

Kan Wang *Editor*

Agrobacterium Protocols

Volume 2

Third Edition



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Agrobacterium Protocols Volume 2 Methods In Molecular Biology By Springer 2014 11

**Satbir Singh Gosal, Shabir Hussain
Wani**



Agrobacterium Protocols Volume 2 Methods In Molecular Biology By Springer 2014 11 :

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

Biotechnologies of Crop Improvement, Volume 2 Satbir Singh Gosal, Shabir Hussain Wani, 2018-07-09 During the past 15 years cellular and molecular approaches have emerged as valuable adjuncts to supplement and complement conventional breeding methods for a wide variety of crop plants Biotechnology increasingly plays a role in the creation conservation characterization and utilization of genetic variability for germplasm enhancement For instance anther microspore culture somaclonal variation embryo culture and somatic hybridization are being exploited for obtaining incremental improvement in the existing cultivars In addition genes that confer insect and disease resistance abiotic stress tolerance herbicide tolerance and quality traits have been isolated and re introduced into otherwise sensitive or susceptible species by a variety of transgenic techniques Together these transformative methodologies grant access to a greater repertoire of genetic diversity as the genes may come from viruses bacteria fungi insects animals human beings unrelated plants or even be artificially derived Remarkable achievements have been made in the production characterization field evaluation and commercialization of transgenic crop varieties worldwide Likewise significant advances have been made towards increasing crop yields improving nutritional quality enabling crops to be raised under adverse conditions and developing resistance to pests and diseases for sustaining global food and nutritional security The overarching purpose of this 3 volume work is to summarize the history of crop improvement from a technological perspective but to do so with a forward outlook on further advancement and adaptability to a changing world Our carefully chosen case studies of important plant crops intend to serve a diverse spectrum of audience looking for the right tools to tackle complicated local and global issues

Zinc in Soil-Plant Continuum Sudhakar Srivastava, Harmanjit Kaur, 2025-06-11 This contributed volume covers the role of zinc in soil and plant systems providing a comprehensive understanding of factors influencing its total and bioavailable levels The book presents the mechanisms of zinc uptake translocation and homeostasis in plants under both Zn deficient and Zn excess conditions It also addresses a variety of agronomic biotechnological and microbial approaches for

managing zinc nutrition in crops Plants have evolved intricate systems of transporters and regulatory mechanisms to obtain trace amounts of zinc which is crucial for their growth and yield Zinc homeostasis is essential for optimal crop performance yet its availability in the environment varies significantly While some regions of the world experience severe zinc deficiency others face zinc toxicity This poses a dual challenge zinc deficiency in crops negatively impacts the nutrition of millions of people dependent on plant based diets while zinc toxicity can lead to excessive zinc accumulation in crops posing health risks to humans The book highlights significant advancements in improving zinc nutrition in crops presenting cutting edge research and strategies to address these challenges It offers insights into the broader implications of zinc in agriculture and human nutrition bridging the gap between plant health and public health This book is an invaluable resource for undergraduate and postgraduate students researchers and academicians It is particularly relevant for those studying or working in the fields of crop nutrition essential elements in plants zinc deficiency and toxicity in soils the role of zinc in human health and sustainable agricultural practices *Advances in breeding techniques for cereal crops* Prof Frank Ordon, Prof. Wolfgang Friedt, 2019-06-28 Assesses performance of conventional techniques such as backcross and hybrid breeding in introducing new traits Maps current progress in methods to identify quantitative trait loci QTL linking phenotypic traits with genetic information for selection Shows comparative strengths and weaknesses of marker assisted selection MAS techniques such as genome wide association studies GWAS and nested association mapping NAM **The Brassica oleracea Genome** Shengyi Liu, Rod Snowdon, Chittaranjan Kole, 2021-03-04 This book presents comprehensive information on genetics genomics and breeding in Brassica oleracea an agriculturally important species that includes popular vegetable crops such as cabbage cauliflower broccoli Brussels sprouts kale collard greens savoy kohlrabi and gai lan The content spans whole genome sequencing assembly and gene annotation for this global vegetable species along with molecular mapping and cloning of genes physical genome mapping and analyses of the structure and composition of centromeres in the B oleracea genome The book also elaborates on asymmetrical genome evolution and transposable elements in the B oleracea describes gene family differentiation in comparison to other Brassica species and structural and functional genomic resources and data bases developed for B oleracea Useful discussions on the impact of genome sequencing on genetic improvement in the species are also included **Agrobacterium** Claudia Stange Klein, 2025-03-27 This volume details Agrobacterium strain methods such as plant genotype transient and stable transformation of plants for gene overexpression silencing transplastomic and editing Transformation protocols are focused mainly in plants with economic importance such as cereals and fruit trees including diploids and polyploids and in non plant species such fungi and algae 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 key tips on troubleshooting and avoiding known pitfalls Authoritative and cutting edge Agrobacterium Methods and Protocols

