

B. Grout

Genetic Preservation of Plant Cells in Vitro



Springer
Lab Manual

Genetic Preservation Of Plant Cells In Vitro

Dr Erica Benson, Erica Benson



Genetic Preservation Of Plant Cells In Vitro:

Genetic Preservation of Plant Cells in Vitro Brian Grout, 2012-12-06 The long term storage and maintenance of viable plant cells and organs is an area of active concern across the range of pure and applied plant sciences In academic government and commercial laboratories the extended storage of propagules of one sort or another with maximum protection of the genome from mutation and altered expression is often a very necessary activity that can draw heavily on resources and effort However preservation per se is typically not an activity in its own right but a facilitating technology that is part of a larger programme of work Consequently there are many laboratories that do not have the benefit of a specialist in storage technology and have to delegate the responsibility to individuals or teams who are faced with a daunting learning curve To maximise the chances of success in the shortest possible time and with minimum losses these researchers need sources of reference that are authoritative and soundly based in practical experience *Plant Conservation Biotechnology*

Dr Erica Benson, Erica Benson, 2002-04-12 Introduces biotechnological techniques which are currently used to conserve horticultural and crop plant germplasm forest tree genetic resources endangered plant species and plant cell culture collections Covers techniques and applications *Cryopreservation of Plant Germplasm II* L.E. Towill, Y.P.S.

Bajaj, 2013-03-14 Ex situ preservation of germplasm for higher plant species has been accomplished using either seeds or clones but storage of these under typical conditions does not provide the extreme longevities that are needed to minimize risk of loss Costs of maintenance and regeneration of stocks are also high Systems that provide virtually indefinite storage should supplement existing methods and it is within this context that cryopreservation is presented The use of low temperature preservation was initially more a concern of medicine and animal breeding and was expanded to plants in the 1970s Survival after cryogenic exposure has now been demonstrated for diverse plant groups including algae bryophytes fungi and higher plants If survival is commonplace then the eventual application is a cryopreservation system whereby cells tissues and organs are held indefinitely for use often in the unforeseen future The increasing interest and capabilities for application could not have occurred at a more opportune time since expanding human populations have placed unprecedented pressures on plant diversity This book emphasizes cryopreservation of higher plants and was initially driven by the concern for loss of diversity in crops and the recognized need that this diversity would be essential for continued improvement of the many plants used by society for food health and shelter The interest in cryopreservation has been expanded by conservationists and their concerns for retaining as much as possible the diversity of natural populations The need for cryopreservation thus is well established **Plant Cell Culture Protocols** Robert D. Hall, 2008-02-02 Robert Hall

and a panel of expert researchers present a comprehensive collection of the most frequently used and broadly applicable techniques for plant cell and tissue culture Readily reproducible and extensively annotated the methods cover culture initiation maintenance manipulation application and long term storage with emphasis on techniques for genetic modification

and micropropagation Many of these protocols are currently used in major projects designed to produce improved varieties of important crop plants Plant Cell Culture Protocols s state of the art techniques are certain to make the book today s reference of choice an indispensable tool in the development of new transgenic plants and full scale commercial applications

