

## Genetic Engineering Smita Rastogi

Designed to serve as a textbook for students of biotechnology, life sciences, genetics, microbiology, biochemistry, and other related areas.

Nanotechnology is considered as one of the emerging fields of science. It has applications in different biological and technological fields which deal with the science of materials at nanoscale (10<sup>-9</sup>). On the other hand, biotechnology is another field that deals with contemporary challenges. Nanobiotechnology fills the gap between these two fields. It merges physical, chemical, and biological principles in a single realm. This combination opens up new possibilities. At nanoscale dimensions, it creates precise nanocrystals and nanoshells. Integrated nanomaterials are used with modified surface layers for compatibility with living systems, improved dissolution in water, or biorecognition leading to enhanced end results in biotechnological systems. These nanoparticles can also be hybridized with additional biocompatible substances in order to amend their qualities to inculcate novel utilities. Nanobiotechnology is used in bioconjugate chemistry by coalescing up the functionality of non-organically obtained molecular components and biological molecules in order to veil the immunogenic moieties for targeted drug delivery, bioimaging and biosensing. This book blends the science of biology, medicine, bioinorganic chemistry, bioorganic chemistry, material and physical sciences, biomedical engineering, electrical, mechanical, and chemical science to present a comprehensive range of advancements. The development of nano-based materials has made for a greater understanding of their characterization, using techniques such as transmission electron microscope, FTIR, X-ray diffraction, scanning electron microscope EDX, and so on. This volume also highlights uses in environmental remediation, environmental biosensors and environmental protection. It also emphasizes the significance of nanobiotechnology to a series of medical applications viz., diagnostics, and therapeutics stem cell technology, tissue engineering enzyme engineering, drug development and delivery. In addition this book also offers a distinctive understanding of nanobiotechnology from researchers and educators and gives a comprehensive facility for future developments and current applications of nanobiotechnology.

This book highlights a collection of high-quality peer-reviewed research papers presented at the Sixth International Conference on Information System Design and Intelligent Applications (INDIA 2019), held at Lendi Institute of Engineering & Technology, Vizianagaram, Andhra Pradesh, India, from 1 to 2 November 2019. It covers a wide range of topics in computer science and information technology, from wireless networks, social networks, wireless sensor networks, information and network security, to web security, Internet of Things, bioinformatics, geoinformatics and computer networks.

Using accessible farming practices to meet the growing demands on agriculture is likely to result in more intense competition for natural resources, increased greenhouse gas emissions, and further deforestation and land degradation, which will in turn produce additional stress in the soil-water-plant-animal continuum. Stress refers to any unfavorable force or condition that inhibits customary functioning in plants. Concurrent manifestations of different stresses (biotic and abiotic) are very frequent in the environment of plants, which consequently reduces yield. Better understanding stress not only changes our perspective on the current environment, but can also bring a wealth of benefits, like improving sustainable agriculture and human beings' living standards. Innovative systems are called for that protect and enhance the natural resource base, while increasing productivity via 'holistic' approaches, such as agroecology, agro-forestry, climate-smart agriculture and conservation agriculture, which also incorporate indigenous and traditional knowledge. The book 'New Frontiers in Stress Management for Durable Agriculture' details the current state of knowledge and highlights scientific advances concerning novel aspects of plant biology research on stress, biotic and abiotic stress responses, as well as emergent amelioration and reclamation technologies to restore normal functioning in agroecology.

Published by Sinauer Associates, an imprint of Oxford University Press. Extensively rewritten and reorganized, this new edition of Evolution--featuring a new coauthor: Mark Kirkpatrick (The University of Texas at Austin)--offers additional expertise in evolutionary genetics and genomics, the fastest-developing area of evolutionary biology. Directed toward an undergraduate audience, the text emphasizes the interplay between theory and empirical tests of hypotheses, thus acquainting students with the process of science. It addresses major themes--including the history of evolution, evolutionary processes, adaptation, and evolution as an explanatory framework--at levels of biological organization ranging from genomes to ecological communities.