aims to be a useful and practical guide to new researchers and experts looking to expand their knowledge **Plant Transformation via Agrobacterium Tumefaciens** Phetole Mangena, 2022-09-02 Plant Transformation via Agrobacterium Tumefaciens compiles fundamental and specific information and procedures involving in vitro soybean transformation which forms the basis for the Agrobacterium mediated genetic manipulation of soybean using plant tissue culture This method serves as one of the most preferred reliable and cost effective mechanism of transgene expression in both leguminous recalcitrant species and non legume crops The technology is favoured due to its simplicity feasibility and high transformation rates that are so far achieved mostly in monocot plants and a few dicot genotypes This book provides a comprehensive review of plant transformation which remains necessary for many researchers who are still facing protocol related hurdles Among some of the major topics covered in Plant Transformation via Agrobacterium Tumefaciens are the history and discovery of Agrobacterium bacterium longstanding challenges causing transformation inefficiencies types and conditions of explants development of transgenic plants for stress resistance and the role of transgenic plants on animal human health including the environment Plant Transformation via Agrobacterium Tumefaciens helps the reader to understand how soybean like many other orphan legume crops faces the risk of overexploitation which may render the currently available varieties redundant and extinct should its narrow gene pool not improve Plant transformation serves as a key technique in improving the gene pool while developing varieties that are drought tolerant have enhanced nutritional value pest resistant and reduce the destruction by disease causing microorganisms This book is an essential foundation tool that is available for researchers and students to reinforce the application of Agrobacterium mediated genetic transformation in soybean Plant Cell Culture Protocols Víctor Loyola-Vargas, Neftalí Ochoa-Alejo, 2024-07-10 This fifth edition provides new and updated protocols on plant cell tissue and organ cultures Chapters are divided into five parts that cover topics from general methodologies statistical analysis and contamination control highly specialized techniques and laborious process of measuring the epigenetics changes in tissue cultures 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 key tips on troubleshooting and avoiding known pitfalls Authoritative and cutting edge Plant Cell Culture Protocols Fifth Edition aims to ensure successful results in the further study of this vital field Flower Development José Luis Riechmann, Cristina Ferrándiz, 2023-08-04 This second edition details new and updated protocols for experimental approaches that are currently used to study the formation of flowers Chapters guide readers on genetic methods phenotypic analyses genome wide experiments modeling and system wide approaches 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 key tips on troubleshooting and avoiding known pitfalls Authoritative and cutting edge Flower Development Methods and Protocols Second Edition aims to be a useful and practical

