FORESTRY SCIENCES

Somatic Cell Genetics of Woody Plants

M.R. AHUJA
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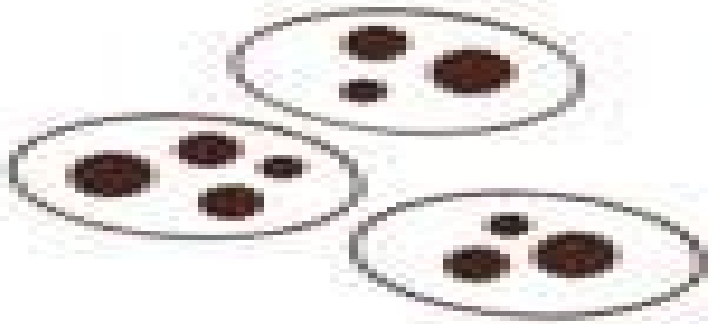

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Somatic Cell Genetics Of Woody Plants

Kan Wang,Alfredo Herrera-Estrella,Marc van Montagu

Somatic Cell Genetics Of Woody Plants:

Somatic Cell Genetics of Woody Plants International Union of Forest Research Organizations. Working Party S2. 04-07 Somatic Cell Genetics,1988 *Somatic Cell Genetics of Woody Plants* M.R. Ahuja,2012-12-06 Most forest tree species were considered recalcitrant a decade ago but now with the improved in vitro techniques some progress has been made towards culture of tree species Micro propagation has been achieved from the juvenile tissues of a number of forest tree species On the other hand tissues from most mature trees are still very difficult to grow and differen tiate in vitro Nevertheless there has been slow but steady progress in the application of tissue culture technology for culture of tissues organs cells and protoplasts of tree species As compared to most agricultural crops and herbaceous plant species trees are a different lot They have long gene ration cycles They are highly heterozygous and have a large reservoir of genetic variability Because of this genetic variability their response in vitro is also variable On a single medium the response of tissues from different trees genotypes of a single species may be quite different some responding by induction of growth and differentiation while others showing minimal or no growth at all That makes the somatic cell genetics of woody plants somewhat difficult but at the same time interesting **Molecular Biology of Woody Plants** S.M. Jain,S.C. Minocha,2013-04-17 Woody plants constitute an artificial and heterogeneous group of plants that share some common phenotypic characteristics but otherwise have no strong evolutionary relationships nor do they share a common habitat They are a primary source of fiber and timber and also include many edible fruit species Their unique phenotypic behavior includes a perennial habit associated with extensive secondary growth Additional characteristics of woody plants include developmental juvenility and maturity with respect to growth habit flowering time and morphogenetic response in tissue cultures environmental control of bud dormancy and flowering cycles variable tolerance to abiotic stresses wounding and pathogens and long distance transport of water and nutrients Woody plants particularly tree species have been the focus of numerous physiological studies to understand their specialized functions however only recently have they become the target of molecular studies Recent advances in our understanding of signal transduction pathways for environmental responses in herbaceous plants including the identification and cloning of genes for proteins involved in signal transduction should provide useful leads to undertake parallel studies with woody plants Molecular mapping techniques coupled with the availability of cloned genes from herbaceous plants should provide shortcuts to cloning relevant genes from woody plants The unique phenotypes of these plants can then be targeted for improvement through genetic engineering In this book we present a broad coverage of various aspects of plant molecular biology that are relevant to the improvement of woody plant **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 contro 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 Cell Genetics and Molecular Genetics of Trees M.R. Ahuja,Wout Boerjan,David B. Neale,2012-12-06 This proceedings is based on a joint meeting of the two IUFRO International Union of Forestry Research Organizations Working Parties Somatic Cell Genetics S2 04 07 and Molecular Genetics S2 04 06 held in Gent Belgium 26 30 September 1995 Although a joint meeting of the two Working Parties had been discussed in the past this was the first such meeting that became a successful reality In fact this meeting provided an excellent forum for discussions and interactions in forest bioteclUlology that encouraged the participants to vote for a next joint meeting In the past decade rapid progress has been made in the somatic cell genetics and molecular genetics of forest trees In order to cover recent developments in the broad area of biotechnology the scientific program of the meeting was divided into several sessions These included somatic embryogenesis regeneration transformation gene expression molecular markers genome mapping and biotic and abiotic stresses The regeneration of plants produced by organogenesis or somatic embryogenesis is necessary not only for mass cloning of forest trees but also for its application in genetic transformation and molecular biology Although micropropagation has been achieved from juvenile tissues in a number of forest tree species in vitro regeneration from mature trees remains a challenging problem in most hardwoods and conifers The mechanisms involved in the transition from juvenile to mature phase in woody plants are poorly understood This transition can now be investigated at the molecular level **Molecular Breeding of Woody Plants** Noriyuki Morohoshi,Atsushi Komamine,2001-11-30 At present plants and agricultural sciences are playing a leading role in providing solutions to problems created by an ever growing world population Through plant biotechnology scientists are seeking ways to improve crop functions that rapidly promote food production Agricultural science is being used to experiment with producing plants tolerant to environmental stresses such as drought salinity and coldness Of the plant species woody plants are producing the most abundant biomass resources playing important roles in the suppression of carbon dioxide increase and supplying huge energy and resources to human beings in the biosphere These Proceedings discuss the recent results of fundamental and applied research for global resource and energy biomass production and environmental problems from the aspect of woody science Topics include Formation of the vascular bundle Biosynthesis of cellulose Lignin biosynthesis and transgenic woody plants Cell and tissue culture and transformation in gymnosperms Micropropagation of woody plants Defense Mechanisms of Woody Plants Against Fungi Robert A. Blanchette,Alan R. Biggs,2013-11-11 For the past decade it has been apparent to both of us that a reference text covering all aspects of tree defense mechanisms to fungi was missing needed and long overdue Such a book would provide a clear