Active botanical ingredients are a prime requirement for herbal formulations and discovering a drug is all about integration of science disciplines. In recent decades there has been a growing interest in treating wounds and diseases using traditional remedies based on local herbs, combined with chemical advances. Although this has led to the development of new bioactive ingredients from plants, there has been little success in terms of clinical trials and post-marketing studies to comply with FDA guidelines. Plants have been used as a source of medicine throughout history and continue to serve as the basis for many pharmaceuticals used today. However, despite the modern pharmaceutical industry being founded on botanical medicine, synthetic approaches to drug discovery have now become standard. Science-driven translational discovery and botanical development has created a new reality, leading to enormous changes in strategies, technologies and the disciplines involved, which have been embraced by the pharmaceutical and biotech industries. This book gathers scientific expertise and traditional knowledge to promote the discovery and development of new formulations and drugs based on active ingredients and to provide guidance on taking these to clinical trials. It discusses major topics, such as how the phytochemical composition of many plants has changed over time due to factors like cultivation, which can have both positive and negative effects on the levels of bioactive compounds. It also explores the importance of plants as a valuable source of therapeutic compounds as a result of their vast biosynthetic capacity, and classifies them according to their intended use, safety and regulatory status. Further, the book offers insights into the regulatory aspects of botanical products, which is an important issue when considering standardization and quality assessment, and also examines the commercial aspects of plant-derived medications and their proven role in the treatment of chronic diseases such as heart disease, high blood pressure, pain, asthma, and other associated conditions. Given its scope, this book is a valuable tool for botanists, natural product chemists, pharmacologists and microbiologists involved in the study of phytochemicals for drug discovery.

Colorectal cancer (CRC) is a major global health challenge as the third leading cause for cancer related mortalities worldwide. Despite advances in therapeutic strategies, the five-year survival rate for CRC patients has remained the same over time due to the fact that patients are often diagnosed in advanced metastatic stages. Drug resistance is another common reason for poor

prognosis. Researchers are now developing advanced therapeutic strategies such as immunotherapy, targeted therapy, and combination nanotechnology for drug delivery. In addition, the identification of new biomarkers will potentiate early stage diagnosis. This book is the first of three volumes on recent developments in colorectal diagnosis and therapy. Each volume can be read on its own, or together. Each volume focuses on different novel therapeutic advances, biomarkers, and identifies therapeutic targets for treatment. Written by leading international experts in the field, coverage also addresses the role of diet habits and lifestyle in reducing gastrointestinal disorders and incidence of CRC. Chapters discuss current and future diagnostic and therapeutic options for colorectal cancer patients, focusing on immunotherapeutic, nanomedicine, biomarkers, and dietary factors for the effective management of colon cancer.

This volume details PCR technique with focus on its application specificities to the biotechnology and bioengineering field. Chapters are broken into five sections covering sgeneral PCR protocols, different applied examples to molecular and synthetic biotechnology, food science and technology, environmental microbiology and molecular ecology, and healthcare. Written in the highly successful Methods in Molecular Biology series format, chapters include introductions to their respective topics, lists of the necessary materials and reagents, step-by-step, readily reproducible laboratory protocols, and tips on troubleshooting and avoiding known pitfalls. Authoritative and cutting-edge, PCR: Methods and Protocols hopes to be a valuable and useful resource for wet lab researchers, particularly within the biotechnology and bioengineering field.

This book gathers high-quality research papers presented at the 3rd International Conference on Advanced Computing and Intelligent Engineering (ICACIE 2018). It includes sections describing technical advances and the latest research in the fields of computing and intelligent engineering. Intended for graduate students and researchers working in the disciplines of computer science and engineering, the proceedings will also appeal to researchers in the field of electronics, as they cover hardware technologies and future communication technologies.

This volume presents selected papers from IACMAG Symposium, The major themes covered in this conference are Earthquake Engineering, Ground Improvement and Constitutive Modelling. This volume will be of interest to researchers and practitioners in geotechnical and geomechanical engineering.

This book features a collection of high-quality, peer-reviewed papers presented at the Third International Conference on Intelligent Computing and Communication (ICICC 2019) held at the School of Engineering, Dayananda Sagar University, Bengaluru, India, on 7 – 8 June 2019. Discussing advanced and multi-disciplinary research regarding the design of smart computing and informatics, it focuses on innovation paradigms in system knowledge, intelligence and sustainability that can be applied to provide practical solutions to a number of problems in society, the environment and industry. Further, the book also addresses the deployment of emerging computational and knowledge transfer approaches, optimizing solutions in various disciplines of science, technology and healthcare.

