Introduction To Plant Biotechnology Hs Chawla

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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

plant biotechnology presents a balanced objective exploration of the technology behind genetic manipulation and its application to the growth and cultivation of plants the book describes the techniques underpinning genetic manipulation and makes extensive use of case studies to illustrate how this influential tool is used in practice

this book has been written to meet the needs of students for biotechnology courses at various levels of undergraduate and graduate studies this book covers all the important aspects of plant tissue culture viz nutrition media micropropagation organ culture cell suspension culture haploid culture protoplast isolation and fusion secondary metabolite production somaclonal variation and cryopreservation for good understanding of recombinant dna technology chapters on genetic material organization of dna in the genome and basic techniques involved in recombinant dna technology have been added different aspects on rdna technology covered gene cloning isolation of plant genes transposons and gene tagging in vitro mutagenesis pcr molecular markers and marker assisted selection gene transfer methods chloroplast and mitochondrion dna transformation genomics and bioinformatics genomics covers functional and structural genomics proteomics metabolomics sequencing status of different organisms and dna chip technology application of biotechnology has been discussed as transgenics in crop improvement and impact of recombinant dna technology mainly in relation to biotech crops

plant biotechnology comprehensively covers different aspects of the subject based on the latest outcomes of this field topics such as tissue culture nutrient medium micronutrients macronutrients solidifying agents supporting systems and growth regulators have been dealt with extensively the book also discusses in detail plant genetic engineering for productivity and performance resistance to herbicides insect resistance resistance to abiotic stresses molecular marker aided breeding molecular markers types of markers and biochemical markers different aspects of important issues in plant biotechnology commercial status and public acceptance biosafety guidelines gene flow and ipr have been also thoroughly examined this book caters to the needs of graduate postgraduate and researchers please note this volume is co published with the energy and resources institute press new delhi taylor francis does not sell or distribute the hardback in india pakistan nepal bhutan bangladesh and sri lanka

as the oldest and largest human intervention in nature the science of agriculture is one of the most intensely studied practices from manipulation of plant gene structure to the use of plants for bioenergy biotechnology interventions in plant and agricultural science have been rapidly developing over the past ten years with immense forward leaps on an annual basis this book begins by laying the foundations for plant biotechnology by outlining the biological aspects including gene structure and expression and the basic procedures in plant biotechnology of genomics metabolomics transcriptomics and proteomics it then focuses on a discussion of the impacts of biotechnology on plant breeding technologies and germplasm sustainability the role of biotechnology in the improvement of agricultural traits production of industrial products and pharmaceuticals as well as biomaterials and biomass provide a historical perspective and a look to the future sections addressing intellectual property rights and sociological and food safety issues round out the holistic discussion of this important topic includes specific emphasis on the inter relationships between basic plant biotechnologies and applied agricultural applications and the way they contribute to each other provides an updated review of the major plant biotechnology procedures and techniques their impact on novel agricultural development and crop plant improvement takes a broad view of the topic with discussions of practices in many countries

plant science is one of the fundamental subjects to begin with biotechnology has given it a force to get modified into an applied field known as plant biotechnology plant tissue culture is widely used for direct commercial applications metabolic engineering of plants promises to create new opportunities in agriculture environmental applications production of chemicals and even medicine therefore molecular techniques encompassing the use of plants are being focused in this era the main aim of this book is to provide readers about the applied aspects of plant biotechnology

today it is generally accepted that one of the key areas of biotechnology for the next century will be in plant based biotechnology biotechnology has created new opportunities for plant scientists with important applications to agriculture and forestry this reference text is divided into five sections for ease of presentation the first section focuses on the structure composition and functionality of plant cells and genes with particular emphasis on the cellular and molecular biology of plants and cultured cells section two is concerned with the direct exploitation of cell cultures for the production of useful substances the third section deals with regeneration and propagation systems the fourth section considers the increasingly central area of genetic manipulation of plant cell systems the last section is on specific applications in plant biotechnology this reference work is a survey of these various facets of plant biotechnology the individual chapters and the follow up literature cited allow an easy access to the various subject areas and will hopefully stimulate interest in these rapidly moving and exciting fields of research

rapid advances in the field of biotechnology have brought revolutionary changes in agriculture health care and environmental science biotechnology has been promoted by many as being essential for human survival and as a technology that will improve the quality of life in every country plant biotechnology has affected all aspects of human life plant biotechnology perspectives and prospects incorporates review and research articles on varied aspects of plant biotechnology in 20 chapters one section deals with genetic manipulation of photosynthesis in higher plants transgenic vegetables for pharmaceutical and industrial applications agricultural genomics and molecular manipulation of carbon dioxide assimilation in crop plants the major section on tissue culture includes articles on in vitro production and utilisation of haploids doubled haploids in rice conventional and biotechnological methods of propagation in oaks orchid roots and in vitro regeneration multiple bud formation and plant regeneration in aquatic ferns tissue culture of medicinal plants micropropagation of fabaceous woody species biotechnology of chlorophyton borivilianum hairy root cultures and on the in vitro effects of polyamine in shootlet proliferation in sugarcane one article is on important challenges in crop plant biology and provides future thrusts to mitigate hunger and poverty in the world the section on stress includes articles on molecular biology and physiology of stress tolerance and micronutrients and their bioavailability to overcome hidden hunger an account related to biotechnological potential of cellulases from extremophiles provides useful and current knowledge on the subject an article on protection of biodiversity and traditional knowledge and another on the role of biotechnology in the protection of intellectual property rights have added to the value of the book this book will be highly beneficial to students teachers and research workers in the field of plant biotechnology agriculture and plant science

