

Effective Organogenesis From Different Explants Of L

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.

Natural bioactive compounds have become an integral part of plant-microbe interactions geared toward adaptation to environmental changes. They regulate symbiosis, induce seed germination, and manifest allelopathic effects, i.e., they inhibit the growth of competing plant species in their vicinity. In addition, the use of natural bioactive compounds and their products is considered to be suitable and safe in e.g. alternative medicine. Thus, there is an unprecedented need to meet the increasing demand for plant secondary metabolites in the flavor and fragrance, food, and pharmaceutical industries. However, it is difficult to obtain a constant quantity of compounds from the cultivated plants, as their yield fluctuates due to several factors including genotypic variations, the geography, edaphic conditions, harvesting and processing methods. Yet familiarity with these substances and the exploration of various approaches could open new avenues in their production. This book describes the basis of bioactive plant compounds, their mechanisms and molecular actions with regard to various human diseases, and their applications in the drug, cosmetic and herbal industries. Accordingly, it offers a valuable resource for students, educators, researchers, and healthcare experts involved in agronomy, ecology, crop science, molecular biology, stress physiology, and natural products.

Food Security and Plant Disease Management offers a comprehensive exploration of biocontrol, the latest technologies being used in plant health assurance, and resulting impacts on crop production and food security. Discussing both theoretical and practical topics, the book examines basic and advanced applications of biosensor and nano-technologies, introduces plant disease, including modes of action and their transmission in host plants, then covers factors contributing to plant disease and various means of addressing those diseases. This volume is part of the Microorganisms in Agriculture and the Environment series and provides important information for developing new effective plant protection practices. The direct or indirect applications of beneficial microbes in the treatment of plant disease is termed "microbial control" and these methods have increasingly been identified as important options for plant health management. The beneficial microbes as well as recent omic and nano-technologies also reveal important mechanisms that can be utilized in disease management strategies. Explores the impact of climate change on plant diseases and new methods of resolution Includes information on gene expression during crop disease management Presents insights into the legal and commercial aspects of microbial control

This book contains complete information on Capsicum genetic resources, diversity, evolution, history and advances in capsicum improvement from classical breeding to whole genome sequencing, genomics, databases and its impact on next generation pepper breeding. Capsicum is one of the most important Solanaceae crops grown worldwide as vegetables and spices. Due to its high economic value and to meet the demands of enormous population growth amid biotic and abiotic stresses, there has been an ongoing breeding program utilizing available genetic resources with desired traits to increase the sustainable productivity of this crop for several decades. However, the precision breeding of this crop for desired traits only started with the advent of molecular markers. The recent advances in high-throughput genome sequencing technologies helped in the quick decoding of transcriptome, epigenome, nuclear and organeller genomes, thereby enhancing our understanding of the structure and function of the Capsicum genome, and helping in genomics assisted breeding. These advanced technologies coupled with conventional mapping have greatly contributed towards dissection and manipulation of economically important traits more precisely and made less time consuming.

Providing a comprehensive and contemporary overview of the status of this particular genus, this book will be of interest to all those concerned with the study and uses of spices, medicinal and aromatic plants.

Development of a simple, reproducible and efficient in-vitro culture protocol for callus proliferation and direct organogenesis from nodal explants of Scoparia dulcis Linn, an exotic medicinal plant Prem Jose

This book presents a detailed analysis of up-to-date literature on in vitro morphogenesis at cell, tissue, organ, and whole plant levels. Its driving force is the substantial advances made in the field of morphogenesis in tissue cultures during the last 25 years.

For the development of an efficient callus initiation and direct organogenesis protocol in Scoparia dulcis Linn., an important medicinal plant, nodal segments of field grown plants were aseptically cultured on agar solidified MS medium supplemented with different concentrations and combinations of three PGRs, namely IAA, NAA and BA. The explants produced a green or light green compact callus on MS medium fortified with 0.5-2.0 mg/L BA in combination with 0.5-1.0 mg/l IAA or NAA. The maximum amount of callus was produced on MS with 1.5 mg/l BAP + 0.5 mg/l NAA in the case of explants. These callus tissues underwent differentiation when grown on a range of PGRs (BAP, IAA and NAA) supplemented media. The maximum number of callus was developed in medium containing 1.5 mg/l BAP + 0.5 mg/l NAA. Direct organogenesis underwent rapid elongation on elongation media and maximum elongation took place on MS with 1.5 mg/l BAP + 0.5 mg/l IAA. Antimicrobial activity of ethanol extracts of S. dulcis was also determined by using various bacterial strains. Ethanolic extracts of S. dulcis showed moderate activity against various organisms.

