

**POLLEN
BIOTECHNOLOGY
FOR
CROP PRODUCTION
AND
IMPROVEMENT**

EDITED BY
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Pollen Biotechnology For Crop Production And Improvement

K. R. Shivanna, V. K. Sawhney



Pollen Biotechnology For Crop Production And Improvement:

Pollen Biotechnology for Crop Production and Improvement K. R. Shivanna,V. K. Sawhney,1997 *Pollen Biotechnology for Crop Production and Improvement* K. R. Shivanna,V. K. Sawhney,1997 **Pollen Biology and Biotechnology** K R Shivanna,2019-04-24 The author offers an overview of pollen biology and biotechnology for students and researchers in areas such as reproductive biology biotechnology aeropalynology plant breeding horticulture and forestry Citing more than 1 500 references to pollen research the text covers topics including advances in understanding pollen tube growth the use

Plant Biology and Biotechnology Bir Bahadur,Manchikatla 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

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 *Transgenic Plants and Crops* George C.

Khachatourians, Y. H. Hui, Ralph Scorza, Wai-Kit Nip, 2002-03-26 With contributions from nearly 130 internationally renowned experts in the field this reference details advances in transgenic plant construction and explores the social political and legal aspects of genetic plant manipulation It provides analyzes of the history genetics physiology and cultivation of over 30 species of transgenic seeds fruits and vegetables Stressing the impact of genetic engineering strategies on the nutritional and functional benefit of foods as well as on consumer health and the global market economy the book covers methods of gene marking transferring and tagging public perceptions to the selective breeding hybridization and recombinant DNA manipulation of food Pollen Cryopreservation Protocols P.E. Rajasekharan, M.R. Rohini, 2023-02-20 This volume focuses

upon pollen cryopreservation in various crops from the most widely cultivated tomato to the lesser known medicinal species like *Decalepis arayalpatra* Chapters detail standard techniques such as pollen collection cryopreservation pollen germination tests for viability and specific crops Step by step protocols are complemented by personal notes precautions and specifying the reagents to be used in each step to ensure the repeatability of the procedure across labs Authoritative and cutting edge Pollen Cryopreservation Protocols aims to serve as reference for researchers studying plant breeding and plant conservation biology *Plant Biotechnology and Agriculture* Arie Altman, Paul Michael Hasegawa, 2012 As the oldest and largest human intervention in nature the science of agriculture is one of the most intensely studied practices From manipulation of plant gene structure to the use of plants for bioenergy biotechnology interventions in plant and agricultural science have been rapidly developing over the past ten years with immense forward leaps on an annual basis This book begins by laying the foundations for plant biotechnology by outlining the biological aspects including gene structure and expression and the basic procedures in plant biotechnology of genomics metabolomics transcriptomics and proteomics It then focuses on a discussion of the impacts of biotechnology on plant breeding technologies and germplasm sustainability The role of biotechnology in the improvement of agricultural traits production of industrial products and pharmaceuticals as well as biomaterials and biomass

provide a historical perspective and a look to the future Sections addressing intellectual property rights and sociological and food safety issues round out the holistic discussion of this important topic Includes specific emphasis on the inter relationships between basic plant biotechnologies and applied agricultural applications and the way they contribute to each other Provides an updated review of the major plant biotechnology procedures and techniques their impact on novel agricultural development and crop plant improvement Takes a broad view of the topic with discussions of practices in many countries

Encyclopedia of Plant and Crop Science (Print) Robert M. Goodman, 2004-02-27 Encyclopedia of Plant and Crop Science is the first ever single source reference work to inclusively cover classic and modern studies in plant biology in conjunction with research applications and innovations in crop science and agriculture From the fundamentals of plant growth and reproduction to developments in agronomy and agricultural science the encyclopedia s authoritative content nurtures communication between these academically distinct yet intrinsically related fields offering a spread of clear descriptive and concise entries to optimally serve scientists agriculturalists policy makers students and the general public

Biocatalysis and Agricultural Biotechnology Ching T. Hou, Jei-Fu Shaw, 2009-04-27 Worldwide energy and food crises are spotlighting the importance of bio based products an area many are calling on for solutions to these shortages Biocatalysis and Agricultural Biotechnology encapsulates the cutting edge advances in the field with contributions from more than 50 international experts comprising sectors of academia industry and

The Embryology of Angiosperm, 7e S S Bhojwani | S P Bhatnagar | P K Dantu, For the last 40 years this book has served well the students of Botany Agriculture and Forestry for their regular courses like BSc General and Hons and Msc as well as competitive examinations It has stood the test of time due to the authors zeal to update it regularly with inputs from latest developments in the field It explains all the important topics such as development and structure of male and female gametophytes pollination fertilization sexual incompatibility development of endosperm and embryo polyembryony apomixis and seed development It also describes embryology in relation to taxonomy and experimental and applied embryology

