

# SOMATIC EMBRYOGENESIS FOR MICROPROPAGATION OF COCONUT (*Cocos nucifera* L.)



QUARANTINE

I.D. Anton, PhD

# Somatic Embryogenesis For Micropropagation Of Coconut Cocos Nucifera L

**S. Mohan Jain, Pramod P.K. Gupta, R.J.  
Newton**



## **Somatic Embryogenesis For Micropropagation Of Coconut Cocos Nucifera L:**

*Coconut Biotechnology: Towards the Sustainability of the 'Tree of Life'* Steve Adkins, Mike Foale, Roland Bourdeix, Quang Nguyen, Julianne Biddle, 2020-06-24 Widely known as the tree of life coconut *Cocos nucifera* L provides a bountiful source for making a wide variety of healthy foods and industrial items Its cultivation however has been encountering seriously destructive issues including lethal diseases and natural adversities which are currently distressing livelihoods of millions of small holder farmers around the world There is an urgent mandate to resolve these issues by meeting sustainable seedling production facilitating genetic conservation as well as developing disease identification and modern breeding This book introduces improvements in coconut biotechnology by covering the advances in micropropagation germplasm conservation and molecular pathogenic diagnosis This comprehensive volume will be a useful source of information and references to researchers graduate students agricultural developers and scholars in the plant sciences In order to benefit general readers the book also covers fundamental aspects of biology diversity and evolution of this marvelous palm species Step Wise Protocols for Somatic Embryogenesis of Important Woody Plants Shri Mohan Jain, Pramod Gupta, 2018-05-30 World population is increasing at an alarming rate and this has resulted in increasing tremendously the demand for tree products such as wood for construction materials fuel and paper fruits oils and medicines etc This has put immense pressure on the world's supplies of trees and raw material to industry and will continue to do so as long as human population continues to grow Also the quality of human diet especially nutritional components is adversely affected due to limited genetic improvement of most of fruit trees Thus there is an immediate need to increase productivity of trees Improvement has been made through conventional breeding methods however conventional breeding is very slow due to long life cycle of trees A basic strategy in tree improvement is to capture genetic gain through clonal propagation Clonal propagation via organogenesis is being used for the production of selected elite individual trees However the methods are labour intensive costly and produce low volumes Genetic gain can now be captured through somatic embryogenesis Formation of embryos from somatic cells by a process resembling zygotic embryogenesis is one of the most important features of plants In 1958 Reinert in Germany and Steward in USA independently reported somatic embryogenesis in carrot cultures Since then tremendous progress in somatic embryogenesis of woody and non woody plants has taken place It offers a potentially large scale propagation system for superior clones **Current Advances in Coconut Biotechnology** C. Oropeza, J.L. Verdeil, G.R. Ashburner, R. Cardena, J.M. Santamaria, 2013-04-17 The coconut palm occupies a significant place in the world economy as an important subsistence crop in all the areas in which it is grown Relatively few countries are able to export any quantity of coconut products because of increasing home demands coupled with low productivity Yields are generally well below potential despite recent developments with improved planting stock and agronomic practices In the last 50 years both these aspects have received considerable attention but the focus is shifting to investigate how the use of recently developed

biotechnological techniques can benefit the coconut industry This volume the result of the International Symposium on Coconut Biotechnology held in December 1997 in Merida Yucatan Mexico describes recent research in three important areas Standard plant breeding techniques used with coconut have produced improved planting material but progress is inevitably very slow Can more rapid genetic improvement be obtained using molecular techniques The papers presented in this section suggest that such techniques will open up exciting new prospects but only after basic information has been gathered on the genetic status of existing coconut stocks Research using microsatellite techniques seems to provide a useful tool to help to classifying these stocks However only a combination of classical breeding methods with modern techniques will lead to the rapid improvement which is required to supply material for urgent replanting programs

**Somatic Embryogenesis and Synthetic Seed I** Professor Dr. Y. P. S. Bajaj, 2013-03-14 While working in the laboratory of Professor Dr Jacob Reinert at the Freie Universitat Berlin 1974 1976 I had the opportunity to become deeply involved in studying the intricacies of the fascinating phenomenon of somatic embryogenesis in plant cells and protoplasts In numerous stimulating discussions with Professor Reinert on this subject I was fully convinced that somatic embryogenesis would become one of the most important areas of study not only regarding basic and fundamental aspects but also for its application in crop improvement During the last decade we have witnessed tremendous interest and achievements in the use of somatic embryos for the production of synthetic seeds for micro propagation genetic transformation cryopreservation and conservation of germplasm The en masse production of somatic embryos in the bioreactors has facilitated some of these studies Somatic embryos have now been induced in more than 300 plant species belonging to a wide range of families It was therefore felt that a compilation of literature state of the art on this subject was necessary Thus two volumes on Somatic Embryo genesis and Synthetic Seed have been compiled which contain 65 chapters contributed by International experts Somatic Embryogenesis and Synthetic Seed I comprises 31 chapters arranged in 3 sections Section I Commitment of the cell to somatic embryogenesis early events anatomy molecular basis gene expression role of polyamines machine vision analysis of somatic embryos Section II Applications of somatic embryos technology of synthetic seed fluid drilling micropropagation genetic transformation through somatic embryos cryopreservation