Globally, natural medicine has been considered as an important alternative to modern allopathic medicine. Although natural medicines are popular in society, only limited medicinal herbs have been scientifically evaluated for their potential in medical treatment. This book connects various aspects of the complex journey from traditional medicine to modern medicine. It provides information on topics including global regulations and regulatory hurdles, diverse nutritional challenges and potential health benefits, novel food innovations especially seed-to-clinic approaches, and future trends. FEATURES • Provides information on sustainable use of natural products in the development of new drugs and clinically validated herbal remedies • Discusses issues on evaluation and clinical aspects of herbal medicine, promotion and development, safety evaluation, metabolite profiling, biomarker analysis, formulation, and stability testing • Describes traditional uses of natural medicine through identification, isolation and structural characterization of

their active components • Elucidates mechanisms of biological action, adverse effects and identification of their molecular targets of natural medicine • Multidisciplinary appeal including chemistry, pharmacology, pharmacognosy and cell and molecular biology, as well as integration with clinical medicine This book serves as an essential guide for individuals researching natural medicines, and industry employees in areas including drug development, pharmacology, natural products chemistry, clinical efficacy, ethnopharmacology, pharmacognosy, phytotherapy, phyto-technology and herbal science.

This two-volume book is a valuable resource to students, researchers, scientists, commercial producers, consultants and policymakers interested in agriculture or plant sciences particularly in date palm biotechnology. Chapters in Date Palm Biotechnology Protocols: Volume 2: Germplasm Conservation and Molecular Breeding guides readers through methods and protocols on germplasm in vitro conservation, molecular analysis of in vitro cultures, genetic diversity, cultivar identity, gender identification, genomics, and proteomics. 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 practical, Date Palm Biotechnology Protocols: Volume 2: Germplasm Conservation and Molecular Breeding aims to supplement the previous volume and to provide precise stepwise protocols in the field of date palm biotechnology.

This Methods in Molecular Biology book covers topics such as how to image the structure of plant ovules and embryos, tools for establishing cell lineages, methods for studying the totipotency of plant cells, fluorescence-activated cell sorting and more."

Soybean is the most important oilseed and livestock feed crop in the world. These dual uses are attributed to the crop's high protein content (nearly 40% of seed weight) and oil content (approximately 20%); characteristics that are not rivaled by any other agronomic crop. Across the 10-year period from 2001 to 2010, world soybean production increased from 168 to 258 million metric tons (54% increase). Against the backdrop of soybean's striking ascendancy is increased research interest in the crop throughout the world. Information in this book presents a comprehensive view of research efforts in genetics, plant physiology, agronomy, agricultural economics, and nitrogen relationships that will benefit soybean stakeholders and scientists throughout the world. We hope you enjoy the book.

Twenty-seven chapters deal with the regeneration of plants from protoplasts and genetic transformation in various species of Agrostis, Allium, Anthriscus, Asparagus, Avena, Boehmeria, Carthamus, Coffea, Funaria, Geranium, Ginkgo, Gladiolus, Helianthus, Hordeum, Lilium, Lithospermum, Mentha, Panax, Papaver, Passiflora, Petunia, Physocomitrella, Pinus, Poa, Populus, Rubus, Saintpaulia, and Swertia. These studies reflect the far-reaching implications of protoplast technology in genetic engineering of plants. This volume is of special interest to advanced students, teachers, and research scientists in the field of plant tissue culture, molecular biology, genetic engineering, plant breeding, and general plant biotechnology.

The depletion of petroleum-derived fuel and environmental concerns have prompted many millennials to consider biofuels as alternative fuel sources. But completely replacing petroleum-derived fuels with biofuels is currently impossible in terms of production capacity and engine compatibility. Nevertheless, the marginal replacement of diesel with biofuel could delay the depletion of petroleum resources and abate the radical climate change caused by automotive pollutants. Energy security and climate change are the two major driving forces for worldwide biofuel development, and also have the potential to stimulate the agro-industry. The development of biofuels as alternative and renewable sources of energy has become critical in national efforts towards maximum self-reliance, the cornerstone of our energy security strategy. At the same time, the production of biofuels from various types of biomass such as plants, microbes, algae and fungi is now an ecologically viable and sustainable option. This book describes the biotechnological advances in biofuel production from various sources, while also providing essential information on the genetic improvement of biofuel sources at both the conventional and genomic level. These innovations and the corresponding methodologies are explained in detail.

