Biotechnology Plant Propagation And Plant Breeding

And Plant Breeding


Biotechnology Contributed articles.

Tissue Culture Plant biotechnology has created unprecedented opportunities for the manipulation of biological systems of plants. To understand biotechnology, it is essential to know the basic aspects of genes and their organization in the genome of plant cells. This text on the subject is aimed at students.

Agrobiotechnology and Plant Tissue Culture Biotechnology encompasses the processes and methods used to manipulate living organisms or the substances and products from these organisms for medical, agricultural, and industrial purposes. Barnum not only supplies the big picture of the biotechnology field, but provides in-depth details to illustrate the technology. Traditionally, biotechnology texts have been too narrow in coverage and focused only on the methods used in biotechnology. In contrast, Barnum's text extensively covers the topics, with lots of examples and case studies, and discusses the implications in areas such as gene therapy, medicine, agriculture, marine biology, and forensics. Designed to grab the interest of students and make the topics relevant to them, Barnum's text is an excellent integration of historical and modern biotechnology topics.

Biotechnology, Patenting Issues The purpose of this book is to provide the advances in plant in vitro culture as related to perennial fruit crops and medicinal plants. Basic principles and new techniques, now available, are presented in detail. The book will be of use to researchers, teachers in biotechnology and for individuals interested to the commercial application of plant in vitro culture.

Proceedings of the International Symposium on Plant Biotechnology, From Bench to Commercialization This book presents basic concepts, methodologies and applications of biotechnology for the conservation and propagation of aromatic, medicinal and other economic plants. It caters to the needs and challenges of researchers in plant biology, biotechnology, the medical sciences, pharmaceutical biotechnology and pharmacology areas by providing an accessible and cost-effective practical approach to micropropagation and conservation strategies for plant species. It also includes illustrations describing a complete documentation of the results and research into particular plant species conducted by the authors over the past 5 years. Plant Biotechnology has been a subject of academic interest for a considerable time. In recent years, it has also become a useful tool in agriculture and medicine, as well as a popular area of biological research. Current economic growth is globally projected in a highly positive manner, but the challenges many countries face with regard to food, feed, malnutrition, infectious diseases, the newly identified life-style diseases, and energy shortages, all of which are worsened by an ever-deteriorating environment, continue to pull the growth digits back. The common thread that connects all of the above challenges is biotechnology, which could provide many answers. Molecular biology and biotechnology have now become an integral part of tissue culture research. The tremendous impact generated by genetic engineering and consequently of transgenics now allows us to manipulate plant genomes at will. There has indeed been a rapid development in this area with major successes in both developed and developing countries. The book introduces several new and exciting areas to researchers who are unfamiliar with plant biotechnology and also serves as a review of ongoing research and future directions for scholars. The book highlights numerous methods for in vitro propagation and utilization of techniques in raising transgenics to help readers reproduce the experiments discussed.

Plant Tissue Culture Plant tissue culture is an essential component of Biotechnology which has gained unbeatable recognition in plant sciences for successful micropropagation and improvement of plant species, leading to the commercial application. A number of plant species have been investigated around the globe. This book presents current research on the application of in vitro technology in the improvement of Balanites aegyptiaca Del., a medicinal plant of semi-arid tropics. The widespread importance of forestry, summed to the lengthy generation cycles of tree species, makes unavoidable development of new technologies that complement conventional tree breeding programmes in order to obtain improved genotypes. Recently, a new set of tools has become available in the past 20 years that combined with traditional plant breeding will allow scientists to generate products that are genetically improved varieties of the future. These set of tools come under the general title of Biotechnology. The three specific biotechnological tools have been successfully used in several programmes of plant conservation, namely, tissue culture techniques for in vitro propagation, the use of molecular markers to assess the degree of variability among population and techniques of long-term conservation such as encapsulation and cryopreservation. Plant tissue culture techniques are particularly relevant and become an alternative not only for large scale propagation of individuals that
are threatened, reduce production costs and increase gains to the industry, but also to provide ecological advantages as in phytoremediation or in the establishment of artificial plantings in weed infested site. The book gives a complete documentation of the results and demonstration of Balanites aegyptiaca conducted by the authors over the past 5 years. The end-to-end approach developed through plant tissue culture techniques is reflected in the book and there has been a successful transfer of technology from lab to field. The authors hope that this information would provide valuable data and also be a reference material for future research activities in this area.

