane Arrays: Fabrication and Applications, by Xiaojun Han, Guodong Qi, Xingtao Xu, Lei Wang
RNA

Aptamers: A Review of Recent Trends and Applications,
by Kyung-Nam Kang, Yoon-Sik Lee

Current Developments in Biotechnology and

Bioengineering: Bioprocesses, Bioreactors and Controls

provides extensive coverage of new developments, state-

of-the-art technologies, and potential future trends,

reviewing industrial biotechnology and bioengineering

practices that facilitate and enhance the transition of

processes from lab to plant scale, which is becoming

increasingly important as such transitions continue to

grow in frequency. Focusing on industrial bioprocesses,

bioreactors for bioprocesses, and controls for

bioprocesses, this title reviews industrial practice to

identify bottlenecks and propose solutions, highlighting

that the optimal control of a bioprocess involves not only

maximization of product yield, but also taking into

account parameters such as quality assurance and

environmental aspects. Describes industrial

bioprocesses based on the reaction media Lists the type

of bioreactors used for a specific bioprocess/application

Outlines the principles of control systems in various

bioprocesses

Biotechnology and the food supply was the subject of the

Food and Nutrition Board's annual symposium. The

papers presented at the symposium, and contained in

this volume, address various aspects of this topic,

including food production, food safety, and food quality.

Systems and Synthetic Metabolic Engineering provides

an overview of the development of metabolic engineering

within medicine that is fueled by systems and synthetic

biology. These newly developed, successful strategies of

metabolic engineering guide the audience on how to propose and test proper strategies for metabolic engineering research. In addition to introductory, regulatory and challenges in the field, the book also covers dynamic control and autonomous regulation to control cell metabolism, along with computational modeling and industrial applications. The book is written by leaders in the field, making it ideal for synthetic biologists, researchers, students and anyone working in this area. Discusses the current progress of metabolic engineering, focusing on systems biology and synthetic biology Covers introductory, regulatory, strategies, production and challenges in the field Written technically for synthetic biologists, researchers, students, industrialists, policymakers and stakeholders

Between 1973 and 2016, the ways to manipulate DNA to endow new characteristics in an organism (that is, biotechnology) have advanced, enabling the development of products that were not previously possible. What will the likely future products of biotechnology be over the next 5–10 years? What scientific capabilities, tools, and/or expertise may be needed by the regulatory agencies to ensure they make efficient and sound evaluations of the likely future products of biotechnology? Preparing for Future Products of Biotechnology analyzes the future landscape of biotechnology products and seeks to inform forthcoming policy making. This report identifies potential new risks and frameworks for risk assessment and areas in which the risks or lack of risks relating to the products of biotechnology are well understood.

New Process Technology for Developing Low-Cost, Environmentally Safe Biofuels

Rising fuel prices have created a surge in the worldwide demand for biofuels made from plant and animal feedstocks. Filled with a wealth of illustrations, *Biofuels Engineering Process Technology* fully explains the concepts, systems, and technology now being used to produce biofuels on both an industrial and small scale. Written by a team of leading biofuels experts, this lucid guide presents a complete introduction to biofuels and biorefining processes...state-of-the-art information on biofuels processed from fermentations of ethanol, hydrogen, microbial oils, and methane...new material on the production of biodiesel from plant and algal oils...and the use of microbial fuel cells to produce bioelectricity. *Biofuels Engineering Process Technology* takes readers step by step through: The key concepts, systems, and technology of biofuels A review of the basic concepts of fermentation pathways and kinetic modeling of bioreactors Biofuels produced from fermentations of agricultural feedstocks and biomass-ethanol, hydrogen, microbial oils, and methane Biodiesel fuels processed from the chemical conversion of microbial and plant oils Bioelectricity produced from microbial fuel cells The latest sustainable biorefinery concepts and methods

Inside This Cutting-Edge Biofuels Engineering Guide • Introduction • Fuels from Fermentations: Ethanol • Hydrogen • Microbial Oils • Methane • Fuel from Chemical Conversion of Plant and Algal Oils: Biodiesel • Microbial Fuel Cells • Technical Resources

Advances in Biotechnology for Food Industry, Volume

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Fourteen in the Handbook of Food Bioengineering series, provides recent insight into how biotechnology impacts the global food industry and describes how food needs are diverse, requiring the development of innovative biotechnological processes to ensure efficient food production worldwide. Many approaches were developed over the last 10 years to allow faster, easier production of widely used foods, food components and therapeutic food ingredients. This volume shows how biotechnological processes increase production and quality of food products, including the development of anti-biofilm materials to decrease microbial colonization in bioreactors and food processing facilities. Presents basic to advanced technological applications in food biotechnology Includes various scientific techniques used to produce specific desired traits in plants, animals and microorganisms Provides scientific advances in food processing and their impact on the environment, human health and food safety Discusses the development of controlled co-cultivations for reproducible results in fermentation processes in food biotechnology