This best-selling undergraduate textbook provides an introduction to key experimental techniques from across the biosciences. It uniquely integrates the theories and practices that drive the fields of biology and medicine, comprehensively covering both the methods students will encounter in lab classes and those that underpin recent advances and discoveries. Its problem-solving approach continues with worked examples that set a challenge and then show students how the challenge is met. New to this edition are case studies, for example, that illustrate the relevance of the principles and techniques to the diagnosis and treatment of individual patients. Coverage is expanded to include a section on stem cells, chapters on immunochemical techniques and spectroscopy techniques, and additional chapters on drug discovery and development, and clinical biochemistry. Experimental design and the statistical analysis of data are emphasised throughout to ensure students are equipped to successfully plan their own experiments and examine the results obtained.

PART I Molecular Biology 1. Molecular Biology and Genetic Engineering Definition, History and Scope 2. Chemistry of the Cell: 1. Micromolecules (Sugars, Fatty Acids, Amino Acids, Nucleotides and Lipids) Sugars (Carbohydrates) 3. Chemistry of the Cell . 2. Macromolecules (Nucleic Acids; Proteins and Polysaccharides) Covalent and Weak Non-covalent Bonds 4. Chemistry of the Gene: Synthesis, Modification and Repair of DNA DNA Replication: General Features 5. Organisation of Genetic Material 1. Packaging of DNA as Nucleosomes in Eukaryotes Techniques Leading to Nucleosome Discovery 6. Organization of Genetic Material 2. Repetitive and Unique DNA Sequences 7. Organization of Genetic Material: 3. Split Genes, Overlapping Genes, Pseudogenes and Cryptic Genes Split Genes or . Interrupted Genes 8. Multigene Families in Eukaryotes 9. Organization of Mitochondrial and Chloroplast Genomes 10. The Genetic Code 11. Protein Synthesis Apparatus Ribosome, Transfer RNA and Aminoacyl-tRNA Synthetases Ribosome 12. Expression of Gene . Protein Synthesis 1. Transcription in Prokaryotes and Eukaryotes 13. Expression of Gene: Protein Synthesis: 2. RNA Processing (RNA Splicing, RNA Editing and Ribozymes) Polyadenylation of mRNA in Prokaryotes Addition of Cap (m7G) and Tail (Poly A) for mRNA in Eukaryotes 14. Expression of Gene: Protein Synthesis: 3. Synthesis and Transport of Proteins (Prokaryotes and Eukaryotes) Formation of Aminoacyl tRNA 15. Regulation of Gene Expression: 1. Operon Circuits in Bacteria and Other Prokaryotes 16. Regulation of Gene Expression . 2. Circuits for Lytic Cycle and Lysogeny in Bacteriophages 17. Regulation of Gene Expression 3. A Variety of Mechanisms in Eukaryotes (Including Cell Receptors and Cell Signalling) PART II Genetic Engineering 18. Recombinant DNA and Gene Cloning 1. Cloning and Expression Vectors 19. Recombinant DNA and Gene Cloning 2. Chimeric DNA, Molecular Probes and Gene Libraries 20. Polymerase Chain Reaction (PCR) and Gene Amplification 21. Isolation, Sequencing and Synthesis of Genes 22. Proteins: Separation, Purification and Identification 23. Immunotechnology 1. B-Cells, Antibodies, Interferons and Vaccines 24. Immunotechnology 2. T-Cell Receptors and MHC Restriction 25. Immunotechnology 3. Hybridoma and Monoclonal Antibodies (mAbs) Hybridoma Technology and the Production of Monoclonal Antibodies 26. Transfection Methods and Transgenic Animals 27. Animal and Human Genomics: Molecular Maps and Genome Sequences Molecular Markers 28. Biotechnology in Medicine: 1. Vaccines, Diagnostics and Forensics Animal and Human Health Care 29. Biotechnology in Medicine 2. Gene Therapy Human Diseases Targeted for Gene Therapy Vectors and Other Delivery Systems for Gene Therapy 30. Biotechnology in Medicine: 3. Pharmacogenetics / Pharmacogenomics and Personalized Medicine Phannacogenetics and Personalized 31. Plant Cell and Tissue Culture' Production and Uses of Haploids 32. Gene Transfer Methods in Plants 33. Transgenic Plants . Genetically Modified (GM) Crops and Floricultural Plants 34. Plant Genomics: 35. Genetically Engineered Microbes (GEMs) and Microbial Genomics References

Biotechnology Is At The Heart Of Technology Revolution In Asia Today With Immense Potential In The Pharmaceutical And Agriculture Sectors. This Study Covers Economic And Policy Issues And The Experiences In Biotechnology In Japan, India, Malaysia, The Phillipines, Korea, Bangladesh, Thailand, China And Singapore And Also The International Cooperative Strategies Of Asean And In Europe. This Book Is A Valuable Resource For Governments, Multilateral Institutions, Academics And Practitioners In The Field Of Economic Development And Technology Policy Management.