Desert Plants Under the vast umbrella of Plant Sciences resides a plethora of highly specialized fields. Botanists, agronomists, horticulturists, geneticists, and physiologists each employ a different approach to the study of plants and each for a different end goal. Yet all will find themselves in the laboratory engaging in what can broadly be termed biotechno

Plant Tissue Culture, Development, and Biotechnology Plant-based medicines play an important role in all cultures, and have been indispensable in maintaining health and combating diseases. The identification of active principles and their molecular targets from traditional medicine provides an enormous opportunity for drug development. Using modern biotechnology, plants with specific chemical compositions can be mass propagated and genetically improved for the extraction of bulk active pharmaceuticals. Although there has been significant progress in the use of biotechnology, using tissue cultures and genetic transformation to investigate and alter pathways for the biosynthesis of target metabolites, there are many challenges involved in bringing plants from the laboratory to successful commercial cultivation. This book presents the latest advances in the development of medicinal drugs, including topics such as plant tissue cultures, secondary metabolite production, metabolomics, metabolic engineering, bioinformatics and future biotechnological directions.

Plant Tissue Culture and Biotechnology Designed primarily as a text for undergraduate and postgraduate students of Botany and Plant Biotechnology, the book discusses the theoretical aspects and modern applications of plant cell, tissue and organ culture. Written with the aim of providing up-to-date information on the subject, and focused on the concept of commercialization of plant cell culture, the contents have been presented with clarity. The book not only discusses the theoretical aspects of plant tissue culture but also emphasizes the art of its practice. It also provides a systematic explanation of asepsis and methods of sterilization, plant tissue culture techniques, culture of reproductive structures, plant tissue culture in germplasm conservation, its applications in the industry and plant pathology and operation and management of greenhouse hardening unit. In addition, it discusses in vitro propagation of plants (micropropagation) with a series of case studies pertaining to tree species and horticultural crops. Besides students, the book will also prove to be useful for researchers, scholars and teachers.

Quick Bibliography Series This book summarises various aspects of plant biotechnology and is divided into 27 chapters. This edition discusses: plant cell culture and development, plant tissue culture, micropropagation, germplasm storage, haploid plants, triploid plants, in vitro pollination and fertilisation, protoplast isolation and culture, somatic cell hybridisation, synthetic seeds, plant breeding, plant derived vaccines, genetically modified foods, improving photosynthesis and crop yield, insect resistant plants, fungus resistant plants, virus resistant plants, ornamental plants, medicinal plants, recombinant DNA, molecular markers, intellectual property rights. Chapters on nanotechnology for micronutrients in soil-plant systems are a unique feature of the book.

Plant Biotechnology and Transgenic Plants Hallmarked as the most successful book of its kind, this remarkably thorough treatment covers all aspects of the propagation of plants(both sexual and asexual)with considerable attention given to human (vs natural) efforts to increase plant numbers. The book presents both the art and science of propagation, and conveys knowledge of specific kinds of plants and the particular methods by which those plants must be propagated. A five-part organization outlines general aspects of plant propagation, seed propagation, vegetative propagation, methods of micropropagation, and propagation of selected plants. For anyone with an interest in how plants are grown and utilized for maintaining and adding enjoyment to human life.

Library of Congress Subject Headings Basics; Laboratory organization; Sterilization techniques; Nutrition medium; Choice of the explant; Plant tissue culture; Seed culture; Micropropagation- meristem culture; Micropropagation- axillary bud proliferation; Micropropagation- adventitious regeneration; Micropropagation- organogenensis; Micropropagation- embryogenesis; Cell suspension; Secondary metabolite production in a cell suspension culture; Anther culture; Protoplast isolation and fusion; Biotechnology; SDS-PAGE electrophoresis of proteins; Isolation of DNA from plant tissues; Isolation an purification of plasmid DNA; Restriction enzyme digestion of DNA; Agarose gel electrophoresis; Preparation of competent cells, transformation of E. coli with plasmid DNA and ligation of insert DNA to a vector; Agrobacterium-mediated gene transfer; Biolistic method of transformation in plants; In vitro amplification of DNA by PCR: detection of transgenes; RAPD analysis; Microsatellite marker analysis; Southern blotting; Southern hybridization.