Plant Biology and Biotechnology Bir Bahadur, Manchikarla Venkat Rajam, Leela Sahijram, K. V. Krishnamurthy, 2015-06-19 Plant genomics and biotechnology have recently made enormous strides and hold the potential to benefit agriculture the environment and various other dimensions of the human endeavor It is no exaggeration to claim that the twenty first century belongs to biotechnology Knowledge generation in this field is growing at a frenetic pace and keeping abreast of the latest advances and calls on us to double our efforts Volume II of this two part series addresses cutting edge aspects of plant genomics and biotechnology It includes 37 chapters contributed by over 70 researchers each of which is an expert in his her own field of research Biotechnology has helped to solve many conundrums of plant life that had long remained a mystery to mankind This volume opens with an exhaustive chapter on the role played by thale cress *Arabidopsis thaliana* which is believed to be the *Drosophila* of the plant kingdom and an invaluable model plant for understanding basic concepts in plant biology This is followed by chapters on bioremediation biofuels and biofertilizers through microalgal manipulation making it a commercializable prospect discerning finer details of biotic stress with plant fungal interactions and the dynamics of abiotic and biotic stresses which also figure elsewhere in the book Breeding crop plants for desirable traits has long been an endeavor of biotechnologists The significance of molecular markers marker assisted selection and techniques are covered in a dedicated chapter as are comprehensive reviews on plant molecular biology DNA fingerprinting techniques genomic structure and functional genomics A chapter dedicated to organellar genomes provides extensive information on this important aspect Elsewhere in the book the newly emerging area of epigenetics is presented as seen through the lens of biotechnology showcasing the pivotal role of DNA methylation in effecting permanent and transient changes to the genome Exclusive chapters deal with bioinformatics and systems biology Handy tools for practical applications such as somatic embryogenesis and micropropagation are included to provide frontline information to entrepreneurs as is a chapter on somaclonal variation Overcoming barriers to sexual incompatibility has also long been a focus of biotechnology and is addressed in chapters on wide hybridization and hybrid embryo rescue Another area of accomplishing triploids through endosperm culture is included as a non conventional breeding strategy Secondary metabolite production through tissue cultures which is of importance to industrial scientists is also covered Worldwide exchange of plant genetic material is currently an essential topic as is conserving natural resources in situ Chapters on in vitro conservation of extant threatened and other valuable germplasms gene banking and related issues are included along with an extensive account of the biotechnology of spices the low volume high value crops Metabolic engineering is another emerging field that provides commercial opportunities As is well known there is widespread concern over genetically modified crops among the public GM

crops are covered as are genetic engineering strategies for combating biotic and abiotic stresses where no other solutions are in sight RNAi and micro RNA based strategies for crop improvement have proved to offer novel alternatives to the existing non conventional techniques and detailed information on these aspects is also included The book s last five chapters are devoted to presenting the various aspects of environmental marine desert and rural biotechnology The state of the art coverage on a wide range of plant genomics and biotechnology topics will be of great interest to post graduate students and researchers including the employees of seed and biotechnology companies and to instructors in the fields of plant genetics breeding and biotechnology *Achieving sustainable cultivation of ornamental plants* Emeritus Professor Michael

Reid,2020-04-28 Strong focus on environmental physiology abiotic stress and breeding more abiotic stress resistant varieties Reviews range of advanced marker assisted breeding techniques including gene editing Discusses key advances in the value chain to improve resource use for more sustainable production **Micropropagation of Woody Trees and Fruits** S.M.

Jain,K. Ishii,2012-12-06 Global warming environmental changes water shortage and sustainable development are the most up to date issues which have challenged mankind Researchers worldwide are engaged in addressing some of these problems including reduction in carbon dioxide accumulation and enrichment of perennial woody species on the terrestrial ecosystem About 12 million hectares of the world s forests disappear every year By 2025 the world population will reach 7.5 billion and the forest area will be reduced to well below 50 % of the current area Reforestation is an important to prevent the loss of forest resources including timber biodiversity and water resources Therefore subsequent volume of reforestation over the deforested land should be followed to safeguard the forests and maintain its size which will require a continuous supply of planting material Similarly fruit trees including tropical and subtropical fruit trees are consumed both as fresh and in the processed form including juices beverages and dried fruits They are an important source of nutrition e.g. rich in vitamins sugars aromas and flavour compounds and raw material for food processing industries The production cultivation and maintenance of tree species provide highly sustainable production systems that conserve soils microenvironment and biodiversity Fruit trees have longjuvenile periods and large tree size In many fruit trees e.g. avocado and others controlled crosses are difficult to make due to massive fruit drop **Introduction to Plant Tissue Culture** M. K. Razdan,2003

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

Sustainable Utilization and Conservation of Plant Genetic Diversity Jameel M Al-Khayri,Shri Mohan

Jain,Suprasanna Penna,2024-03-28 This book collates a wide spectrum of topics relevant to contemporary research