In developing countries, traditional fermentation serves many purposes. It can improve the taste of an otherwise bland food, enhance the digestibility of a food that is difficult to assimilate, preserve food from degradation by noxious organisms, and increase nutritional value through the synthesis of essential amino acids and vitamins. Although "fermented food" has a vaguely distasteful ring, bread, wine, cheese, and yogurt are all familiar fermented foods. Less familiar are gari, ogi, idli, ugba, and other relatively unstudied but important foods in some African and Asian countries. This book reports on current research to improve the safety and nutrition of these foods through an elucidation of the microorganisms and mechanisms involved in their production. Also included are recommendations for needed research.

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The book explores and exploits the synergy and boundary between biotechnology, bioprocessing and food engineering. Divided into three parts, *Advances in Food Bioproducts and Bioprocessing Technologies* includes contributions that deal with new developments in procedures, bioproducts, and bioprocesses that can be given quantitative expression. Its 40 chapters will describe how research results can be used in engineering design, include procedures to produce food additives and ingredients, and discuss accounts of experimental or theoretical research and recent advances in food bioproducts and bioprocessing technologies.

This book presents the first comprehensive text on construction biomaterials and bioprocesses. It details aspects of construction biotechnology, a new interdisciplinary area involving applications of environmental and industrial microbiology and biotechnology in geotechnical and civil engineering. It also critically reviews all existing and potential construction biotechnology processes. It discusses a number of topics including the biotechnological production of new construction materials such as self-healing concrete, construction biocomposites, construction bioplastics, and biotechnological admixtures to cement. It also addresses construction-related processes like biocementation, bioclogging, soil surface fixation and biosealing, microbial cements and grouts, the biocoating of construction material surfaces, the microbiology and biosafety of the construction environment, the prevention of biocorrosion as well as biodeterioration and biofouling in civil engineering.

Biomediated precipitation of calcium, magnesium, and iron compounds as carbonates, phosphates, sulphides, and silicate minerals in soil for its clogging and strengthening are considered from geotechnical, chemical, and microbiological points of view. It offers an overview of the basic microbiology that will enable civil engineers to perform the construction

biogeochemical processes. Design principles and considerations for different field implementations are discussed from a practical point of view. The book can be used as a textbook for graduate and senior undergraduate students in biotechnology, civil engineering and environmental engineering as well as a reference book for researchers and practitioners working in this new interdisciplinary area.

Genetic-based animal biotechnology has produced new food and pharmaceutical products and promises many more advances to benefit humankind. These exciting prospects are accompanied by considerable unease, however, about matters such as safety and ethics. This book identifies science-based and policy-related concerns about animal biotechnologyâ€"key issues that must be resolved before the new breakthroughs can reach their potential. The book includes a short history of the field and provides understandable definitions of terms like cloning. Looking at technologies on the near horizon, the authors discuss what we know and what we fear about their effectsâ€"the inadvertent release of dangerous microorganisms, the safety of products derived from biotechnology, the impact of genetically engineered animals on their environment. In addition to these concerns, the book explores animal welfare concerns, and our societal and institutional capacity to manage and regulate the technology and its products. This accessible volume will be important to everyone interested in the implications of the use of animal biotechnology.

Provides insight into biopolymers, their physicochemical properties, and their biomedical and biotechnological applications This comprehensive book is a one-stop reference for the production, modifications, and assessment of biopolymers. It highlights the technical and methodological advancements in introducing biopolymers, their study, and

promoted applications. "Biopolymers for Biomedical and Biotechnological Applications" begins with a general overview of biopolymers, properties, and biocompatibility. It then provides in-depth information in three dedicated sections: Biopolymers through Bioengineering and Biotechnology Venues; Polymeric Biomaterials with Wide Applications; and Biopolymers for Specific Applications. Chapters cover: advances in biocompatibility; advanced microbial polysaccharides; microbial cell factories for biomanufacturing of polysaccharides; exploitation of exopolysaccharides from lactic acid bacteria; and the new biopolymer for biomedical application called nanocellulose. Advances in mucin biopolymer research are presented, along with those in the synthesis of fibrous proteins and their applications. The book looks at microbial polyhydroxyalkanoates (PHAs), as well as natural and synthetic biopolymers in drug delivery and tissue engineering. It finishes with a chapter on the current state and applications of, and future trends in, biopolymers in regenerative medicine. * Offers a complete and thorough treatment of biopolymers from synthesis strategies and physiochemical properties to applications in industrial and medical biotechnology * Discusses the most attracted biopolymers with wide and specific applications * Takes a systematic approach to the field which allows readers to grasp and implement strategies for biomedical and biotechnological applications "Biopolymers for Biomedical and Biotechnological Applications" appeals to biotechnologists, bioengineers, and polymer chemists, as well as to those working in the biotechnological industry and institutes.