Plant Biotechnology, Commercial Prospects and Problems Introduction and Techniques; Introductory history; Laboratory organisation; Media; Aseptic manipulation; Basic aspects; Cell culture; Cellular totipotency; Somatic embryogenesis; Applications to plant breeding; Haploid production; Triploid production; In vitro pollination and fertilization; Zygotic embryo culture; Somatic hybridisation and cybridisation; Genetic transformation; Somaclonal and gametoclonal variant selection; Application to horticulture and forestry; Production of disease-free plants; clonal propagation; General applications; Industrial applications: secondary metabolite production; Germplasm conservation.

Trees: Propagation and Conservation Plant tissue culture, a fundamental technique of plant biotechnology, has found varied applications in the plant industry and is a valuable laboratory technique. This text, for students and researchers, explores the topic.

Hartmann and Kester's Plant Propagation This text discusses technologies and research on the engineering, synthesis, utilization and control of primary and secondary plant metabolites, such as carbohydrates, amino acids, lipids, polymers, proteins and phytochemicals for industrial, pharmaceutical and food and feed applications.

Plant Tissue Culture: An Introductory Text Automation and Environmental Control in Plant Tissue Culture rigorously explores the new challenges faced by modern plant tissue culture researchers and producers worldwide: issues of cost efficiency, automation, control, and optimization of the in vitro microenvironment. This book achieves a critical balance between the economic, engineering and biological viewpoints, and presents well-balanced, unique, and clearly organized perspectives on current initiatives in the tissue culture arena. Each chapter offers guidelines leading towards an exhaustive, unprecedented level of control over in vitro growth, based on emerging technologies of robotics, machine vision, environmental sensors and regulation, and systems analysis. Unlike other tissue culture books which focus on specific crops and techniques, this book spans the broad range of major tissue culture production systems, and advances evidence on how some underdressed aspects of the process actually determine the status of the end product. Key researchers from industry and academia have joined to give up-to-date research evidence and analysis. The collection comprises an essential reference for industrial-scale tissue culture producers, as well as any researcher interested in optimizing in vitro production.

Plant Biotechnology and Medicinal Plants


Plant Biotechnology Plant tissue culture (PTC) is basic to all plant biotechnologies and is an exciting area of basic and applied sciences with considerable scope for further research. PTC is also the best approach to demonstrate the totipotency of plant cells, and to exploit it for numerous practical applications. It offers technologies for crop improvement (Haploid and Triploid production, In Vitro Fertilization, Hybrid Embryo Rescue, Variant Selection), clonal propagation (Micropropagation), virus elimination (Shoot Tip Culture), germplasm conservation, production of industrial phytochemicals, and regeneration of plants from genetically manipulated cells by recombinant DNA technology (Genetic Engineering) or cell fusion (Somatic Hybridization and Cybridization). Considerable work is being done to understand the physiology and genetics of in vitro embryogenesis and organogenesis using model systems, especially Arabidopsis and carrot, which is likely to enhance the efficiency of in vitro regeneration protocols. All these aspects are covered extensively in the present book. Since the first book on Plant Tissue Culture by Prof. P.R. White in 1943, several volumes describing different aspects of PTC have been published. Most of these are compilation of invited articles by different experts or proceedings of conferences. More recently, a number of books describing the Methods and Protocols for one or more techniques of PTC have been published which should serve as useful laboratory manuals. The impetus for writing this book was to make available a complete and up-to-date text covering all basic and applied aspects of PTC for the students and early-career researchers of plant sciences and plant / agricultural biotechnology. The book comprises of nineteen chapters profusely illustrated with self-explanatory illustrations. Most of the chapters include well-tested protocols and relevant media compositions that should be helpful in conducting laboratory experiments. For those interested in further details, Suggested Further Reading is given at the end of each chapter, and a Subject and Plant Index is provided at the end of the book.