guide to new researchers and experts looking to expand their knowledge *Applications of Genetic and Genomic Research in Cereals* Thomas Miedaner, Viktor Korzun, 2018-11-19 *Applications of Genetic and Genomic Research in Cereals* covers new techniques for practical breeding also discussing genetic and genomic approaches for improving special traits Additional sections cover drought tolerance biotic stress biomass production the impact of modern techniques on practical breeding hybrid breeding genetic diversity and genomic selection Written by an international team of top academics and edited by an expert in the field this book will be of value to academics working in the agricultural sciences and essential reading for professionals working in plant breeding Provides in depth and comprehensive coverage of a rapidly developing field Presents techniques used in genetic and genomics research with coverage of genotyping gene cloning genome editing and engineering and phenotyping in various cereals Includes the latest genetic and genomic approaches for improving special traits drought tolerance biotic stress and biomass production Covers breeding practices with chapters on the genetic diversity of wheat hybrid breeding and the potential of rye and barley crops **Novel Technologies for Soybean**

Improvement Xianzhong Feng, Deyue Yu, Madan K. Bhattacharyya, 2022-11-14 *Abiotic Stresses in Agroecology: A Challenge for Whole Plant Physiology* Mauro Centritto, 2017-07-04 Understanding plant responses to abiotic stresses is central to our ability to predict the impact of global change and environmental pollution on the production of food feed and forestry Besides increasing carbon dioxide concentration and rising global temperature increasingly frequent and severe climatic events e g extended droughts heat waves flooding are expected in the coming decades Additionally pollution e g heavy metals gaseous pollutants such as ozone or sulfur dioxide is an important factor in many regions decreasing plant productivity and product quality This Research topic focuses on stress responses at the level of whole plants addressing biomass related processes development of the root system root respiration fermentation leaf expansion stomatal regulation photosynthetic capacity leaf senescence yield and interactions between organs transport via xylem and phloem long distance signaling and secondary metabolites Comparisons between species and between varieties of the same species are helpful to evaluate the potential for species selection and genetic improvement This research topic is focused on the following abiotic stresses and interactions between them Increased carbon dioxide concentration in ambient air is an important parameter influenced by global change and affects photosynthesis stomatal regulation plant growth and finally yield Elevated temperature both the steady rise in average temperature and extreme events of shorter duration heat waves must be considered in the context of alterations in carbon balance through increased photorespiration decreased Rubisco activation and carboxylation efficiency damage to photosynthetic apparatus as well as loss of water via transpiration and stomatal sensitivity Low temperatures late frosts prolonged cold phases freezing temperature can decrease overwintering survival rates productivity of crop plants and species composition in meadows Water availability More frequent severe and extended drought periods have been predicted by climate change models The timing and duration of a drought period is crucial to

determining plant responses particularly if the drought event coincides with an increase in temperature Drought causes stomatal closure decreasing the cooling potential of transpiration and potentially leading to thermal stress as leaf temperature rises Waterlogging may become also more relevant during the next decades and is especially important for seedlings and young plants It is not the presence of water itself that causes the stress but the exclusion of oxygen from the soil which causes a decrease in respiration and an increase in fermentation rates followed by a period of potential oxidative stress as water recedes Salinity high salt concentration in soil influences soil water potential the water status of the plant and hence affects productivity Salt tolerance will become an important trait driven by increased competition for land and the need to exploit marginal lands Understanding plant responses to abiotic stresses is central to our ability to predict the impact of global change and environmental pollution on the production of food feed and forestry Besides increasing carbon dioxide concentration and rising global temperature increasingly frequent and severe climatic events e g extended droughts heat waves flooding are expected in the coming decades Additionally pollution e g heavy metals gaseous pollutants such as ozone or sulfur dioxide is an important factor in many regions decreasing plant productivity and product quality This Research topic focuses on stress responses at the level of whole plants addressing biomass related processes development of the root system root respiration fermentation leaf expansion stomatal regulation photosynthetic capacity leaf senescence yield and interactions between organs transport via xylem and phloem long distance signaling and secondary metabolites Comparisons between species and between varieties of the same species are helpful to evaluate the potential for species selection and genetic improvement This research topic is focused on the following abiotic stresses and interactions between them Increased carbon dioxide concentration in ambient air is an important parameter influenced by global change and affects photosynthesis stomatal regulation plant growth and finally yield Elevated temperature both the steady rise in average temperature and extreme events of shorter duration heat waves must be considered in the context of alterations in carbon balance through increased photorespiration decreased Rubisco activation and carboxylation efficiency damage to photosynthetic apparatus as well as loss of water via transpiration and stomatal sensitivity Low temperatures late frosts prolonged cold phases freezing temperature can decrease overwintering survival rates productivity of crop plants and species composition in meadows Water availability More frequent severe and extended drought periods have been predicted by climate change models The timing and duration of a drought period is crucial to determining plant responses particularly if the drought event coincides with an increase in temperature Drought causes stomatal closure decreasing the cooling potential of transpiration and potentially leading to thermal stress as leaf temperature rises Waterlogging may become also more relevant during the next decades and is especially important for seedlings and young plants It is not the presence of water itself that causes the stress but the exclusion of oxygen from the soil which causes a decrease in respiration and an increase in fermentation rates followed by a period of potential oxidative stress as water recedes Salinity high salt