Plant tissue culture (PTC) technology has gained unassailable success for its various commercial and research applications in plant sciences. Plant growth regulators (PGRs) are an essential part of any plant tissue culture intervention for propagation or modification of plants. A wide range of PGRs are available, including aromatic compounds that show cytokinin activities, promote cell division and micro-propagation, viz. kinetin, N⁶-benzyladenine and topolins. Topolins are naturally occurring aromatic compounds that have gained popularity as an effective alternative for other frequently used cytokinins in in vitro culture of plants. Among them, meta-topolin [6-(3-hydroxybenzylamino) purine] is the most popular and its use in plant tissue culture has amplified swiftly. During the last few decades, there have been numerous reports highlighting the effectiveness of meta-topolin in micropropagation and alleviation of various physiological disorders, rooting and acclimatization of tissue culture raised plants.

Mitosis and Meiosis, Part A, Volume 144, a new volume in the Methods in Cell Biology series, continues the legacy of this premier serial with quality chapters authored by leaders in the field. Unique to this updated volume are chapters on Analyzing the Spindle Assembly Checkpoint in human cell culture, an Analysis of CIN, a Functional analysis of the tubulin code in mitosis, Employing CRISPR/Cas9 genome engineering to dissect the molecular requirements for mitosis, Applying the auxin-inducible degradation (AID) system for rapid protein depletion in mammalian cells, Small Molecule Tools in Mitosis Research, Optogenetic control of mitosis with photocaged chemical, and more. Contains contributions from experts in the field from across the world Covers a wide array of topics on both mitosis and meiosis Includes relevant, analysis based topics

Plants have always occupied a prominent position in the life of every living being. Plants are the primary source of food, shelter and medicines. The global inclination toward

herbal medicine has advanced the expansion of plant-based pharmaceutical industries to a vast extent. The production of traditional medicine at global market has been estimated to touch US \$5 trillion by 2050. Some of the useful plant-based drugs include vinblastine, vincristine, taxol, podophyllotoxin, camptothecin, digoxigenin, morphine, codeine, aspirin, atropine, capscicine, allicin, curcumin, artemesinin and ephedrine. Genus Sapindus is an important economical and medicinal trees, distributed over the world. Soap nuts contain higher amount of saponin, a natural detergent which can be used to clean clothes and hairs. Sapindus species possesses various pharmacological properties including antimicrobial, antioxidant, anti-inflammatory, anticancer, hepatoprotective, anti-trichomonas activity. Extracts of this plant are rich in various phytochemicals and polyphenolic compounds. All the pharmacological properties are due to presence of saponins. Biotechnological techniques can improve the saponin content; thus this chemical content can be produced at large scale and can be used as phytomedicine. We hope that this book would be of great use to under graduates, postgraduates, scientists, researchers and faculty members who are studying, teaching or working in the field of Biotechnology, Phytochemistry and Ethnopharmacology. The techniques explained in this book could be of immense use for the researchers working in this area. We shall deeply appreciate receiving any critical comments and suggestions from the readers from the different parts of globe which would help us improve the first edition of this publication.

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.

Proceedings of the Third International Food Legumes Research Conference

Scientists within the field of plant biotechnology are in a constant search for techniques that can, in the simplest manner possible, answer the genetic and biochemical questions that underlie developmental processes. Thin Cell Layer Culture System not only takes an in-depth look at a technique that has had so much success in attempting, through various practical models and systems, to answer these issues, but also represents a celebration of almost 30 years of research that has covered a massive scope of plant species and areas of study. The initial studies conducted on tobacco thin cell layers (TCLs) - proving that organogenesis can be strictly controlled in vitro - allowed plant research to benefit from this finding, expanding this knowledge in a practical and applied manner into the biotechnological fields of tissue culture and micropropagation, cell and organ genetics and biochemistry. The chapters in this book tell the enigmatic tale of TCLs. An historical perspective opens the scene for an inquiry into the possible cellular, biochemical and genetic processes that allow for the controlled development of a TCL into any organ type. The success of the system is further demonstrated in both monocotyledonous and dicotyledonous species, covering successful organogenesis and in vitro flowering in species within ornamental, leguminous and wood crops, cereals and grasses. Methodologies are outlined in detail, as is the rationale behind the TCL-organogenesis-developmental sequel. The TCL method, shown to be superior to many conventional micropropagation systems, has also shown to be vital in the recovery of transgenic plants. This book is an essential part of every plant, cell and developmental biologist, geneticist and tissue culturalist's shelf as it addresses the primary issue of any plant: the cell, the tissue, and their subsequent development into a highly organized system.