Novel Food and Feed Safety SET 1: Safety Assessment of Transgenic Organisms OECD Consensus Documents Volumes 1 and 2 OECD, 2008-08-08 These OECD Biosafety Consensus Documents identify elements of scientific information used in the environmental safety and risk assessment of transgenic organisms which are common to OECD member countries

Somatic Embryogenesis in Woody Plants S.M. Jain, P.K. Gupta, R.J. Newton, 2013-11-11 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 a tremendous pressure on trees and tree products growing awareness of the potential of previously unexploited tree resources and environmental pollution have both accelerated the development of new technologies for tree propagation breeding and improvement Biotechnology of trees may be the answer to solve the problems which can not 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 a large number of the trees and woody plants So far plant tissue culture technology has largely been exploited by commercial companies in propagation of ornamentals especially foliage house plants Gene rally 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 a inexpensive clonal propagation for large scale production of plants or emblings or somatic seedlings b protoplast work c cryopreservation d genetic transformation and e synthetic or artificial or manufactured seed production

Technological Innovations in Major World Oil Crops, Volume 2 S.K. Gupta, 2011-11-09 The present volume presents essential information on advancements in oilseed production processing and utilization Advances in the technology of seed processing to produce oil and oil quality for edible and industrial applications are well presented followed by hybrid technology biotechnology oil technology and meal quality for animal nutrition The following areas are also covered the potential for oil in developing biodiesel markets fatty acid long chains and their derivative pollination management and safety of pollinators from harmful effects of pesticides This volume also includes an economic assessment of oilseed integrated pest management IPM programs in different regions of the world Dr Surinder Kumar Gupta is Professor Chief Scientist Oilseeds Plant Breeding Genetics and Nodal officer in School of Biotechnology S K University of Agricultural Sciences Technology Faculty of Agriculture Chatha Jammu India He holds a distinguished academic and service record and has been devoted primarily to research on oilseed Brassicas for nearly two decades He has written two books on plant breeding and edited three volumes one on Recent Advances in Oilseed Brassicas Kalyani Publishers New Delhi India second on Rapeseed Breeding Advances in Botanical Research Vol 45 Academic Press Elsevier Publishers and third on Biology and Breeding of crucifers CRC Publishers Taylor and Francis Group Industrial Crops Von Mark V. Cruz, David A. Dierig, 2014-11-17 The volume on Industrial Crop Breeding will be part of the series Handbook of Plant Breeding This volume will focus on the emerging area of plant breeding for sustainable production of transportation fuels and bio based products using the current advances in the field The book is scheduled to consist of a total number of 30 chapters divided into four sections The sections will emphasize crops being considered for different challenge areas including oil crops for biodiesel sugar starch and cellulosic crops for biofuel crops for bio products and issues and future prospects A chapter introducing the first three sections will also be included Outstanding scientists for each crop species are proposed as senior authors who may invite co authors to contribute part of a chapter to provide additional expertise or perspective The proposed authors will represent various national and international institutions to get a more diverse view on the topic and somehow get a global view on the common issues that researchers on industrial crops are facing The book will comprise primarily of specific issues available germplasm breeding techniques and potential geographical areas of production pertaining to individual crops being

considered for industrial uses We hope to encourage the proposed authors of new crops to provide an estimate of the crop readiness for commercial development and discuss the limitations This book will be of interest and envisioned to serve as an updated reference to researchers in both academic and industrial setting to students and teachers of plant breeding and to policy makers who are looking for alternative solutions to dependency on imported petroleum products Plant Breeding H.K. Jain,M.C. Kharkwal,2012-12-06 The Indian Society of Genetics and Plant Breeding was established in 1941 in recognition of the growing contribution of improved crop varieties to the country s agriculture Scientific plant breeding had started inIndia soon after the rediscovery of Mendel s laws of heredity The Indian Agricultural Research Institute set up in 1905 and a number of Agricultural Colleges in different parts of the country carried out some of the earliest work mostly inthe form of pure line selections In subsequent years hybridization programmes in crops like wheat rice oilseeds grain legumes sugarcane and cotton yielded a large number of improved cultivars with significantly higher yields A turning point came in the 1960s with the development of hybrids in several crops including inter specific hybrids in cotton And when new germplasm with dwarfing genes became available in wheat and rice from CIMMYT and IRRI respectively Indian plant breeders quickly incorporated these genes into the genetic background of the country s widely grown varieties with excellent grain quality and other desirable traits This was to mark the beginning of modem agriculture in India as more and more varieties were developed characterized by a high harvest index and response to modem farm inputs like the inorganic fertilizers India s green revolution which has led to major surpluses offood grains and othercommodities like sugar and cotton has been made possible by the work of one of the largest groups of plant breeders working in a coordinated network