This book represents a new, completely updated, version of a book edited by two of the current editors, published with Springer in 1999. It covers pest and disease management of greenhouse crops, providing readers the basic strategies and

tactics of integrated control together with its implementation in practice, with case studies with selected crops. The diversity of editors and authors provides readers a complete picture of the world situation of IPM in greenhouse crops.

Sugarcane has garnered much interest for its potential as a viable renewable energy crop. While the use of sugar juice for ethanol production has been in practice for years, a new focus on using the fibrous co-product known as bagasse for producing renewable fuels and bio-based chemicals is growing in interest. The success of these efforts, and the development of new varieties of energy canes, could greatly increase the use of sugarcane and sugarcane biomass for fuels while enhancing industry sustainability and competitiveness. *Sugarcane-Based Biofuels and Bioproducts* examines the development of a suite of established and developing biofuels and other renewable products derived from sugarcane and sugarcane-based co-products, such as bagasse. Chapters provide broad-ranging coverage of sugarcane biology, biotechnological advances, and breakthroughs in production and processing techniques. This text brings together essential information regarding the development and utilization of new fuels and bioproducts derived from sugarcane. Authored by experts in the field, *Sugarcane-Based Biofuels and Bioproducts* is an invaluable resource for researchers studying biofuels, sugarcane, and plant biotechnology as well as sugar and biofuels industry personnel.

print on demand

Since the introduction of recombinant human growth hormone and insulin a quarter century ago, protein therapeutics has greatly broadened the horizon of health care. Many patients suffering with life-threatening diseases or chronic dysfunctions, which were medically untreatable not long ago, can attest to the wonder these drugs have achieved.

Although the first generation of protein therapeutics was produced in recombinant *Escherichia coli*, most recent products use mammalian cells as production hosts. Not long after the first production of recombinant proteins in *E. coli*, it was realized that the complex tasks of most post-translational modifications on proteins could only be efficiently carried out in mammalian cells. In the 1990s, we witnessed a rapid expansion of mammalian-cell-derived protein therapeutics, chiefly antibodies. In fact, it has been nearly a decade since the market value of mammalian-cell-derived protein therapeutics surpassed that of those produced from *E. coli*. A common characteristic of recent antibody products is the relatively large dose required for effective therapy, demanding larger quantities for the treatment of a given disease. This, coupled with the broadening repertoire of protein drugs, has rapidly expanded the quantity needed for clinical applications. The increasing demand for protein therapeutics has not been met exclusively by construction of new manufacturing plants and increasing total volume capacity. More importantly the productivity of cell culture processes has been driven upward by an order of magnitude in the past decade.

Petroleum-based industrial products have gradually replaced products derived from biological materials. However, biologically based products are making a comeback--because of a threefold increase in farm productivity and new technologies. Biobased Industrial Products envisions a biobased industrial future, where starch will be used to make biopolymers and vegetable oils will become a routine component in lubricants and detergents. Biobased Industrial Products overviews the U.S. land resources available for agricultural production, summarizes plant materials currently produced, and describes prospects for increasing varieties and yields. The committee discusses the concept of the biorefinery and outlines proven and potential thermal,

mechanical, and chemical technologies for conversion of natural resources to industrial applications. The committee also illustrates the developmental dynamics of biobased products through existing examples, as well as products still on the drawing board, and it identifies priorities for research and development.

This book explores the risks and benefits of crops that are genetically modified for pest resistance, the urgency of establishing an appropriate regulatory framework for these products, and the importance of public understanding of the issues. The committee critically reviews federal policies toward transgenic products, the 1986 coordinated framework among the key federal agencies in the field, and rules proposed by the Environmental Protection Agency for regulation of plant pesticides. This book provides detailed analyses of: Mechanisms and results of genetic engineering compared to conventional breeding for pest resistance. Review of scientific issues associated with transgenic pest-protected plants, such as allergenicity, impact on nontarget plants, evolution of the pest species, and other concerns. Overview of regulatory framework and its use of scientific information with suggestions for improvements.

