

# *Plant Gene Research*

## *Molecular Approaches to Crop Improvement*

Edited by E. S. DENNIS  
and D. J. LLEWELLYN



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# Molecular Biology And Crop Improvement

**Pravin Chandra Trivedi**



## **Molecular Biology And Crop Improvement:**

**Molecular Biology and Crop Improvement** Austin R. B.,1980      *Molecular Biology and Crop Improvement* Austin R. B.,1980      **Molecular Biology and Crop Improvement** R. B. Austin,1986-06-19 This book identifies targets for plant transformation by molecular biology for wheat and oilseed rape and faba beans      *Molecular Approaches to Crop Improvement* Elizabeth S. Dennis,Danny J. Llewellyn,2012-12-06 Although plant genes were first isolated only some twelve years ago and transfer of foreign DNA into tobacco cells first demonstrated some eight years ago the application and extension of biotechnology to agricultural problems has already led to the field testing of genetically modified crop plants The promise of tailor made plants containing resistance to pests or diseases as well as many other desirable characteristics has led to the almost compulsory incorporation of molecular biology into the research programs of chemical and seed companies as well as Governmental agricultural agencies With the routine transformation of rice and the early evidence of transformation of maize the possibility of the world s major cereal crops being modified for improved nutritional value or resistance characteristics is now likely in the next few years The increasing number of cloned plant genes and the increasing sophistication of our knowledge of the major developmental and biochemical pathways in plants should eventually allow us to engineer crop plants with higher yields and with less detrimental impact on the environment than now occurs in our current high input agricultural systems This book draws together many of the expanding areas of plant molecular biology and genetic engineering that will make a substantial contribution to the development of the more productive and efficient crop plants that the world s farmers will be planting in the next decade      **Molecular Breeding for Sustainable Crop Improvement** Vijay Rani Rajpal,S. Rama Rao,S.N. Raina,2016-02-02 The world population is estimated to reach to more than 10 billion by the year 2050 These projections pose a challenging situation for the agricultural scientists to increase crops productivity to meet the growing food demands The unavailability and or inaccessibility to appropriate gene pools with desired traits required to carry out genetic improvement of various crop species make this task formidable for the plant breeders Incidentally most of the desired genes reside in the wild genetic relatives of the crop species Therefore exploration and characterization of wild genetic resources of important crop species is vital for the efficient utilization of these gene pools for sustainable genetic improvements to assure food security Further understanding the myriad complexities of genic and genomic interactions among species more particularly of wild relatives of crop species and or phylogenetically distant germplasm can provide the necessary inputs to increase the effectiveness of genetic improvement through traditional and or genetic engineering methods This book provides comprehensive and latest insights on the evolutionary genesis of diversity access and its utilization in the evolution of various crop species A comprehensive account of various crops origin exploitation of the primary secondary and tertiary gene pools through breeding biosystematical cytogenetical and molecular phylogenetical relationships and genetic enhancement through biotechnological interventions among others have been

provided as the necessary underpinnings to consolidate information on the effective and sustainable utilization of the related genetic resources. The book stresses upon the importance of wild germplasm exploration, characterization and exploitation in the assimilation of important crop species. The book is especially intended for students and scientists working on the genetic improvement of crop species. Plant Breeders, Geneticists, Taxonomists, Molecular Biologists and Plant Biotechnologists working on crop species are going to find this book very useful. *Genetics and Molecular Biology in Crop Improvement* Pravin Chandra Trivedi, 2016

**Molecular Techniques in Crop Improvement** Shri Mohan Jain, D.S. Brar, 2002-04-30. This book provides comprehensive information on the latest tools and techniques of molecular genetics and their applications in crop improvement. It thoroughly discusses advanced techniques used in molecular markers, QTL mapping, marker-assisted breeding and molecular cytogenetics.