This book provides comprehensive information on micropropagation of economically important forest and fruit trees, which is usually available in scattered literature. Topics cover a wide range, from tropical forest and fruit trees for paper or food supply, to Prunus species for local craft bark production.

This book examines the development of innovative modern methodologies towards augmenting conventional plant breeding, in individual crops, for the production of new crop varieties under the increasingly limiting environmental and cultivation factors to achieve sustainable agricultural production, enhanced food security, in addition to providing raw materials for innovative industrial products and pharmaceuticals. This is Vol 7, subtitled Legumes, focuses on advances in breeding strategies using both traditional and modern approaches for the improvement of individual legume crops. Included in this volume are Adzuki bean, Black gram, Chickpea Cluster bean, Common bean, Cowpea, Faba bean, Hyacinth bean, Lentil, Mung bean, Pigeonpea and Soybean. This volume is contributed by 57 internationally reputable scientists from 9 countries. Each chapter comprehensively reviews the modern literature on the subject and reflects the authors own experience.

Presents the basic concepts and terminology of plant anatomy with a special emphasis on its significance and applications to other disciplines. This book also highlights the important contribution made by studying anatomy to the solutions of a number of problems. It is illustrated with line drawings and photographs.

This new volume of Current Topics in Developmental Biology covers the area of mechanisms in regeneration. With an international board of authors, it provides a comprehensive set of reviews covering such topics as control of growth during regeneration, skeletal muscle degeneration and regeneration in mammals and flies, and suppression of regeneration in mammals. Covers the area of mechanisms in regeneration International board of authors Provides a comprehensive set of reviews

The way plants grow and develop organs significantly impacts the overall performance and yield of crop plants. The basic knowledge now available in plant development has the potential to

help breeders in generating plants with defined architectural features to improve productivity. Plant translational research effort has steadily increased over the last decade due to the huge increase in the availability of crop genomic resources and Arabidopsis-based sequence annotation systems. However, a consistent gap between fundamental and applied science has yet to be filled. One critical point often brought up is the unreadiness of developmental biologists on one side to foresee agricultural applications for their discoveries, and of the breeders to exploit gene function studies to apply to candidate gene approaches when advantageous on the other. In this book, both developmental biologists and breeders make a special effort to reconcile research on the basic principles of plant development and organogenesis with its applications to crop production and genetic improvement. Fundamental and applied science contributions intertwine and chase each other, giving the reader different but complementary perspectives from only apparently distant corners of the same world.

Modern Applications of Plant Biotechnology in Pharmaceutical Sciences explores advanced techniques in plant biotechnology, their applications to pharmaceutical sciences, and how these methods can lead to more effective, safe, and affordable drugs. The book covers modern approaches in a practical, step-by-step manner, and includes illustrations, examples, and case studies to enhance understanding. Key topics include plant-made pharmaceuticals, classical and non-classical techniques for secondary metabolite production in plant cell culture and their relevance to pharmaceutical science, edible vaccines, novel delivery systems for plant-based products, international industry regulatory guidelines, and more. Readers will find the book to be a comprehensive and valuable resource for the study of modern plant biotechnology approaches and their pharmaceutical applications. Builds upon the basic concepts of cell and plant tissue culture and recombinant DNA technology to better illustrate the modern and potential applications of plant biotechnology to the pharmaceutical sciences Provides detailed yet practical coverage of complex techniques, such as micropropagation, gene transfer, and biosynthesis Examines critical issues of international importance and offers real-life examples and potential solutions