Showcases the recent advances in microbial functional food applications across food science, microbiology, biotechnology, and chemical engineering Microbial technology plays a key role in the improvement of biotechnology, cosmeceuticals, and biopharmaceutical applications. It has turned into a subject of expanding significance because new microbes and their related biomolecules are distinguished for their biological activity and health benefits. Encompassing both biotechnology and chemical engineering, Microbial Functional Foods and Nutraceuticals brings together microbiology, bacteria, and food processing/mechanization, which have applications for a

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variety of audiences. Pharmaceuticals, diagnostics, and medical device development all employ microbial food technology. The book addresses the recent advances in microbial functional foods and associated applications, providing an important reference work for graduates and researchers. It also provides up-to-date information on novel nutraceutical compounds and their mechanisms of action—catering to the needs of researchers and academics in food science and technology, microbiology, chemical engineering, and other disciplines who are dealing with microbial functional foods and related areas. **Microbial Functional Foods and Nutraceuticals** is: **Ground-breaking:** Includes the latest developments and research in the area of microbial functional foods and nutraceuticals **Multidisciplinary:** Applicable across food science and technology, microbiology, biotechnology, chemical engineering, and other important research fields **Practical and academic:** An important area of both academic research and new product development in the food and pharmaceutical industries **Microbial Functional Foods and Nutraceuticals** is an ideal resource of information for biologists, microbiologists, bioengineers, biochemists, biotechnologists, food technologists, enzymologists, and nutritionists.

Applied Molecular Biotechnology: The Next Generation of Genetic Engineering explains state-of-the-art advances in the rapidly developing area of molecular biotechnology, the technology of the new millennium. Comprised of chapters authored by leading experts in their respective fields, this authoritative reference text: **Highlights** the latest omics-based tools and approaches used in modern biotechnology **Explains** how various molecular biology technologies can be used to develop transgenic plants and how those plants can meet growing food and plant-derived product demands **Discusses** chloroplast gene expression systems, mitochondrial omics,

plant functional genomics, and whole-genome resequencing for crop improvement Explores plant–microbe and plant–insect interactions affecting plant protection and productivity Covers animal models, pharmacogenomics, human tissue banking, and the molecular diagnosis of diseases such as cervical cancer, obesity, and diabetes Examines the molecular aspects of viral diseases, production of industrial commodities using viral biotechnology, and biotechnological uses of magnetic nanoparticles Describes the use of biotechnology in the food, chemical, pharmaceutical, environmental conservation, and renewable energy sectors Applied Molecular Biotechnology: The Next Generation of Genetic Engineering serves as a springboard for new discoveries in molecular biology and its applications. Thus, this book is an invaluable resource for students and researchers of molecular biotechnology.

This book provides exhaustive information on several recent technologies that are employed for sugarcane improvement through biotechnology and will be of great interest to plant scientists, biotechnologists, molecular biologists and breeders who work on sugarcane crop. Topics discussed in this volume include genomics and transcriptomics, transgenic sugarcane for trait improvement, potential candidate promoters, new strategies for transformation, molecular farming, sugarcane as biofuel, chloroplast transformation, and genome editing. Sustainable Biofuels: Opportunities and challenges, a volume in the “Applied Biotechnology Reviews series, explores the state-of-the-art in research and applied technology for the conversion of all types of biofuels. Its chapters span a broad spectrum of knowledge, from fundamentals and technical aspects to optimization, combinations, economics, and environmental aspects. They cover various facets of research, production, and commercialization of bioethanol, biodiesel, biomethane, biohydrogen, biobutanol, and biojet

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fuel. This book discusses biochemical, thermochemical, and hydrothermal conversion of unconventional feedstocks, including the role of biotechnology applications to achieve efficiency and competitiveness. Through case studies, techno-economic analysis and sustainability assessment, including life cycle assessment, it goes beyond technical aspects to provides actual resources for better decision-making during the development of commercially viable technology by researchers, PhD students, and practitioners in the field of bioenergy. It is also a useful resource for those in adjacent areas, such as biotechnology, industrial microbiology, chemical engineering, environmental engineering, and sustainability science, who are working on solutions for the bioeconomy. The ability to compare different technologies and their outcome that this book provides is also beneficial for energy analysts, consultants, planners, and policy-makers. The “Applied Biotechnology Reviews series highlights current development and research in biotechnology-related fields, combining in single-volume works the theoretical aspects and real-world applications for better decision-making. Covers current technologies and advancements in biochemical, thermochemical, and hydrothermal conversion methods for production of various types of biofuels from conventional and nonconventional feedstock Examines biotechnology processes, including genetic engineering of microorganisms and substrates, applied to biofuel production Bridges the gap between technology development and prospects of commercialization of bioprocesses, including policy and economics of biofuel production, biofuel value chains, and how to accomplish cost-competitive results and sustainable development

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