Introduction to Plant Tissue Culture Major Advances Made During The Last One Decade In The Field Of Plant Tissue Culture And Molecular Biology have Been Presented In This Book. It Comprises About Fifty Research Articles On A Wide Range Of Topical Subjects From Overall Review Of Plant Tissue Culture To Superoxide Dismutases In Plants; Somatic Embryogenesis In Crop Species Like Cicer Arietinum, Helianthus Annuus, Etc., Besides Plantation Crops Like Coffee And Pepper; Micropropagation Of Divergent Plant Species, Including Medicinal And Ornamental Plants; Haploid And Somaclonal Variation In Pigeonpea, Peanut, Etc.; Production Of Secondary Metabolites In Plant Species Like Catharanthus Roseus, Artemesia Maritima And Azadirachta Indica; Stress Biology In Crop Plants; Use Of Molecular Markers In Coffee, Pcr-Based Dna Fingerprinting, Seed Protein Profiles Of Fodder Grains, And Nodule Initiation In Pigeonpea. This Book Serves Not Only As A Handbook For Students, Scholars, Teachers, Researchers And Industries Alike In Plant Tissue Culture And Biotechnology, But Also For General Reference.

Applications of Plant Biotechnology Plant Tissue Culture In One Form Or Another Has Become One Of The Most Promising Branches Of Plant Science. Arising From The Totipotency Of Plant Cells, It Now Occupies A Key Position In Plant Breeding, Plant Propagation And Plant Biotechnology. Plant Tissue Culture - Basic And Applied Brings To The Student Accessible, Up-To-Date Information On This Subject. Basic Knowledge Of Tissue Culture Methods Such As Isolation Of Suitable Tissues From The Mother Plant, Maintenance Of The Tissues Under In Vitro Condition In An Undifferentiated Or De-Differentiated Stage, Methods Of Genetic Engineering And Gene Transfer, Chromosomal Studies And The Handling Of In Vitro Micro Plants Are Described In Detail In This Book. Similarly, Application Aspects Of Micropropagation, Haploid Cell Culture, Protoplast Culture, Embryo Culture, Somatic Embryogenesis And Artificial Seeds Are Also Discussed.

Plant Breeding Plant Propagation and Biotechnology This work integrates basic biotechnological methodologies with up-to-date
agricultural practices, offering solutions to specific agricultural needs and problems from plant and crop yield to animal husbandry. It presents and evaluates the limitations of classical methodologies and the potential of novel and emergent agriculturally related biotechnologies.

Plant Biotechnology

Biotechnology for Medicinal Plants Plant tissue culture and advanced biotechnologies have proven to be influential tools that complement conventional breeding and accelerate development of many medicinal plants. Various approaches, such as pathway engineering, precursor feeding, transformation with biotic and abiotic elicitors and scaling up in bioreactors, have been explored to improve the production of secondary metabolites from different medicinal plants. This book provides a comprehensive description of various studies, carried out on in vitro culture and hairy root cultures of Catharanthus roseus, Silybum marianum and Digitalis species which have been considered as alternative sources for the production of anti-tumour compounds, flavonoids and cardiac glycosides. Specific focus is on elicitation strategy for increasing production of bioactive compounds of C. roseus L., S. marianum and Digitalis species to overcome the constrains of conventional propagation. This book is valuable for researchers or students working on medicinal plants, phytochemistry, and plant tissue culture. It also serves as a reference for the pharmaceutical industry.