achievement in sustainable utilization of plant genetic resources and conservation of plant genetic diversity within the framework of different crop systems. It introduces the status of crop genetic diversity and provides prospects for conservation of crop genetic diversity for sustainable agriculture. Plant genetic diversity is crucial for food security and agro ecosystem maintenance paving ways to achieve sustainable agriculture development. This necessitates consciously and judiciously the conservation of all existing plant genetic resources for sustainable use in a variety of applications for human welfare. The wild and traditional landraces have generated an increased interest as a repertoire of valuable traits for breeding and improvement of cultivated germplasm. Internationally concerted actions and policies toward for the conservation and management of plant genetic diversity are mounting from the organization levels to national policies as deemed appropriate for the sustainable development goals. This needs an understanding of genetic diversity of different crops, ecological drivers and the structural changes within genetic diversity due to climate change. It is also equally important to evolve knowledge on what, how and where to conserve the existing plant genetic resources for present and future use. Assessment of the genetic diversity presents in a wild and traditional agro ecosystem is another step towards effective utilization. In the past few years, advanced breeding tools have been developed which have offered great promise for efficient modification of targeted traits. This book consolidates current knowledge in the above core areas of plant genetic diversity and conservation. It is an essential reference for professionals, researchers, policy makers and commercial entrepreneurs concerned with plant genetic diversity and breeding to achieve enhanced agricultural productivity and sustainability of food resources to ensure food security. The book is also invaluable for graduate students involved in agriculture research.

Automation and environmental control in plant tissue culture Jenny Aitken-Christie, T. Kozai, M.A.L. Smith, 2013-06-29. 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 underrated 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.

Current Frontiers in Cryobiology Igor Katkov, 2012-03-09. Almost a decade has passed since the last textbook on the science of cryobiology, *Life in the Frozen State*, was published. Recently there have been

some serious tectonic shifts in cryobiology which were perhaps not seen on the surface but will have a profound effect on both the future of cryobiology and the development of new cryopreservation methods We feel that it is time to revise the previous paradigms and dogmas discuss the conceptually new cryobiological ideas and introduce the recently emerged practical protocols for cryopreservation The present books Current Frontiers in Cryobiology and Current Frontiers in Cryopreservation will serve the purpose This is a global effort by scientists from 27 countries from all continents and we hope it will be interesting to a wide audience

Applied and Fundamental Aspects of Plant Cell, Tissue, and Organ Culture Jakob Reinert, Yashpal S. Bajaj, 2013-04-17 Progress in the field of plant cell and tissue culture has made this area of research one of the most dynamic and promising not only in plant physiology cell biology and genetics but also in agriculture forestry horticulture and industry Studies with plant cell cultures clearly have bearing upon a variety of problems as yet unsolved in basic and applied research This was the compelling reason for assembling such a comprehensive source of information to stimulate students teachers and research workers This book comprises 34 articles on regeneration of plants vegetative propagation and cloning haploids cytology cytogenetics and plant breeding protoplasts somatic hybridization and genetic engineering plant pathology secondary products and a chapter on isoenzymes radiobiology and cryobiology of plant cells Particular attention has been paid to modern fast growing and fascinating disciplines e g the induction of haploids somatic hybridization and genetic manipulation by protoplast culture which possess an enormous potential for plant improvement

Somatic Embryogenesis in Ornamentals and Its Applications Abdul Mujib, 2015-12-22 Somatic embryogenesis SE is a unique process by means of which a vegetative somatic plant cell transforms into an embryo This in vitro embryogeny has immense fundamental and practical applications The SE process is complex and is controlled by a variety of external and internal triggers This book compiles the latest advances in embryogenesis research on ornamentals and discusses the importance of embryogenic cultures tissues in raising transgenic crops The technique of cryopreservation in the protection of ornamental genetic resources is discussed using embryogenic culture embryo as the tissue of choice and the respective roles of the genotype plant growth regulator environment and other regulating factors in embryogenesis are discussed The book also focuses on comparative biochemical and physiological differences during the acquisition and development of embryos The importance of plant proteome and functional genomics as a source of markers is highlighted and special attention is paid to genes gene homologues SERC in characterizing embryogenesis Lastly the book examines the involvement of auxin polar transport and other molecular networks regulating gene expression

Life in the Frozen State Barry J. Fuller, Nick Lane, Erica E. Benson, 2004-05-10 While it is barely 50 years since the first reliable reports of the recovery of living cells frozen to cryogenic temperatures there has been tremendous growth in the use of cryobiology in medicine agriculture horticulture forestry and the conservation of endangered or economically important species As the first major text on cryobiology

AROIDS: Opportunities and Challenges R.S. Misra, M. Nedunchezhiyan, 2013-12-21 The ever

increasing demand for food has to be met to save the mankind from starvation Realizing the unprecedented potential of aroids as a food crop a Global Conference on Aroids Opportunities and Challenges was organized during 23-25 January 2012 by the Regional Centre of Central Tuber Crops Research Institute at Bhubaneswar to share and discuss the latest developments in aroids research across the globe and formulate strategies and collaborative action plan to exploit the potential of aroids as food crop and to introduce them in new areas This book is a compilation of papers presented on different aspects of aroids during the conference

