

Medicinal Plant Biotechnology

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Plants Some Aspects Of Medicinal Plant Biotechnology Biotechnological Approaches for Medicinal and Aromatic Plants *Ciddi Veeresham Reagan Knox Rajesh Arora Mohd. Shahid Rajesh Arora Oliver Kayser Mohamed Ramadan Rady Deependra Singh Reagan Knox Ian Stewart Suman Chandra S. Srivastava Ashwani Kumar Deependra Singh Oliver Kayser Halina Maria Ekiert Mohd Shahnawaz Nitish Kumar*

plant based medicines assume a critical part in all societies and have been fundamental in keeping up wellbeing and battling infections the distinguishing proof of dynamic standards and their sub atomic focuses from customary prescription gives a huge chance to sedate advancement utilizing present day biotechnology plants with particular synthetic syntheses can be mass spread and hereditarily enhanced for the extraction of mass dynamic pharmaceuticals in spite of the fact that there has been noteworthy advance in the utilization of biotechnology utilizing tissue societies and hereditary change to research and modify pathways for the biosynthesis of target metabolites there are many difficulties associated with bringing plants from the lab to effective plug development this book shows the most recent advances in the improvement of restorative medications including points for example plant tissue societies optional metabolite generation metabolomics metabolic building bioinformatics and future biotechnological bearings this special review of plants and transgenic systems of extraordinary logical therapeutic and financial incentive for both industry and the scholarly community covers the entire range from cell culture methods by means of hereditary designing and auxiliary item digestion up to the utilization of transgenic plants for the generation of bioactive mixes

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

the book provides an overview of current trends in biotechnology and medicinal plant sciences the work includes detailed chapters on various advance biotechnological tools involved in production of phytoactive compounds of medicinal significance some recent and novel research studies on therapeutic applications of different medicinal plants from various geographical regions of the world have also been included these studies report the antimicrobial activity of various natural plant products against various pathogenic microbial strains informative chapters on recent emerging applications of plant products such as source for nutraceuticals and vaccines have been integrated to cover latest advances in the field this book also explores the conservation aspect of medicinal plants thus chapters having comprehensively complied in vitro conservation protocols for various commercially important rare threatened and endangered

medicinal plants were provided in the present book

there have been rapid advances in the field of plant biotechnology in recent years increasing the potential for medical application covering the latest advances in the use of plants to produce medicinal drugs and vaccines this volume examines topics including plant tissue culture secondary metabolite production metabolomics and metabolic engineering bioinformatics molecular farming and future biotechnological directions with contributors from key researchers in the field

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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 elicitation 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 flavonolignans and cardenolides specific focus is on elicitation strategy for increasing production of bioactive compounds of *C. roseus*, *S. marianum* and *Digitalis* species to overcome the constraints 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

this book explores our knowledge of biotechnology and its application to improving the quality of medicinal plants with its unique and sustained focus on medicinal plant biotechnology it offers an essential guide and a systematic reference for the development of medicinal products with the help of biotechnology from natural sources with contributions from world renowned experts in the fields of biotechnology pharmaceutical biology pharmacognosy chemistry and pharmaceutical biotechnology plant biotechnology was written while keeping in mind the requirements of botanists the pharmaceutical industry biotechnologists microbiologists and specialists working on plant biotechnology it can serve as either a textbook or a reference work for students teachers or scientists working

in the field of medicinal plant biotechnology and its readership also includes natural product chemists biotechnologists pharmacognosists and pharmacologists as well as academic and industry researchers features provides essential evidence for all specialists overseeing supportive biotechnology on its utility discusses the fundamental techniques in biotechnology and their implementation with medicinal plants

plant biochemistry is the study of the chemistry of plants plant biochemists study the structure and function of cellular components and chemical reactions that taking place in plants the tools and techniques of new biology have opened several new and exciting avenues in plant biochemistry however these have not been sufficiently tapped by plant scientists in their rush for cloning sequencing tissue culture and transformation biochemistry is the study of chemical reactions taking place in living organisms notably reactions of degradation of food substances which provide the energy required by organisms and transformation of biosynthesis reactions leading to the formation of compounds needed by the cells medicinal plants are nature s hidden and to a large extent unexplored treasure india is endowed with about 8000 species of medicinal plants according to a recent estimate of the planning commission government of india the potential for plant based crude drugs is about rs 400 billion globally the demand for medicinal plants and their derivatives is growing at a rate of 7 15 this book provides students and researchers in the plant sciences with a concise up to date account of the bio chemical basis of the major metabolic processes in plants this is a comprehensive exclusive and exhaustive work on the subject it is an asset for all researchers and scholars