Plant Tissue Culture & Biotechnology Deserts appear very fascinating during our short visits. However, the lives of plants and animals are very different under the harsh climatic conditions of high temperature and scant water supply in deserts, sometimes associated with high concent- rations of salt. The editor of this book was born and brought up in the Great Indian Desert, and has spent much of his life studying the growth and metabolism of desert plants. It is very charming on a cool summer evening to sit at the top of a sand dune listening only to blowing air and nothing else. It has been my dream to prepare a volume on desert plants encompassing various aspects of desert plant biology. In this book, I have tried to present functional and useful aspects of the vegetation resources of deserts along with scientiﬁc input aimed at understanding and improving the utility of these plants. The scant vegetation of deserts supports animal life and provides many useful medicines, timber and fuel wood for humans. Therefore, there are chapters devoted to medicinal plants (Chap. 1), halophytes (Chaps. 13, 14), and fruit plants (Chaps. 17, 20). Desert plants have a unique reproductive biology (Chaps. 9/11), well-adapted eco-physiological and anatomical characteristics (Chap. 7), and specialised metabolism and survival abilities. These plants are distinctly different from those of other biomes and pose many problems to researchers developing biotechnological approaches for their amelioration (Chaps. 18/20).

Biotechnology in Horticultural and Plantation Crops Covering the latest advances in the use of plants to produce medicinal drugs and vaccines, examines topics including plant tissue culture, secondary metabolite production, metabolomics and metabolic engineering, bioinformatics, molecular farming and future biotechnological directions.

INTRODUCTION TO PLANT CELL TISSUE AND ORGAN CULTURE

Recent Advances in Plant in vitro Culture This book provides a general introduction of plant tissue culture followed by specific applications of biotechnology in regeneration of rice (Oryza sativa), Maize, Eucalyptus, hot pepper, guava (Psidium guajava L.) stone fruit (Pinus pinea) and compares the features of in vitro grown plants to in vivo plants, Transgenic plants production and application, generating marker-free transgenic plants, genetic engineering and metabolic engineering of plants, molecular farming, abiotic stress tolerance, transgenic in floriculture and ornamental plants, celery, Secondary metabolite production with special reference to sennoside, transformation of potato and biosafety concerns, bioinformatics and its application to crop improvement, Intellectual property rights, biotechnological aspects of secondary metabolite production, application of biotechnology in pharmaceutical sciences and production of recombinant proteins, cyclotides, Hypericum perforatum and Gentiana punctata provide a selected survey of key advances in the fascinating field of plant cell and tissue culture as a tool in biotechnology. Besides covering basic techniques employed in leading laboratories worldwide, follows an extended account of important applications in, for example, plant propagation, gene technology and secondary metabolite production. The book will prove useful to both students and researchers of biotechnology, agriculture, horticulture, forestry as well as for the industry.

Plant Tissue Culture: Propagation, Conservation and Crop Improvement Contributed articles.

Scale-Up and Automation in Plant Propagation Biotechnological Developments And Genetic Engineering Are Revolutionising Agriculture And Medical Science. The Many Applications Of Biotechnology Include The Production Of New And Improved Foods, Industrial Chemicals, Pharmaceuticals And Livestock, And Offer Hope For Restoring The Environment And Protecting Endangered Species. Plant Tissue Culture And Biotechnology Contains 17 Chapters On Varied Aspects Of Current Interest And Progress Made In The Field Of Biotechnology In The Recent Past. A Major Section Includes Articles On Plant Tissue Culture And Application Of Biotechnology In Agriculture, Medicine And Environmental Management. The Potential Role Of Biotechnology In Food And Agriculture; Transgenic In Oil Seeds; Genetically Modified Plants For Sustainable Food Security; Synthetic Seed; Plant Genetic Engineering; Biotechnological Achievement In Sugarcane, Etc. Provide Information On Application Of Biotechnology In Crop Improvement. The Book Also Covers Information On Stem Cell Therapy; Nanotechnology And Role Of Biotechnology In Bioremediation. Other Topics Include Survey Of Alkaldoids, Steroids And Flavonoids Of In Vivo And In Vitro Grown Medicinal Plants; Role Of Tissue Culture In Floriculture; Micropropagation Of Aloe Barbadensis Et Datura Metel; Plant Propagation And Bioreactors Application In Tissue Culture And Regeneration Studies In Brassica Species Provide Necessary Information Using Tissue Culture Technique. A Comprehensive Account Of The Role Of Plant-Based Anti-Cancer Drugs In The Management Of Cancer And Identification Of Orchid Hybrids Through Isozyme Analysis Have Added To The Value Of The Book. This Book Will Be Useful To Biotechnologists, Biologists, Agriculture Scientists, Researchers, Teachers And Students Of Plant Sciences.