comprehensive overview of how living roots stems and leaves respond to fungal pathogens The need for such a book became in creasingly clear to us from our conversations with each other as well as from our interactions with students and colleagues who desired a sourcebook containing reviews of morphological biochemical and physiological aspects of host parasite interactions in trees During a field trip sponsored by the Forest Pathology Committee of the Ameri can Phytopathological Society on a bus from one site to another we decided to take the responsibility to prepare a book of this type and began to plan its composition To adequately address the topic of this book as we had envisioned it we believed that well illustrated chapters were needed in order to reflect the important advances made by the many investigators who have examined the anatomical and physiological changes that occur when trees are attacked by fungi We are grateful to Dr Tore Timell the Wood Science editor for Springer Verlag for supporting our efforts and for providing an avenue to publish such a profusely il lustrated volume *General Technical Report SO* ,1977 **In Vitro Culture of Trees** J.M. Bonga,Patrick Aderkas,2013-06-29 Woody plants provide many challenges to the tissue culturist Although there are many excellent tissue culture books and manuals available these are generally strongly biased towards herbacious crops Consequently they often do not pay sufficient attention to the problems that specifically apply to in vitro culture of tree species Culture of the latter often poses problems which are either absent or of lesser significance when culturing herbacious species When trees in the field are used as explant source the problems can be especially severe For example the physiological condition of the explants is difficult to control because of variation in weather and biotic factors Furthermore it is often difficult to obtain explants free of contaminants from field grown trees Lack of genetic uniformity and maturation are additional problems one often has to deal with when culturing tree cells or tissues These problems are emphasized in this text In vitro culture of trees is not viewed in isolation It is considered in conjunction with breeding traditional cloning and other common tree improvement techniques The text discusses theoretical as well as practical aspects of the in vitro culture of trees

Somaclonal Variation and Induced Mutations in Crop Improvement S.M. Jain,D.S. Brar,B.S. Ahloowalia,2013-03-14 Genetic variability is an important parameter for plant breeders in any con ventional crop improvement programme Very often the desired variation is un available in the right combination or simply does not exist at all However plant breeders have successfully recombined the desired genes from cultivated crop gerrnplasm and related wild species by sexual hybridization and have been able to develop new cultivars with desirable agronomie traits such as high yield disease pest and drought resistance So far conventional breeding methods have managed to feed the world s ever growing population Continued population growth no further scope of expanding arable land soil degradation environ mental pollution and global warrning are causes of concern to plant biologists and planners Plant breeders are under continuous pressure to improve and develop new cultivars for sustainable food production However it takes several years to develop a new cultivar Therefore they have to look for new technologies which could be combined with conventional methods to create