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

the genesis of the volume plant biotechnology and molecular markers has been the occasion of the retirement of professor sant saran bhojwani from the

department of botany university of delhi for professor bhojwani retirement only means relinquishing the chair as being a researcher and a teacher which has always been a way of life to him professor bhojwani has been an ardent practitioner of modern plant biology and areas like plant biotechnology and molecular breeding have been close to his heart the book contains original as well as review articles contributed by his admirers and associates who are experts in their area of research while planning this contributory book our endeavour has been to incorporate articles that cover the entire gamut of plant biotechnology and also applications of molecular markers besides articles on in vitro fertilization 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

this 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 covers the classical aspect of plant biotechnology viz tissue culture and micropropagation use of genetic engineering via agrobacterium and direct transfer of dna through particle bombardment to develop transformed plants in artemisia castor and orchids and production of recombinant proteins in plant cells have been dealt with in the third section the fourth section addresses 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 examines medicinal plants and alkaloid production

this unique overview of plants and transgenic techniques of great scientific medicinal and economic value for both industry and academia covers the whole spectrum from cell culture techniques via genetic engineering and secondary product metabolism right up to the use of transgenic plants for the production of bioactive compounds practical examples are given throughout including the production of cancer therapeutics functional food and flavor compounds in plants of particular interest to the pharmaceutical and biotechnological industries as well as medicinal chemists biochemists and molecular biologists

medicinal plant research is an evergreen subject there is a tremendous increase in popularity of herbal medicine in traditional medicine ethnomedicine modern

medicine and as over the counter food supplements even after this increased demand supply is neither uniform nor assured as most of these plants are collected from wild in developing countries of tropical and subtropical regions where majority of herbal drugs are produced this is not organised sector making it vulnerable to several malpractices hence standardization of all aspects required this has also negative impact on biodiversity and conservation of plants as well as supply of uniform material this book is aimed to provide up to date information about sustainable use of selected medicinal plants their active ingredients and efforts made to domesticate them to ensured uniform supply development of agrotechnology biotechnology and cultivation practices using conventional and non conventional methods are presented where these efforts will lead the medicinal plant research and future perspective are discussed the chapters are written by well recognised group leaders in working in the field the book contains topics on general biology of medicinal plants their sustainable use and cultivation and domestication efforts a uniform chapter structure has been designed to keep consistency the book will be useful for academicians agriculturists biotechnologists and researcher and industries involved in manufacturing herbal drugs and supplementary products

it enhance the understanding of fundamentals in the field of the plant tissue culture it enables its readers to get acquainted with the applications of the tissue culture technique to conserve the endangered medicinally important plants in the present book the tissue culture of the two medicinally important plants such as geranium sp and cholorophytum sp were studied the in vitro raised platelets were successfully transferred to field

for the majority of the world s population medicinal and aromatic plants are the most important source of life saving drugs biotechnological tools represent important resources for selecting multiplying and conserving the critical genotypes of medicinal plants in this regard in vitro regeneration holds tremendous potential for the production of high quality plant based medicines while cryopreservation a long term conservation method using liquid nitrogen provides an opportunity to conserve endangered medicinal and aromatic plants in vitro production of secondary metabolites in plant cell suspension cultures has been reported for various medicinal plants and bioreactors represent a key step toward the commercial production of secondary metabolites by means of plant biotechnology addressing these key aspects the book contains 29 chapters divided into three sections section 1 in vitro production of secondary metabolites section 2 in vitro propagation genetic transformation and germplasm conservation section 3 conventional and molecular approaches

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