**Molecular Biology and Crop Improvement**, 1986

**Tailoring Genes for Crop Improvement** George Bruening, John Harada, Tsune Kosuge, Alexander Hollaender, 2012-12-06. In August 1982 a conference was held at the University of California Davis to discuss both molecular and traditional approaches to plant genetic analysis and plant breeding. Papers presented at the meeting were published in *Genetic Engineering of Plants: An Agricultural Perspective*. A second conference entitled *Tailoring Genes for Crop Improvement* sponsored by the UC Davis College of Agricultural and Environmental Sciences and the College's Biotechnology Program was held at Davis in August 1986 to discuss the notable advances that had been made during the intervening years in the technology for gene modification, transfer and expression in plants. This volume contains papers that were presented at this meeting and provides readers with examples of how the new experimental strategies are being used to gain a clearer understanding of the biology of the plants we grow for food and fiber; it also discusses how molecular biology approaches are being used to introduce new genes into plants for plant breeding programs. We are grateful to the speakers for their excellent presentations for the conference and extend our sincere thanks to those who contributed manuscripts for this volume.

**Genetic Engineering of Plants for Crop Improvement** Rup Lal, 2020-01-31. *Genetic Engineering of Plants for Crop Improvement* discusses current genetic engineering methods for plants and addresses the commercial opportunities for transgenic plants. Topics covered include Agrobacterium-mediated transformations, the use of electroporation, PEG-mediated transformation, microinjection, the microprojectile bombardment method and the electrical discharge particle acceleration method. A concise account of the resistance of transgenic plants to insect attack, viral infection and herbicides has also been provided. Possibilities for genetic manipulation for proteins that have superior nutritional properties are discussed and a brief account of tests confirming the safety and commercial validity of transgenic plants is included. A valuable source of information for researchers and students in plant biotechnology, plant gene manipulation, molecular biology and all areas of the life sciences.

*Applications of Genetic Engineering to Crop Improvement* G.B. Collins, Joseph F. Petolino, 2012-12-06. The contributions of plant genetics to the production of higher yielding crops of superior quality are well documented. These successes have been realized through the

application of plant breeding techniques to a diverse array of genetically controlled traits Such highly effective breeding procedures will continue to be the primary method employed for the development of new crop cultivars however new techniques in cell and molecular biology will provide additional approaches for genetic modification There has been considerable speculation recently concerning the potential impact of new techniques in cell and molecular biology on plant improvement These genetic engineering techniques should offer unique opportunities to alter the genetic makeup of crops if applied to existing breeding procedures Many questions must be answered in order to identify specific applications of these new technologies This search for applications will require input from plant scientists working on various aspects of crop improvement This volume is intended to assess the interrelationships between conventional plant breeding and genetic engineering

**Crop Improvement** Pankaj Kumar,Ajay Kumar Thakur,2021-06-29 Crop Improvement Biotechnological Advances Biomedical Science The field of biotechnology is advancing at a fast pace The availability of low cost DNA genome sequencing technologies has led to the discovery and functional characterization of myriad of genes imparting stress tolerance and quality traits The omics group of technologies including genomics proteomics transcriptomics and metabolomics has revolutionized the agricultural biotechnology sector The Nobel Prize winning technology such as the genome editing technique is being employed to edit various gene functions in plants aiding in crop improvement This technology may be adopted very quickly by consumers compared with the transgenic technique because the genome edited plants have no adverse effects on the genome of the plant itself and on the environment and related species non target organisms In this book authors have attempted to compile the latest techniques of agricultural biotechnology and their applications in crop improvement Certain chapters have been dedicated to describe the use of nanotechnology a fast emerging new technique in the agriculture sector Features Development potential and safety issues in biotechnology Advances in genomics proteomics and transcriptomics in agriculture Protein bioinformatics and its applications Genetically modified GM technology and its implications Genome editing in crop improvement Marker assisted selection MAS in crop improvement Mutation breeding Cryobiotechnology Nanotechnology and biosensors This book includes real world examples and applications making it accessible to a broader interdisciplinary readership We hope that it will serve as a reference book for researchers engaged in molecular biology and biotechnology and will act as a ready reckoner for postgraduate PG students in the biotechnology discipline