more genetic variability and reduce the time in developing new cultivars with early maturity and improved yield The first report on induced mutation of a gene by HJ Muller in 1927 was a major mi1estone in enhancing variation and also indicated the potential applica tions of mutagenesis in plant improvement Radiation sources such as X rays gamma rays and fast neutrons and chemical mutagens e g ethyl methane sulphonate have been widely used to induce mutations **High-Tech and Micropropagation II** Y. P. S. Bajaj,2012-12-06 Second in the series High Tech and Micropropagation this work covers the micropropagation of trees and fruit bearing plants such as poplar birches larch American sweetgum black locust Sorbus sandalwood Quercus cedar Persian walnut date palm cocoa Citrus olive apple pear peach plum cherry papaya pineapple kiwi Japanese persimmon grapevine strawberry and raspberry The importance and distribution of conventional propagation and in vitro studies on individual species are discussed In particular detail the transfer of in vitro plants to the greenhouse or the field and the prospects of commercial exploitation are examined The book will be of use to advanced students research workers and teachers in horticulture forestry and plant biotechnology in general and also to individuals interested in industrial micropropagation *Plant Protoplasts and Genetic Engineering II* Y. P. S. Bajaj,2012-12-06 **Plant Regeneration and Genetic Variability** Indra Vasil,2012-12-02 Plant Regeneration and Genetic Variability

Transformation of Plants and Soil Microorganisms Kan Wang,Alfredo Herrera-Estrella,Marc van Montagu,2004-01-29 Over the past fifty years plant breeders have achieved impressive improvements in yield quality and disease resistance These gains suggest that many more modifications might be introduced if appropriate genes can be identified Current DNA techniques allow the construction of transgenic plants and this important new book reviews the current state of knowledge A team of leading researchers provide in depth reviews at the cutting edge of technology for laboratory techniques for the transformation of important soil microorganisms and recalcitrant plants of economic value The book is divided into three sections soil microorganisms cereal crops and industrially important plants The most effective methods used to date are compared and their merits and limitations discussed Some chapters emphasise case studies and applications In cases where obstacles remain to be overcome an overview of progress to date is given The book will serve as a general guide and reference tool for those working on transformation in microbiology and plant science **Plant Protoplasts and Genetic Engineering VII** Y. P. S. Bajaj,2013-03-14 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 *Clonal Forestry I* Mulkh-Raj Ahuja,William J. Libby,2012-12-06 Clonal forestry has come of age Basic

techniques in genetics and biotechnology of other organisms are generally applicable to forest trees However there are some differences in particular in the juvenile and maturation related regeneration Examined here are crucial topics of juvenility maturation and rejuvenation in clonal propagation of trees In addition the genetics of clones population biology of clonal deployment propagation and field testing of clones clone identification clonal physiology regeneration and variation in plant tissue cultures the role of somatic embryogenesis in clonal forestry and recent developments in biotechnology including the molecular structure of trees and gene transfer are covered in depth *Seed Technology and Its Biological Basis* Michael Black,J. Derek Bewley,2000 Edited by a renowned seed biologist with a team assembled from the most respected laboratories worldwide Seed Technology and Its Biological Basis illustrates the commercial value of seeds as a major resource The editors provide a sweeping overview of the current state of the art in seed technology and its biological basis The book is invaluable to researchers and professionals in both the industrial and academic sectors **Populus** ,1990 **Bibliographies and Literature of Agriculture** ,1978 Cryopreservation of Plant Germplasm II L.E. Towill,Y.P.S. Bajaj,2002-04-11 This volume highlights achievements in cryopreservation chronicles method development and describes relevant literature The provided detailed information helps practitioners develop and improve methods for desired species The volume is divided into four parts I Cryopreservation of Germplasm II Herbaceous Plants Barley celery chamomile chicory garlic ginseng hop horseradish mint taro wasabi III Woody Species Coffee Eucalyptus guazuma horse chestnut neem olive poplar oak Prunus Ribes rose IV Australian Species Initially cryopreservation was driven by the concern for loss of diversity of crops essential for continued improvement of the many plants used for food health and shelter The interest has been expanded by conservationists and their concerns for retaining the diversity of natural populations

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