Agricultural Biotechnology Scale-Up and Automation in Plant Propagation reviews methods of automation and scale-up of plant propagation in vitro. It looks at the large scale clonal propagation of plants, or micropropagation, as the first major practical application
of plant biotechnology. It also discusses the advantages and limitations of micropropagation and evaluates current methods of commercial micropropagation. Organized into 13 chapters, this volume begins with an overview of the benefits of scaling up and automating plant propagation before proceeding with a discussion of synthetic seeds and their use for plant propagation, along with problems and economic considerations associated with synthetic seed technology. It then considers the implementation of somatic embryogeneseis technology for clonal forestry, the development and commercialization of bioreactor technology for automated propagation of potato microtubers and lily microbulbs, and approaches to automated propagation of fruit trees. Other chapters focus on issues of cost reduction and development of "new" products, scale-up and operation of prototype bioreactors for plant propagation, and application of machine vision technology to scale-up and automated evaluation of somatic embryogenesis in sweet potato. The book also describes methods of measurement and control of the environment in culture, environmental factors affecting photosynthesis, and use of robotics and field transplanter in the automation of plant propagation. Scientists and plant breeders will find this book extremely useful.

Plant Biotechnology: Volume 18, Plant Biotechnology

Biotechnology of Plant Tissues The present book is divided into five sections. The first section deals with the methodology and bioresource generation, techniques related to genetic engineering, and gene transfer to the nuclear genome and chloroplast genome. The new techniques of genome profiling and gene silencing are also presented. The second section of the book deals with the classical aspect of plant biotechnology viz. tissue culture and micropropagation. Use of genetic engineering via Agrobacterium and direct transfer of DNA via particle bombardment to develop transformed plants in Artemesia, castor and orchids, and production of recombinant proteins in plant cells have been dealt with in the third section. The fourth section deals with the abiotic and biotic stress tolerance in plants. The basic biology of some of the stress responses, and designing plants for stress tolerance is discussed in this section. The fifth section deals with medicinal plants and alkaloid production.

Plant Development and Biotechnology

The genesis of the volume, Plant Biotechnology and Molecular Markers, has been the occasion with medicinal plants and alkaloid production.

Introduction to Plant Science

Automation and environmental control in plant tissue culture

Medicinal Plant Biotechnology

Biotechnology revolutionized traditional plant breeding programs. This rapid change produced new discussions on techniques and opportunities for commerce, as well as a fear of the unknown. Plant Development and Biotechnology addresses the major issues of the field, with chapters on broad topics written by specialists. The book applies an informal style that addresses the major aspects of development and biotechnology with minimal references, without sacrificing information or accuracy. Divided into five primary parts, this volume explores how the field emerged from its early theoretical base to the technical discipline of today. It also covers progress being made with genetically engineered plants, providing a snapshot of the field's controversial present.

Part III discusses methods for preparing media, creating solutions and dilutions, and accomplishing sterile culture work. It investigates common methods for visualizing and documenting studies, and quantifying responses of tissue culture in research. Part IV delivers the essential foundation of plant tissue culture, introducing the three types of commonly used culture regeneration systems. Part V integrates propagation techniques with other methodologies for the modification and manipulation of germplasm. Besides articles on in vitro feralization and micropropagation, there are articles on forest tree improvement through genetic engineering. Considering the importance of conservation of our precious natural wealth, one article deals with cryopreservation of plant material. Chapter on molecular marker considers DNA indexing as markers of clonal fidelity of in vitro regenerated plants and prevention against bio-piracy. A couple of write-ups also cover stage-specific gene markers, DNA polymorphism and genetic engineering, including raising of stress tolerant plants to sustain productivity and help in reclamation of degraded land.

Plant Biotechnology

This revised text provides a comprehensive introduction to the fascinating world of plant science. From the basic requirements for plant growth, to genetic engineering and biotechnology, this easy-to-understand book is ideal for the high school level agriscience curriculum or college freshman level plant science course. Students will learn about the origins of cultivated plants, structure and anatomy, photosynthesis, respiration, propagation, production of major agronomic crops, and more.

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