concentration in soil influences soil water potential the water status of the plant and hence affects productivity Salt tolerance will become an important trait driven by increased competition for land and the need to exploit marginal lands

Broadening the Genetic Base of Grain Cereals Mohar Singh,Sandeep Kumar,2016-09-13 This book offers comprehensive coverage of important grain cereals including their origin and distribution crop gene pool level of diversity production constraints traits of importance for genetic base widening crop improvement methodologies genome mapping genomics for breeding and future strategies The chapters contributed by eminent crop researchers from around the world provide rare insights into the crop specific constraints and prospects drawing from their substantial experience As such the book offers an essential source of information for grain cereals scientists teachers students policy planners and developmental experts alike Grain cereals which comprise rice wheat maize barley oats sorghum and millets are members of the grass family These crops are vital to human nutrition thanks to their roles as staple food crops in different parts of the globe Some of them are rich sources of carbohydrates which provide energy while others are important sources of minerals vitamins and proteins in addition to their medicinal properties In most cereals the existing variability among elite germplasm has been exploited to attain a desirable level of productivity However to make further breakthroughs in enhancing yield and improving stability in future crop cultivars new sources of genes alleles need to be identified in wild weedy species and incorporated into the cultivated varieties Though there have been many publications on various aspects of grain cereal improvement in the recent past to date this essential information has remained scattered among different periodicals The Carrot Genome Philipp Simon,Massimo Iorizzo,Dariusz Grzebelus,Rafal Baranski,2019-05-08 This book provides an up to date review and analysis of the carrot s nuclear and organellar genome structure and evolution In addition it highlights applications of carrot genomic information to elucidate the carrot s natural and agricultural history reproductive biology and the genetic basis of traits important in agriculture and human health The carrot genome was sequenced in 2016 and its relatively small diploid genome combined with the fact that it is the most complete root crop genome released to date and the first ever Euasterid II genome to be sequenced mean the carrot has an important role in the study of plant development and evolution In addition the carrot is among the top ten vegetables grown worldwide and the abundant orange provitamin A carotenoids that account for its familiar orange color make it the richest crop source of vitamin A in the US diet and in much of the world This book includes the latest genetic maps genetic tools and resources and covers advances in genetic engineering that are relevant for plant breeders and biologists alike Nanocomposites, Nanophotonics, Nanobiotechnology, and Applications Olena Fesenko,Leonid Yatsenko,2014-08-11 This book presents some of the latest achievements in nanotechnology and nanomaterials from leading researchers in Ukraine Europe and beyond It features contributions from participants in the 2nd International Summer School Nanotechnology From Fundamental Research to Innovations and International Research and Practice Conference Nanotechnology and Nanomaterials NANO 2013 which

were held in Bukovel Ukraine on August 25 September 1 2013 These events took place within the framework of the European Commission FP7 project Nanotwinning and were organized jointly by the Institute of Physics of the National Academy of Sciences of Ukraine University of Tartu Estonia University of Turin Italy and Pierre and Marie Curie University France Internationally recognized experts from a wide range of universities and research institutions share their knowledge and key results on topics ranging from nanooptics nanoplasmonics and interface studies to energy storage and biomedical applications