This book offers insights into the current focus and recent advances in bioremediation and green technology applications for waste minimization and pollution control. Increasing urbanization has an impact on the environment, agriculture and industry, exacerbating the pollution problem and creating an urgent need for sustainable and green eco-friendly remediation technology. Currently, there is heightened interest in environmental research, especially in the area of pollution remediation and waste conversion, and alternative, eco-friendly methods involving better usage of agricultural residues as economically viable substrates for environmental cleanup are still required. The book offers researchers and scholars inspiration, and suggests directions for specific waste management and pollution control. The research

presented makes a valuable contribution toward a sustainable and eco-friendly societal environment.

The book is a collection of high-quality peer-reviewed research papers presented at International Conference on Frontiers of Intelligent Computing: Theory and applications (FICTA 2016) held at School of Computer Engineering, KIIT University, Bhubaneswar, India during 16 - 17 September 2016. The book aims to present theories, methodologies, new ideas, experiences, applications in all areas of intelligent computing and its applications to various engineering disciplines like computer science, electronics, electrical, mechanical engineering, etc.

This book features selected research papers presented at the International Conference on Evolutionary Computing and Mobile Sustainable Networks (ICECMSN 2020), held at the Sir M. Visvesvaraya Institute of Technology on 20–21 February 2020. Discussing advances in evolutionary computing technologies, including swarm intelligence algorithms and other evolutionary algorithm paradigms which are emerging as widely accepted descriptors for mobile sustainable networks virtualization, optimization and automation, this book is a valuable resource for researchers in the field of evolutionary computing and mobile sustainable networks.

For several years there has been a growing interest in understanding the dynamics of parasites in ecosystems, as well as the diversity of ways in which they influence ecosystem functioning through their effects on host populations and communities. Ecologists, epidemiologists, evolutionary biologists, and other scientists are increasingly coming to realise that parasites must be taken into account when studying ecosystems. Parasitism and Ecosystems summarizes current knowledge on this topic, providing a comprehensive overview for researchers and students. It represents the first synthesis of both the roles and the consequences of pathogens in ecosystems, utilising well-documented case-studies to illustrate the main issues as well as identifying prospects for future research.

Written by practicing infectious diseases specialists at Mayo Clinic, this comprehensive, state-of-the-art publication covers current and essential clinical aspects of diseases likely to be encountered by the infectious disease specialist as well as to appear on the subspecialty infectious diseases board examination.

Today's synthetic biologists are in the early stages of engineering living cells to help treat diseases, sense toxic compounds in the environment, and produce valuable drugs. With this manual, you can be part of it. Based on the BioBuilder curriculum, this valuable book provides open-access, modular, hands-on lessons in synthetic biology for secondary and post-secondary classrooms and laboratories. It also serves as an introduction to the field for science and engineering enthusiasts. Developed at MIT in collaboration with award-winning high school teachers, BioBuilder teaches the foundational ideas of the emerging synthetic biology field, as well as key aspects of biological engineering that researchers are exploring in labs throughout the world.

These lessons will empower teachers and students to explore and be part of solving persistent real-world challenges. Learn the fundamentals of biodesign and DNA engineering Explore important ethical issues raised by examples of synthetic biology Investigate the BioBuilder labs that probe the design-build-test cycle Test synthetic living systems designed and built by engineers Measure several variants of an enzyme-generating genetic circuit Model "bacterial photography" that changes a strain's light sensitivity Build living systems to produce purple or green pigment Optimize baker's yeast to produce  $\beta$ -carotene

Explains why biotechnology is a relevant and volatile issues. Begins with a history of biotechnology and its effect on agriculture, medicine, and the environment. Equal space is devoted to discussing the efforts of human-rights advocates, animal-rights advocates, and environmentalists to create definitive governmental regulations for this budding industry.

Genetic Engineering Oxford University Press, USA

Legumes include many very important crop plants that contribute very critical protein to the diets of both humans and animals around the world. Their unique ability to fix atmospheric nitrogen in association with Rhizobia enriches soil fertility, and establishes the importance of their niche in agriculture. Divided into two volumes, this work presents an up-to-date analysis of in vitro and recombinant DNA technologies for the improvement of grain, forage and tree legumes. Volume 10B presents the current state and future prospects of in vitro regeneration and genetic transformation expression and stability of transgenes modification of traits in almost all the important legumes, for example: soybean; peanut; pea; french bean; chick pea; pigeon pea; cowpea; mung bean; black gram; azuki bean; lentil; Lathyrus; lupinus; Lotus spp; Medicago spp; Trifolium spp; Winged bean; Guar; and tree legumes for their improvement.