Plant Gene Containment Melvin J. Oliver,Yi Li,2012-08-08 Gene Containment provides a comprehensive look at genetically modified organisms and the strategies and implementation of key methods to gene containment The book is divided into 5 parts An Introduction that discusses the need for biotechnology and GMOs Section 1 looks at the need for gene containment Part II discusses varying strategies for gene containment section III explores the assessment of gene containment approaches and section IV covers the steps involved in implementing gene containment Gene Containment will provide a thorough and up to date look at gene containment research and the needs for implementing new strategies in this arena *Plant Breeding Reviews* Jules Janick,2011-02-02 Plant Breeding Reviews presents state of the art reviews on plant breeding and genetics covering horticultural agronomic and forestry crops incorporating both traditional and molecular methods The contributions are authored by world authorities anonymously reviewed and edited by Professor Jules Janick of Purdue University USA The series is an indispensable resource for crop breeders plant scientists and teachers involved in crop improvement and genetic resources

Mutualistic Interactions between Flowering Plants and Animals Palatty Allesh Sinu,KR Shivanna,2016-03-01 The plant animal interactions both mutualistic and antagonistic play a crucial role in the diversification of plants and animals and are important in functioning of communities in their natural habitats The mutual

interactions between the flowering plants and the animals in pollination and seed dispersal largely determine the reproductive success of the flowering plants Maintenance of these eco services is critical for the sustainability of our biodiversity India with its rich biodiversity and leveling of crop yields in recent years would benefit from research in the area of plant animal interactions This volume includes chapters on various aspects of mutualistic plant animal interactions In particular the fundamental and applied aspects of ecoservices pollination and seed dispersal are covered comprehensively It also covers tritrophic interaction and the potential of genomics in studies on the plant animal interactions The book will be of interest to post graduate students teachers and researchers in the areas of Biology Ecology Botany Zoology Agri horticulture Forestry and Conservation Biology

Reproductive Biology of Angiosperms Arun K. Pandey, 2022-10-18 This book is designed to introduce the basics of different aspects of the biology of reproduction in a concise and coherent manner The book aims to equip students with the fundamentals of the biology of reproduction and also update them with the most recent advances in the field of reproduction The book has been organized into 16 chapters that introduce and explain different aspects in a stimulating manner Each chapter is supplemented with a summary and relevant illustrations A glossary has been added to help the students to understand some important scientific terms The book offers comprehensive coverage of the important topics including Flower structure and development Development and structure of male and female gametophytes Pollination biology fertilization and self incompatibility Endosperm embryo and polyembryony Apomixis and seed biology A separate topic on experimental plant reproductive biology experimental embryology has been provided which includes basics of cell tissue and organ culture anther culture pollen culture flower ovary ovule culture embryo culture somatic embryogenesis synthetic seeds protoplast culture and other aspects of plant biotechnology The book aims to cater to the needs of the advanced undergraduate and post graduate students in Botany Forestry Agriculture and related fields

Industrial Oil Crops Thomas McKeon, Douglas G. Hayes, David Hildebrand, Randall Weselake, 2016-02-24 Industrial Oil Crops presents the latest information on important products derived from seed and other plant oils their quality the potential environmental benefit and the latest trends in industrial uses This book provides a comprehensive view of key oil crops that provide products used for fuel surfactants paints and coatings lubricants high value polymers safe plasticizers and numerous other products all of which compete effectively with petroleum derived products for quality and cost Specific products derived from oil crops are a principle concern and other fundamental aspects of developing oil crops for industrial uses are also covered These include improvement through traditional breeding and molecular tissue culture and genetic engineering contributions to breeding as well as practical aspects of what is needed to bring a new or altered crop to market As such this book provides a handbook for developing products from renewable resources that can replace those currently derived from petroleum Led by an international team of expert editors this book will be a valuable asset for those in product research and development as well as basic plant research related to oil crops Up to date review of all the key oilseed crops used primarily

for industrial purposes Highlights the potential for providing renewable resources to replace petroleum derived products
Comprehensive chapters on biodiesel and polymer chemistry of seed oil Includes chapters on economics of new oilseed crops
emerging oilseed crops genetic modification and plant tissue culture technology for oilseed improvement

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