Artemisinin - From Traditional Chinese Medicine to Artemisinin Combination Therapies; Four Decades of Research on the Biochemistry, Physiology, and Breeding of Artemisia annua Tomasz Czechowski, Ian A. Graham, Pamela J.

Weathers, Peter E. Brodelius, Geoffrey Duncan Brown, 2020-12-04 This eBook is a collection of articles from a Frontiers Research Topic Frontiers Research Topics are very popular trademarks of the Frontiers Journals Series they are collections of at least ten articles all centered on a particular subject With their unique mix of varied contributions from Original Research to Review Articles Frontiers Research Topics unify the most influential researchers the latest key findings and historical advances in a hot research area Find out more on how to host your own Frontiers Research Topic or contribute to one as an author by contacting the Frontiers Editorial Office frontiersin.org about contact

Biotechnological

Approaches to Enhance Plant Secondary Metabolites Mohd. Shahnawaz, 2021-11-04 Thousands of secondary metabolites are produced by plants to withstand unfavourable environmental conditions and are important molecules for nutraceutical agro cosmetic and pharmaceutical industries etc Harvesting of plants for the extraction of these important metabolites can threaten the plant germplasm and various medicinally important plants are at the verge of extinction Based on need various methods and strategies were developed and followed by researchers from time to time to save the plant germplasm and produce important secondary metabolites efficiently to meet their growing demands Biotechnological Approaches to Enhance Plant Secondary Metabolites Recent Trends and Future Prospects provides a comprehensive introduction and review of state of the art biotechnological tools in this field of research at global level The methodologies are highlighted by real data examples in both in vitro and in vivo level studies The book Highlights and provides overviews of the synthesis classification biological function and medicinal applications of the recent advancements for the enhanced production of novel secondary metabolites in plants Provides an overview of the role of induced mutation salinity stress and brassinosteroids impact to increase the secondary metabolic contents in plants and suggests an increase in enzymatic activity in plants could be due to various point mutations which in turn could play a role at transcriptome levels Discusses the significant role of endophytes to enhance the contents of plant secondary metabolites Alternatively suggests the urgent need to set up the standard operating procedures using hydroponics system of cultivation for significant enhancement of secondary metabolite contents Enlists various in vitro techniques to enhance plant secondary metabolites contents using plant tissue culture approaches Provides a systematic overview of state of the art biotechnological tools CRISPER Cas9 and

RNAi to enhance the plant secondary metabolite contents Recommends CRISPER Cas9 technology over RNAi ZFNs and TALENs because of its relatively simple and high precision method with an easily programmable tool This serves as a reference book for the researchers working in the field of plant secondary metabolites and pharmaceutical industries at global level *Plants as Bioreactors for Industrial Molecules* Santosh Kumar Upadhyay, Sudhir Pratap Singh, 2023-02-06

PLANTS AS BIOREACTORS FOR INDUSTRIAL MOLECULES An incisive and practical discussion of how to use plants as bioreactors In *Plants as Bioreactors for Industrial Molecules* a team of distinguished researchers delivers an insightful and global perspective on the use of plants as bioreactors In the book you ll find coverage of the basic applied biosynthetic and translational approaches to the exploitation of plant technology in the production of high value biomolecules The authors focus on the yield and quality of amino acids vitamins and carbohydrates The authors explain how high value biomolecules enable developers to create cost effective biological systems for the production of biomolecules useful in a variety of sectors They provide a holistic approach to plant based biological devices to produce natural molecules of relevance to the health and agriculture industries Readers will also find A thorough overview of plants as bioreactors and discussions of molecular farming for the production of pharmaceutical proteins in plants Comprehensive explorations of plants as edible vaccines and plant cell culture for biopharmaceuticals Practical discussions of the production of attenuated viral particles as vaccines in plants and insecticidal protein production in transgenic plants Extensive treatment of the regulatory challenges involved in using plants as bioreactors Perfect for academics scientists and researchers in industrial microbiology and biotechnology *Plants as Bioreactors for Industrial Molecules* will also earn a place in the libraries of biotechnology company professionals in applied product development