**Coconut Genetic Resources** Pons Batugal, 2005 *Biotechnology of Fruit and Nut Crops, 2nd Edition* Richard E. Litz, Fernando Pliego-Alfaro, Jose Ignacio Hormaza, 2020-01-29 This book covers the biotechnology of all the major fruit and nut species Since the very successful first edition of this book in 2004 there has been rapid progress for many fruit and nut species in cell culture genomics and genetic transformation especially for citrus and papaya This book covers both these cutting edge technologies and regeneration pathways protoplast culture in vitro mutagenesis ploidy manipulation techniques that have been applied to a wider range of species Three crop species Diospyros kaki persimmon Punica granatum pomegranate and Eriobotrya japonica loquat are included for the first time The chapters are organized by plant family to make it easier to make comparisons and exploitation of work with related species Each

chapter discusses the plant family and the related wild species for 38 crop species and has colour illustrations It is essential for scientists and post graduate students who are engaged in the improvement of fruit nut and plantation crops **Somatic Embryogenesis: Fundamental Aspects and Applications** Víctor M Loyola-Vargas, Neftalí Ochoa-Alejo, 2016-06-06 This book discusses basic and applied aspects of somatic embryogenesis one of the most powerful tools in plant biotechnology It is divided into three parts Part I includes topics such as the history of this research field how differentiated plant cells can re acquire totipotency molecular features as well as the epigenetics and proteomics of somatic embryogenesis Part II covers the somatic embryogenesis of different crops such as Agave spp maize Cocos nucifera Bixa orellana Capsicum spp Coffea spp Musa spp Pinus spp and Arabidopsis thaliana Various applications like scale up propagation and genetic engineering are discussed in detail in Part III The book will appeal to plant scientists plant breeders and experts working in industry **The Coconut** Steve Adkins, Julianne Biddle, Amirhossein Bazrafshan, Sundaravelpandian Kalaipandian, 2024-01-25 The coconut palm Cocos nucifera L is one of the world s most important palms and contributes significantly to the income and livelihood of many people in tropical countries Widely referred to as the tree of life coconut has been used as a source of food drink oil medicine shelter and wood for around 500 years Every part of the coconut palm can be utilized The demand for coconut fruit and its products has increased recently as people have become aware of its nutritional and health benefits especially those of coconut water and virgin coconut oil This book is a key resource for researchers and students in horticulture plant science and agriculture and those interested in the production of tropical crops and practitioners in the coconut industry

*Guidelines for Seed Exchange and Plant Introduction in Tropical Crops* Food and Agriculture Organization of the United Nations, 1986-01-01 **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 **Horticultural Reviews, Volume 48** Ian Warrington, 2021-03-31 *Horticultural Reviews* presents state of the art reviews on topics in horticultural science and technology covering both basic and applied research Topics covered include the horticulture of fruits vegetables nut crops and ornamentals These review articles written by world authorities bridge the gap between the specialized researcher and the broader community of horticultural scientists and

teachers

**Applications of Biotechnology in Forestry and Horticulture** V. Dhawan, 2012-12-06 Major and exciting changes have taken place recently in various aspects of bio technology and its applications to forestry Even more exciting is the prospect of major innovations that the entire field of biotechnology holds for plant growth in general The importance of these developments for the forestry sector is considerable particularly since forestry science has not received the kinds of technical and R D inputs that say agriculture has received in the past few decades Yet the problems of deforestation as well as stagnation in yields and productivity of existing forests throughout the world are becoming increasingly apparent with consequences and ecological effects that cause growing worldwide concern Policies for application of existing knowledge in biotechnology to the field of forestry and priorities for future research and development are therefore of considerable value because it is only through the adoption of the right priorities and enlightened policies that scientific developments will move along the right direction leading to improvements in forestry practices throughout the world It was against this backdrop that the Tata Energy Research Institute TERI organised a major international workshop on the Applications of Biotechnology in Forestry and Horticulture at New Delhi in January 1988 The present volume covers the proceedings of this international workshop *Advances in Plant Tissue Culture* Avinash Chandra Rai, Ajay Kumar, Arpan Modi, Major Singh, 2022-05-28