Cryopreservation of Plant Germplasm I Y. P. S. Bajaj, 2013-03-09 The germ plasm of numerous plant species especially those of forest trees some agricultural crops and medicinal plants is endangered and threatened with extinction This depletion of germplasm pools and the shrinkage of naturally occurring genetic resources have caused international concern Conventionally the germplasm of plants is conserved through seeds tubers roots corms rhizomes bulbs cuttings etc However the germ plasm of a number of trees and plantation crops such as coconut cocoa coffee oil palm rubber mango horse chestnut etc cannot be preserved since their seed are short lived recalcitrant Likewise germplasm of vegetatively propagated crops such as potato and cassava cannot be stored on a long term basis and has to be grown and multiplied periodically in nurseries and fields The plants are thus exposed to unpredictable weather conditions and diseases with the result that instances are known where entire genetic stocks are lost Therefore unconventional methods are being developed for the storage and international exchange of germplasm For this purpose in vitro cultures have been employed but they can only enable short to medium term preservation moreover cell cultures upon repeated subculture undergo genetic erosion In view of the recent developments in the in vitro induction of genetic variability through somaclonal variation somatic hybridization recombinant DNA technology etc new methods need to be employed for the storage of desirable cultures In this regard freeze preservation of cells in liquid nitrogen 196 °K like that of semen enables long term storage theoretically for an indefinite period of time

Manual of Environmental Microbiology Christon J. Hurst, Ronald L. Crawford, Jay L. Garland, David A. Lipson, 2007-05-14 The most definitive manual of microbes in air water and soil and their impact on human health and welfare Incorporates a summary of the latest methodology used to study the activity and fate of microorganisms in various environments Synthesizes the latest information on the assessment of microbial presence and microbial activity in natural and artificial environments Features a section on biotransformation and biodegradation Serves as an indispensable reference for environmental microbiologists microbial ecologists and environmental engineers as well as those interested in human diseases water and wastewater treatment and biotechnology

Plant Tissue Culture and Its Agricultural Applications Lyndsey A. Withers, P. G. Alderson, 2013-10-22 Plant Tissue Culture and Its Agricultural Applications presents the proceedings of the 41st University of Nottingham Easter School in Agricultural Science held in England The sessions covered in this volume reflect the revolution of tissue culture and its role in the propagation of elite plant material and the development of improved genotypes This book is organized into four

main sections The first section chronicles the revolution of the plant tissue culture This includes papers on clonal propagation morphogenesis germplasm storage plant health and genetic improvement The core of this volume is covered by the introductory and the final chapters which interrelate the different subjects areas covered by the proceedings and provide a realistic assessment of future research required for the plant tissue culture revolution to come to fruition This book will be useful to readers interested in understanding the history evolution and future of plant tissue culture and its applications in the agricultural sector

Precision Agriculture Technologies for Food Security and Sustainability Abd El-Kader, Sherine M., Mohammad El-Basioni, Basma M., 2020-10-16 Precision agriculture integrates new technologies with the agronomic experience to intelligently manage the high spatial variability of all agricultural variables and the time scales at which these variables change The right application of this approach increases the size and quality of the agricultural production saves resources improves environmental quality helps to achieve self sufficiency food security and agricultural sustainability increases exports and more Precision Agriculture Technologies for Food Security and Sustainability is an essential reference source that compiles a comprehensive multidisciplinary review of current research in the field of precision agriculture It also discusses cutting edge tools and models that can help facilitate and improve the systems implementation Featuring coverage of a wide range of topics including agronomy public policy and internet of things this book is ideally designed for agriculturalists government officials economists environmentalists academicians researchers students and engineers in the fields of electronics ICT and agriculture

Bioresources and Bioprocess in Biotechnology Sabu Abdulhameed, N.S. Pradeep, Shiburaj Sugathan, 2017-05-10 This book is a compilation of articles on various aspects of bioresources and the processes employed for its judicious utilization Biodiversity and conservation food security gene banks and repositories laws governing biodiversity bioprospecting bioresources in traditional medicine and biodiversity mining are some of the important topics covered in the book The unique contents of the book make it an important source of information for conservation scientists academics activists and to those who are actively involved in product oriented research from bioresources

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