Advances in Plant Breeding Strategies: Vegetable Crops Jameel M. Al-Khayri, S. Mohan Jain, Dennis V. Johnson, 2021-08-25 Plant breeders and geneticists are under constant pressure to sustain and expand food production by using innovative breeding strategies and introducing minor crops which are well adapted to marginal lands provide a source of nutrition and have abiotic and biotic stress tolerance to feed an ever increasing human population The basic concept of this book is to examine the use of innovative methods augmenting traditional plant breeding towards the improvement and development of new crop varieties under the increasingly limiting environmental and cultivation factors to achieve sustainable agricultural production and enhanced food security Three volumes of the book series *Advances in Plant Breeding Strategies* were published in 2015 2016 and 2018 respectively Volume 1 *Breeding Biotechnology and Molecular Tools* Volume 2 *Agronomic Abiotic and Biotic Stress Traits* and Volume 3 *Fruits* In 2019 the following four volumes were published Volume 4 *Nut and Beverage Crops* Volume 5 *Cereals* Volume 6 *Industrial and Food Crops* and Volume 7 *Legumes* In 2021 three volumes are being concurrently published Volume 8 *Vegetable Crops Bulbs Roots and Tubers* Volume 9 *Vegetable Crops Fruits and Young Shoots* and Volume 10 *Vegetable Crops Leaves Flowerheads Green Pods Mushrooms and Truffles* This Volume 10 subtitled *Vegetable Crops Leaves Flowerheads Green Pods Mushrooms and Truffles* consists of 14

chapters focusing on advances in breeding strategies using both traditional and modern approaches for the improvement of individual vegetable crops Chapters are arranged in 4 parts according to the edible vegetable parts Part I Leaves Chicory *Cichorium intybus* L Chinese cabbage *Brassica rapa* L var *pekinensis* Rocket salad *Eruca vesicaria* ssp *sativa* Mill Spring onion *Allium fistulosum* L Water spinach *Ipomoea aquatica* Forsk and Watercress *Nasturtium officinale* R Br Pat II Flowerheads and Green Pods Cauliflower *Brassica oleracea* var *botrytis* L Globe artichoke *Cynara cardunculus* var *scolymus* L Garden pea *Pisum sativum* L and Yardlong bean *Vigna unguiculata* L Walp ssp *sesquipedalis* L Verdc Part III Mushrooms Enoki mushroom *Flammulina velutipes* Curtis Singer and Shiitake mushroom *Lentinula edodes* Berk Sing Part IV Truffles Desert truffles *Terfezia* spp and White truffle *Tuber magnatum* Picco and *T. borchii* Vittad Each chapter comprehensively reviews the contemporary literature on the subject and reflects the experiences of the authors Chapters are written by internationally reputable scientists and subjected to a review process to assure quality presentation and scientific accuracy Each chapter begins with an introduction covering related backgrounds and provides in depth discussion of the subject supported with high quality color photos illustrations and relevant data The chapter concludes with recommendations for future research directions a comprehensive list of pertinent references to facilitate further reading and appendixes of genetic resources and concerned research institutes This book series is a valuable resource for advanced students researchers scientists commercial producers and seed companies as well as consultants and policymakers interested in agriculture particularly in modern breeding technologies

Proceedings of RBMP 2018 - Plant Molecular Biology Oscar Lorenzo,Andrea Chini,Myriam Calonje,2021-07-01

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