This reference work provides a comprehensive overview of bioactive compounds found in underutilized vegetables and legumes around the globe. It describes their pharmacological, biological and health effects in detail, and provides a strategic framework for further research and global development activities. Using a consistent structure and divided into 9 parts based on the plant source, the book reviews bioactive compounds in various plant species. Each part opens with a leading article discussing the respective plant species. This book is a valuable reference resource for plant biologists and biotechnologists, pharmacologists, pharmacists, food technologists, nutritionists and other health professions working in academia and industry.

A major update of the highly popular second edition, with changes in the content and organisation that reflect advances in the subject. New and expanded topics include cytoskeleton, molecular motors, bioimaging, biomembranes, cell signalling, protein structure, and enzyme regulation. As with the first two editions, the third edition of Instant Notes in Biochemistry provides the essential facts of biochemistry with detailed explanations and clear illustrations.

The author presents a basic introduction to the world of genetic engineering. Copyright © Libri GmbH. All rights reserved.

Within the field of infectious diseases, medical mycology has experienced significant growth over the last decade. Invasive fungal infections have been increasing in many patient populations, including: those with AIDS; transplant recipients; and the elderly. As these populations grow, so does the diversity of fungal pathogens. Paralleling this development, there have been recent launches of several new antifungal drugs and therapies. Clinical Mycology offers a comprehensive review of this discipline. Organized by types of fungi, this volume covers microbiologic, epidemiologic and demographic aspects of fungal infections as well as diagnostic, clinical, therapeutic, and preventive approaches. Special patient populations are also detailed.

Tuberculosis (TB) is an infectious disease caused by the bacterium Mycobacterium tuberculosis (MTB) and it represents a persistent public health threat for a number of complex biological and sociological reasons. According to the most recent Global Tuberculosis Report (2019) edited by the World Health Organization (WHO), TB is considered the ninth cause of death worldwide and the leading cause of mortality by a single infectious agent, with the highest rate of infections and death toll rate mostly concentrated in developing and low-income countries. We

present here the editorial section to the Special Issue entitled "Mycobacterium tuberculosis Pathogenesis, Infection Prevention and Treatment" that includes 7 research articles and a review. The scientific contributions included in the Special Issue mainly focus on the characterization of MTB strains emerging in TB endemic countries as well as on multiple mechanisms adopted by the bacteria to resist and to adapt to antitubercular therapies.

The book is a collection of high-quality peer-reviewed research papers presented at International Conference on Frontiers of Intelligent Computing: Theory and applications (FICTA 2016) held at School of Computer Engineering, KIIT University, Bhubaneswar, India during 16 – 17 September 2016. The book presents theories, methodologies, new ideas, experiences and applications in all areas of intelligent computing and its applications to various engineering disciplines like computer science, electronics, electrical and mechanical engineering.

When enjoying a southeast asian soup or cup of herbal tea, we are really savoring the flavor of lemongrass. Similarly, the sweet aroma of mosquito-repelling lotions comes from the citronella oil present in them. Fine perfumes, candles, and herbal pillows with the pleasing smell of rose are often in fact scented with palmarosa. Providing an in-depth look at their history and production, Essential Oil Bearing Grasses: The genus Cymbopogon provides a comprehensive review of these economically important grasses. A detailed examination of chemical constituents and market trends, the book explores the cosmetic, medicinal, and nutritional uses of the plant. It covers the botany, taxonomy, chemistry, and biogenesis of the oils, and their extraction and analytical methods, biotechnology, storage, legislation, and trade. Highlighting industrial uses for the grasses in this genus, the book also includes coverage of the physiological and ecophysiological considerations. It presents a comprehensive overview of most of the cultivated and wild species of cymbopogons. Featuring contributions from a team of international experts, the book describes the considerable ethno-botanical, phytochemical, and pharmacological knowledge associated with the multidimensional uses of the oils. It provides a complete industrial profile that includes market size, geographical sources, export and import data, and industry uses. Its pages offer an invaluable resource for research, cultivation, marketing, or product development of Cymbopogon.