*Advances in Plant Tissue Culture* Current Developments and Future Trends provides a complete and up to date text on all basic and applied aspects of plant tissue cultures and their latest application implications It will be beneficial for students and early career researchers of plant sciences and plant agricultural biotechnology Plant tissue culture has emerged as a sustainable way to meet the requirements of fresh produces horticultural crops medicinal or ornamental plants Nowadays plant tissue culture is an emerging field applied in various aspects including sustainable agriculture plant breeding horticulture and forestry This book covers the latest technology broadly applied for crop improvement clonal propagation Somatic hybridization Embryo rescue Germplasm conservation genetic conservation or for the preservation of endangered species However these technologies also play a vital role in breaking seed dormancy over conventional methods of conservation Focuses on plant tissue culture as an emerging field applied in various aspects including sustainable agriculture plant breeding horticulture and forestry Includes current studies and innovations in biotechnology Covers commercialization and current perspectives in the field of plant tissue culture techniques **Somatic Embryogenesis in Woody Plants** S.M. Jain, Pramod P.K. Gupta, R.J. Newton, 2013-04-17 The rapid progress made on somatic embryogenesis and its prospects for potential applications in improving woody plants prompted us to edit this book initially in three volumes and now to add two more volumes The editors were all convinced that such a treatise was needed and would be extremely useful to researchers and students This Volume 4 has been divided into three sections and contains 23 chapters Section A contains eleven chapters covering studies of embryo development and cell biology of white spruce proliferative somatic embryogenesis in woody species somatic embryo germination and desiccation tolerance in conifers performance of conifer somatic seedlings

apoptosis during early somatic embryogenesis water relation parameters in conifer embryos image analysis of somatic embryos somatic embryogenesis in woody legumes cold storage and cryopreservation and commercialization of plant somatic embryogenesis Section B contains six chapters dealing with angiosperm woody plants such as somatic embryogenesis in myrtaceous plants *Laurus nobilis* *Simarouba glauca* *Magnolia* spp *Juglans cinerea* and somatic embryogenesis and evaluation of variability in somatic seedlings of *Quercus serrata* by RAPD markers The chapters contained in Section C are focused on somatic embryogenesis in gymnosperms including *Pinus patula* *Encephalartos Picea wilsonii* *Pinus banksiana* hybrid firs and *Taxus* All the chapters have been peer reviewed and revised accordingly to improve their quality *Cell and Tissue Culture in Forestry* J.M. Bonga, D.J. Durzan, 2013-04-17 [Plant Sciences Reviews 2011](#) David Hemming, 2012 Plant Sciences Reviews 2011 provides scientists and students in the field with timely analysis on key topics in current research Originally published online in CAB Reviews this volume makes available in printed form the reviews in plant sciences published during 2011 **Plant Cell and Tissue Culture** Indra K. Vasil, Trevor A. Thorpe, 1994-06-30 Plant Cell and Tissue Culture gives an exhaustive account of plant cell culture and genetic transformation including detailed chapters on all major field and plantation crops Part A presents a comprehensive coverage of all necessary laboratory techniques for the initiation nutrition maintenance and storage of plant cell and tissue cultures including discussions on these topics as well as on morphogenesis and regeneration meristem and shoot tip culture plant protoplasts mutant cell lines variation in tissue cultures isogenic lines fertilization control cryopreservation transformation and the production of secondary metabolites Part B then proceeds into detail on the specific in vitro culture of specific crops including cereals legumes vegetables potatoes other roots and tubers oilseeds temperate fruits tropical fruits plantation crops forest trees and ornamentals Plant Cell and Tissue Culture is and is likely to remain the laboratory manual of choice as well as a source of inspiration and a guide to all workers in the field

[Micropropagation of Woody Plants](#) M.R. Ahuja, 2013-06-29 This volume covers recent advances in the vegetative propagation of woody plants by tissue culture A wide range of topics relevant to micropropagation of woody plants are discussed by renowned international scientists These include cellular control of morphogenesis light regimes in tissue culture maturation and rejuvenation synthetic seed genetics of micropropagated plants haploid embryogenesis protoplast culture and acclimatization of ex vitro woody plants In addition to micropropagation of selected woody plants both gymnosperms and angiosperms this volume also includes in vitro genetic selection strategic planning for application of biotechnology for genetics and breeding and clonal options for woody plant improvement A balanced view of both perspectives and limitations of woody plant micropropagation is presented **Somatic Embryogenesis in Woody Plants** S. Mohan Jain, Pramod P.K. Gupta, R.J. Newton, 2012-12-06 The quality of human life has been maintained and enhanced for generations by the use of trees and their products In recent years ever rising human population growth has put tremendous pressure on trees and tree products growing awareness of the potential of previously unexploited tree resources and environmental pollution have both

accelerated development of new technologies for tree propagation breeding and improvement Biotechnology of trees may be the answer to solve the problems which cannot be solved by conventional breeding methods The combination of biotechnology and conventional methods such as plant propagation and breeding may be a novel approach to improving and multiplying in large number the trees and woody plants So far plant tissue culture technology has largely been exploited in the propagation of ornamental plants especially foliage house plants by commercial companies Generally tissue culture of woody plants has been recalcitrant However limited success has been achieved in tissue culture of angiosperm and gymnosperm woody plants A number of recent reports on somatic embryogenesis in woody plants such as Norway spruce *Picea abies* Loblolly pine *Pinus taeda* Sandalwood *Santalum album* Citrus Mango *Mangifera indica* etc offer a ray of hope of an inexpensive clonal propagation for large scale production of plants or seedlings or somatic embryo plants by protoplast work cryopreservation d genetic transformation and e artificial or manufactured seed production **Indian Coconut Journal**,2017-05

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