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

A multi-faceted reference work, the Encyclopedia of Applied Plant Sciences addresses the core knowledge, theories, and techniques employed by plant scientists, while also concentrating on applications of these in research and in industry. Plants influence all our lives as sources of sustenance, fuel and building materials. The Encyclopedia of Applied Plant Sciences is a comprehensive yet succinct publication that covers the application of current advances in the biological sciences, through which scientists can now better produce sustainable, safe food, feed and food ingredients, and renewable raw materials for industry and society. This three-volume set also covers the concerns over continuing advances in the application of knowledge in the areas of ecology and plant pathology, genetics, physiology, biochemistry and biotechnology, as well as the ethical issues involved in the use of the powerful techniques available to modern plant science. An invaluable reference, the Encyclopedia of Applied Plant Sciences will be an indispensable addition to the library of anyone involved in the study of plant sciences. The Encyclopedia of Applied Plant Sciences is available online on ScienceDirect. The print edition price for this reference work does not include online access. For more information on pricing for access to the online edition, please review our Licensing Options. The richness and authority of Elsevier reference works is now lent valuable functionality and accessibility through the online launch of Elsevier Reference Works on ScienceDirect. Features: Extensive browsing and searching across subject, thematic, alphabetical, author and cited author indexes - as applicable to the work Basic and advanced search functionality within volumes, parts of volumes, or across the whole work Ability to build, save and re-run searches as well as combine saved searches Internal cross-referencing between articles in the work, plus dynamic linking to journal articles and abstract databases, making navigation flexible and easy All articles are available as full-text HTML files, and as PDF files that can be viewed, downloaded or printed out in their original print format A dedicated Reference Works navigation tab and homepage on ScienceDirect to enable easy linking from your OPAC or library website For more information about the Elsevier Reference Works on ScienceDirect Program, please visit:

http://www.info.sciencedirect.com/reference_works. Comprehensively covers both the key theoretical and practical aspects of plant sciences Edited and written by a distinguished international group of editors and contributors Well-organized format provides for concise, readable entries, easy searches, and thorough cross-references Presents complete up-to-date information on over 25 separate areas of plant science Features many tables and figures, with a color plate section in each volume New terms clearly explained in glossary sections of each article

The overall goals of this research are to establish tissue culture systems for rose (*Rosa hybrida* L. and *R. chinensis minima*) and evergreen azalea (*Rhododendron* spp.), develop efficient and highly reliable regeneration systems via organogenesis and/or somatic embryogenesis, and develop gene transfer systems for these two important floral crops. Shoot organogenesis was observed on callus tissue upon transfer of rhizogenic explants pre-incubated with 2,4-D to a regeneration medium containing 22.7 μM TDZ and 2.9 μM GA₃. Secondary embryogenesis was observed, and increased numbers of somatic embryos were obtained following transfer of embryogenic calli to a growth regulator-free medium. For 'Carefree Beauty', glucose at 111 mM promoted higher organogenesis and somatic embryogenesis than sucrose at either 59 or 117 mM concentrations; however, for 'Baby Katie', no differences were observed between glucose and sucrose. The best growth regulator combination for adventitious shoot regeneration of azalea 'Fuchsia' and 'Hino Crimson' was 22.74 μM TDZ and 22.8 μM IAA. In general, incubating leaf explants in the dark for at least 1 week followed by low-light or high-light intensity was enhanced regeneration frequency. Continuous culture under high-light intensity suppresses shoot regeneration; however, a 2-week dark pretreatment promotes shoot organogenesis even when explants were grown under high-light intensity. Several factors for optimizing microprojectile-mediated gene transfer methods for rose and azalea were investigated. Transformation efficiency was increased by elevating the osmotic level of the medium during bombardment. Transformation efficiency was enhanced by combining osmotic treatment, cotyledonary-stage of embryogenic calli, and higher accelerating pressure settings. Comparing GUS