reviews several recent developments that relate to improving crop productivity and product diversification considers the genetic manipulation of major products such as carbohydrates fatty acids sesquiterpenes and floriculture crops and discusses aspects of the biosafety environmental release and commercial exploitation of transgenics other topics include developing pest resistant transgenic plants producing human therapeutics in plants using molecular biology techniques in plant breeding to protect intellectual property rights and biosystematics annotation copyrighted by book news inc portland or

this work covers micropropagation technology the problems and economics of large scale micropropagation tissue culture of hardwoods including palms and orchids and disease detection tissue techniques such as embryo and anther culture are included along with in vitro mutagenesis

introduction and techniques introductory history laboratory organisation media aseptic manipulation basic aspects cell culture cellular totipotency somatic embryogenesis applications to plant breeding haploid prodution 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

focused on basics and processes this textbook teaches plant biology and agriculture applications with summary and discussion questions in each chapter updates each chapter to reflect advances changes since the first edition for example new biotechnology tools and advances genomics and systems biology intellectual property issues on dna and patents discussion of synthetic biology tools features autobiographical essays from eminent scientists providing insight into plant biotechnology and careers has a companion website with color images from the book and powerpoint slides links with author s own website that contains teaching slides and graphics for professors and students bit ly 2ci3mjp

summarizes the latest scientific findings and methods in molecular biology genetic engineering and tissue culture applied to agriculture emphasis is on cell and tissue culture genetic transformation and regeneration of transgenic plants contains chapters on the plant genome plant genetic engineering gene transfer systems for plants and plant tissue culture plus study outlines and questions for undergraduate and graduate students annotation copyrighted by book news inc portland or

with the appearance of methods for the sequencing of genomes and less expensive next generation sequencing methods we face rapid advancements of the omics technologies and plant biology studies reverse and forward genetics functional genomics transcriptomics proteomics metabolomics the movement at distance of effectors and structural biology from plant genomics to plant biotechnology reviews

the recent advancements in the post genomic era discussing how different varieties respond to abiotic and biotic stresses understanding the epigenetic control and epigenetic memory the roles of non coding rnas applicative uses of rna silencing and rna interference in plant physiology and in experimental transgenics and plants modified to specific aims in the forthcoming years these advancements will support the production of plant varieties better suited to resist biotic and abiotic stresses for food and non food applications this book covers these issues showing how such technologies are influencing the plant field in sectors such as the selection of plant varieties and plant breeding selection of optimum agronomic traits stress resistant varieties improvement of plant fitness improving crop yield and non food applications in the knowledge based bio economy discusses a broad range of applications the examples originate from a variety of sectors including in field studies breeding rna regulation pharmaceuticals and biotech and a variety of scientific areas such as bioinformatics omics sciences epigenetics and the agro industry provides a unique perspective on work normally performed behind closed doors as such it presents an opportunity for those within the field to learn from each other and for those on the outside to see how different groups have approached key problems highlights the criteria used to compare and assess different approaches to solving problems shows the thinking process practical limitations and any other considerations aiding in the understanding of a deeper approach

the book techniques in molecular biology and plant biotechnology is a compendium on the laboratory experiments in molecular biology plant tissue culture genetic engineering and immuno diagnostics covering a total of 90 experiments the present day education system focuses on skilling and development of entrepreneurial human resources biotechnology has emerged as a promising career option demanding skilled biotechnologists in various sectors like agriculture horticulture animal sciences fisheries science natural resource management medicine pharmaceutical and food processing industries the step by step procedure on different techniques in plant biotechnology presented in the book will be an authentic knowledge source and a ready reckoner for skill and capability development in biotechnology for students research scholars teachers and scientists

written in easy to follow language the book presents cutting edge agriculturally relevant plant biotechnologies and applications in a manner that is accessible to all this book introduces the scope and method of plant biotechnologies and molecular breeding within the context of environmental analysis and assessment a diminishing supply of productive arable land scarce water resources and climate change authors who have studied how agro ecosystems have changed during the first decade and a half of commercial deployment review effects and stress needs that must be considered to make these tools sustainable

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 organogenesis 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 coil 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 southerm biotting southerm hybridization

the branch of agricultural science that utilizes advanced scientific methodologies to alter plants for various purposes is referred to as plant biotechnology techniques like molecular markers vaccines tissue culture molecular diagnostics and genetic engineering are some of the techniques and tools used within this field crop biotechnology is a prominent subset that involves transferring desired traits from one plant species to another these traits include flavor growth rate and resistance to pests and diseases diverse modification techniques such as polyploidy genome editing mutagenesis transgenics and protoplast fusion are important within plant biotechnology to get the desired result this book provides significant information of this discipline to help develop a good understanding of plant biotechnology it unfolds the innovative aspects of this area which will be crucial for the holistic understanding of the subject matter this textbook with its detailed analyses and data will prove immensely beneficial to students involved in this area at various levels

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