This book focuses on soft computing and how it can be applied to solve real-world problems arising in various domains, ranging from medicine and healthcare, to supply chain management, image processing and cryptanalysis. It gathers high-quality papers presented at the International Conference on Soft Computing: Theories and Applications (SoCTA 2019), organized by the National Institute of Technology Patna, India. Offering valuable insights into soft computing for teachers and researchers alike, the book will inspire further research in this dynamic field.

Previous Years solved Papers is not hard at all but easy to score well if you follow a simple method of structuring your answers. That smart structuring is the core of our Solved paper book as each solution is superbly explained by our CBSE expert. This will give you enough practice to crack any question in the exam. This book covers the following: CBSE 2019 Solved By 2019 CBSE Topper CBSE 2018 Topper Solution CBSE 2017 Topper Solution Right from essays/letters marks breakdown to following strict CBSE blueprint and Exam syllabus for February 2020 Exam, this book is superbly written. It starts with never-before focus points that dissect the whole 2020 paper and explains how to structure and answer each question of the 2020 All Subjects (Mathematics, Science, Social Science, English, Hindi A & Hindi B Exam efficiently. Extra value items added in this book: Utilising 15 minute reading time just before the exam (by CBSE topper) Focus points at the beginning (6 pages) Structuring your Maths Exam 3 hours smartly (by CBSE Markers) 2020 marking scheme points (value points) underlined in all papers (CBSE markers look for these key points to allot full marks) Self-assessments are included to help you practice without the temptation of checking the answers at the back and thus strain your memory further to get to the answer. This book provides the right recipe to practice for the English 2020 board exam. Take our word for it :) And of course we are here should you have any issue during your preparation. We hope you give this book a buy and crack the All Subjects exam with ease. Best of luck students!

This edited volume demonstrates how the latest developments in biogeography (for example in phylogenetics, macroecology, and geographic information systems) can be applied to studies in the evolutionary ecology of host-parasite interactions in order to integrate spatial patterns with ecological theory.

The book focuses on soft computing and its applications to solve real-world problems in different domains, ranging from medicine and health care, to supply chain management, image processing and cryptanalysis. It includes high-quality papers presented at the International Conference on Soft Computing: Theories and Applications (SoCTA 2018), organized by Dr. B. R. Ambedkar National Institute of Technology, Jalandhar, Punjab, India. Offering significant insights into soft computing for teachers and researchers alike, the book inspires more researchers to work in the field of soft computing.

An extraordinary array of infectious agents affect humans, from worms and fungi to bacteria and prions. This compendium of the curious organisms that cause disease provides a fact-filled account of the nature of each organism, the ways in which they infect humans, and the human stories behind their discovery

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.

Soil salinity is a key abiotic-stress and poses serious threats to crop yields and quality of produce. Owing to the underlying complexity, conventional breeding programs have met with limited success. Even genetic engineering approaches, via transferring/overexpressing a single 'direct action gene' per event did not yield optimal results. Nevertheless, the biotechnological advents in last decade coupled with the availability of genomic sequences of major crops and model plants have opened new vistas for understanding salinity-responses and improving salinity tolerance in important glycophytic crops. Our goal is to summarize these findings for those who wish to understand and target the molecular mechanisms for producing salt-tolerant and high-yielding crops. Through this 2-volume book series, we critically assess the potential venues for imparting salt stress tolerance to major crops in the post-genomic era. Accordingly, perspectives on improving crop salinity tolerance by targeting the sensory, ion-transport and signaling mechanisms are presented here in volume 1. Volume 2 will focus on the potency of post-genomic era tools that include RNAi, genomic intervention, genome editing and systems biology approaches for producing salt tolerant crops.

During the last decade the well-established tools of statistical physics have been successfully applied to an increasing number of biological phenomena. It is a fruitful approach to systems characterised by fluctuations and/or a large number of very similar units, and such systems are common in biology, whether it be the individuals in the codons of a genetic code or the behavioural responses of macromolecules to thermal fluctuations. This book is thus able to cover a wide range of phenomena, including fractal pattern formation, group motion in organisms from bacteria to humans, or the mechanisms by which fluctuations are rectified in the cell's molecular machinery. This book provides a summary of the majority of recent approaches and concepts born in the study of biological phenomena involving collective behaviour and random perturbation, as well as presenting some of the most important new results to specialist researchers. It is, particularly, a key text for all students of scaling and fluctuations in biology.

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.

[Copyright: a8a2eb2a9857831a5bbc9b200b9174f1](#)