(β -glucuronidase) transient expression of two particle guns, the PIG (particle inflow gun) and the biolistic PDS-1000/He gene gun, the PIG device resulted in higher GUS expression than the biolistic gene gun. A 10% GUS transient expression was obtained at 1100 psi helium pressure with 6 cm distance from stopping screen-to-leaf sections of azalea using the biolistic gun. A 22.2% GUS transient expression was obtained on shoot tip-derived calli of azalea using the PIG device at 60 psi with an open-chamber accelerating setting. Several factors for optimizing Agrobacterium-mediated gene transfer methods for rose and azalea were also investigated. Highly proliferating tissues, rose somatic embryogenic calli and azalea shoot-tips, have been found to be amenable to Agrobacterium-mediated transformation. The cotyledonary-stage of rose somatic embryos was found to be most amenable for gene transfer. Regeneration and transformation of azalea shoot-tips were better than stem segments or leaf sections. Kanamycin was effective for inhibiting regeneration of azalea leaf sections; however, it was less efficient for selection of rose embryogenic calli. Wounding manipulations were not necessary for rose embryogenic calli; however, for certain Agrobacterium strains, a wounding treatment might increase regeneration and/or transformation frequency. Based on GUS expression, bombardment and fresh cut treatments showed a higher blue color intensity. Adding acetosyringone or a nurse culture of minced tobacco leaf nurse culture to the cocultivation medium enhanced the number and intensity of blue spots; moreover, adding acetosyringone to the bacterial culture probably increased stable transformation in azalea. The susceptibility of various tissue types to different Agrobacterium strains was observed.

Plant biotechnology is a most interesting branch for academicians and researchers in recent past. Now days, it becomes a very useful tool in agriculture and medicine and is regarded as a popular area of research especially in biological sciences because it makes an integral use of biochemistry, molecular biology and engineering sciences in order to achieve technological application of cultured tissues, cell and microbes. Plant tissue culture (PTC) refers to a technique of cultivation of plant cells and other parts on artificial nutrient medium in controlled environment under aseptic conditions. PTC requires various nutrients, pH, carbon source, gelling agent, temperature, photoperiod, humidity etc. and most importantly the judicious use of plant growth regulators. Various natural, adenine and phenyl urea derivatives are employed for the induction and proliferation of different types of explants. Several phenyl urea derivatives were evaluated and it was observed that thidiazuron (n-phenyl-N'-1,2,3- thidiazol-5-ylurea) was found to be the most active among the plant growth regulators. Thidiazuron (TDZ) was initially developed as a cotton defoliant and showed high cytokinin like activity. In some examples, its activity was 100 times more than BA in tobacco callus assay and produces more number of shoots in cultures than Zeatin and 2iP. TDZ also showed major breakthrough in tissue culture of various recalcitrant legumes and woody species. For the last two decades, number of laboratories has been working on TDZ with different aspect and number of publications has come out. To the best of our knowledge, there is no comprehensive edited volume on this particular topic. Hence the edited volume is a deed to consolidate the scattered information on role of TDZ in plant tissue culture and genetic manipulations that would hopefully prove informative to various researches. Thidiazuron: From Urea Derivative to Plant Growth Regulator compiles various aspects of TDZ in Plant Tissue Culture with profitable implications. The book will provides basic material for academicians and researchers who want to initiate work in this fascinating area of research. The book will contain 26 chapters compiled by International dignitaries and thus giving a holistic view to the edited volume.

In November 1990 Indo-American Hybrid Seeds (IAHS), one of the largest and very innovative horticultural enterprises of its kind in India, celebrated its silver jubilee year in the town of Bangalore, India. On the occasion of this silver jubilee of IAHS an International Seminar on 'New Frontiers in Horticulture' was organized from 25-28th of November 1990 at the Ashok Radisson Hotel in Bangalore. IAHS was almost fully responsible in terms of organization and financially for this International Seminar. Assisted by an International Scientific Advisory Board, the organizing committee, all members of the company IAHS, really did a great job. I would like to thank in particular Mr. Mammohan Attavar (the company's founder) and Mr. Sri N.K. Bhat (partner of the company), respectively chairman and treasurer of the organizing committee, for their organizational and financial support in organizing this conference. Very special words of thanks go to my colleague editor, Dr. Jitendra Prakash, Secretary Organizing committee and Director of Biotechnology - IAHS, who was really the spill in the whole organization of our very successful conference.

This important reference book is the first comprehensive resource worldwide that reflects research achievements in date palm biotechnology, documenting research events during the last four decades, current status, and future outlook. This book is essential for researchers, policy makers, and commercial entrepreneurs concerned with date palm. The book is invaluable for date palm biotechnology students and specialists. This monument is written by an international team of experienced researchers from both academia and industry. It consists of five sections covering all aspects of date palm biotechnology including A) Micropropagation, B) Somaclonal Variation, Mutation and Selection, C) Germplasm Biodiversity and Conservation, D) Genetics and Genetic Improvement, and E) Metabolites and Industrial Biotechnology. The book brings together the principles and practices of contemporary date palm biotechnology. Each chapter contains background knowledge related to the topic, followed by a comprehensive literature review of research methodology and results including the authors own experience including illustrative tables and photographs.

It was emphasized to engineering abiotic stress tolerance in blackgram by overexpression of the glyoxalase I gene isolated from Brassica juncea under a most widely used CaMV 35S promoter. We have demonstrated for the first the applicability of the glyoxalase system in imparting abiotic stress tolerance in a crop legume Vigna mungo. The transgenic lines were confirmed for gene insertion using different molecular techniques. The expression pattern of the inserted gene/s confirmed the expression and activity of the gene in the all transgenic lines studied up to T2 generations. The in vitro raised plants are usually sensitive to hardening process as well as transplantation. In case of blackgram, the survival rate during hardening and the transplantation was ca. 65-70%. To improve the percentage survival of plants, plant growth promoting Rhizobium and Arbuscular Mycorrhizal fungi were applied during the hardening and transplantation. This resulted in overall survival rate of plants up to 90% in both the transgenics as well as the untransformed control plants. Effect of Rhizobium and Mycorrhiza on transgenic as well as the untransformed control plants was studied. We reported for the first time that the transgenic nature of the plant does not affect association of the plant growth promoting Rhizobacteria or Mycorrhiza. Alleviates transplantation shock of in vitro grown Vigna

mungo plants was also observed.

The objective of the present investigation was to establish in vitro culture and plant regeneration methods from leaf base and rhizome bud explants of *Z. officinale*. The MS medium with 1.0 mg/l 2, 4-D proved to be the best for callus induction from leaf base explants. Shoot regeneration was achieved after subculturing the calli in different media formulation and 8.0 mg/l BA with 0.2 mg/l 2, 4-D was found to be the best for multiple shoot regeneration from callus through organogenesis. MS medium supplemented with 5.0 mg/l NAA was the best formulation for successful culture establishment as well as shoot proliferation from rhizome bud explant. Multiple shoot proliferation was noticed at 4th subculture in medium with 5.0 mg/l NAA and shoot proliferation was increased with the increased number of subculture. Activated charcoal (AC) enhanced multiple shoot proliferation and the optimum pH level for shoot formation was 5.5 - 6.0 in the medium. MS + 4.0 mg/l NAA proved to be the best for root induction. Rooted shoots (plantlets) were gradually acclimatized and successfully established in polybag soil.

This book provides a general introduction as well as a selected survey of key advances in the fascinating field of plant cell and tissue culture as a tool in biotechnology. After a detailed description of the various basic techniques employed in leading laboratories worldwide, follows an extended account of important applications in, for example, plant propagation, secondary metabolite production and gene technology. Additionally, some chapters are devoted to historical developments in this domain, metabolic aspects, nutrition, growth regulators, differentiation and the development of culture systems. The book will prove useful to both newcomers and specialists, and even "old hands" in tissue culture should find some challenging ideas to think about.

The third edition of a standard resource, this book offers a state-of-the-art, multi-disciplinary presentation of plant roots. It examines structure and development, assemblage of root systems, metabolism and growth, stressful environments, and interactions at the rhizosphere. Reflecting the explosion of advances and emerging technologies in the field, the book presents developments in the study of root origin, composition, formation, and behavior for the production of novel pharmaceutical and medicinal compounds, agrochemicals, dyes, flavors, and pesticides. It details breakthroughs in genetics, molecular biology, growth substance physiology, biotechnology, and biomechanics.

Camptothecin and Camptothecin Producing Plants: Botany, Chemistry, Anticancer Activity and Biotechnology provides updated information on camptothecin yielding plants, chemical diversity of camptothecin, extraction and exploitation methods, biosynthesis, biotechnological production and enhancement for drug delivery, and the pharmacological properties of the drugs. The book focuses on camptothecin anticancer properties based on recent developments of biotechnology. Topics emphasize anticancer activities, biosynthesis, potent derivatives currently undergoing experimental phases, and biotechnological methods to enhance the production. This book is a valuable source for cancer researchers, oncologists, biotechnologists, pharmacologists and members of the biomedical field who are interested in camptothecin and its applicability in cancer treatment. Provides information on camptothecin producing plants and their anticancer properties for the development of new treatments Discusses new applications of camptothecin based on recent biotechnology advancements Presents comprehensive information on the pharmacology of camptothecin for leveraging new anticancer drugs developments

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