*Model Plants and Crop Improvement* Rajeev K. Varshney,Robert M.D. Koebner,2006-09-29 Within the past decade there has been an explosion of research in both the public and private sectors regarding the use of plant genetic models to improve crop yield Bringing together experts from across the globe Model Plants and Crop Improvement provides a critical assessment of the potential of model plant species for crop improvement The first comprehensive summary of the use of model plant systems the book delineates the model species contribution to understanding the genomes of crop species The book provides an in depth examination of the achievements and limitations of

the model paradigm It explores how continued research in models can contribute to the goal of delivering the outputs of molecular biology to crops Covering the major genetic models such as Arabidopsis thaliana Lotus japonicus and Medicago the book goes on to discuss applications to food plants of global importance including rice canola and legumes The book introduces the evolutionary genetic genomic and morphological attributes of B distachyon that make it such an attractive new model plant system As the post genomic era dawns a key question to address is how this growing body of genetic and biological information can be extended beyond the model to the modeled species This book takes you one step closer to applying modeling results to crops in the field

**Molecular Plant Breeding and Genome Editing Tools for Crop Improvement** Deka, Pradip Chandra, 2020-08-07 Plant breeders have used mutagenic agents to create variability for their use in crop improvement However application of mutagenic agents has its own drawbacks such as non specificity and random nature simultaneous effect on large numbers of genes and induction of chromosomal aberrations To overcome these limitations several genome editing systems have been developed with the aid of cutting edge technology rooted in the expertise of several research fields Molecular Plant Breeding and Genome Editing Tools for Crop Improvement is a pivotal reference source that provides an interdisciplinary approach to crop breeding through genetics Featuring coverage of a broad range of topics including software molecular markers and plant variety identification this book is ideally designed for agriculturalists biologists engineers advocates policymakers researchers academicians and students

*Molecular Marker Systems in Plant Breeding and Crop Improvement* Horst Lörz, Gerhard Wenzel, 2005 Successful release of new and better crop varieties increasingly requires genomics and molecular biology This volume presents basic information on plant molecular marker techniques from marker location up to gene cloning The text includes a description of technical approaches in genome analysis such as comparison of marker systems positional cloning and array techniques in 19 crop plants A special section focuses on converting this knowledge into general and specific breeding strategies particularly in relation to biotic stress Theory and practice of marker assisted selection for QTL gene pyramiding and the future of MAS are summarized and discussed for maize wheat and soybean Furthermore approaches in silviculture on the examples of Fagus Populus Eucalyptus Picea and Abies are presented The volume ends with a comprehensive review of the patents relevant for using molecular markers and marker assisted selection

**Molecular Plant Breeding** Yunbi Xu, 2010 Recent advances in plant genomics and molecular biology have revolutionized our understanding of plant genetics providing new opportunities for more efficient and controllable plant breeding Successful techniques require a solid understanding of the underlying molecular biology as well as experience in applied plant breeding Bridging the gap between developments in biotechnology and its applications in plant improvement Molecular Plant Breeding provides an integrative overview of issues from basic theories to their applications to crop improvement including molecular marker technology gene mapping genetic transformation quantitative genetics and breeding methodology

**Molecular Strategies for Crop Improvement, USA R.**

G. Dietzgen, Ray Shorter, 1990 Study Tour report and abstracts of the 1990 UCLA symposium Molecular Strategies for Crop Improvement summarising the latest developments in Plant Molecular Biology and their possible applications in QDPI programs Reports on biotechnology R D at Iowa State University seed companies in Iowa and research institutions in California

**Genome Editing for Crop Improvement** Jameel M. Al-Khayri, Muhammad N. Sattar, Sudhir K. Sopory, Shri Mohan Jain, 2025-03-25 Genome editing offers a powerful tool to significantly accelerate crop breeding programs in order to develop new and improved varieties It allows precise modification of an organism's DNA sequence often by creating targeted double strand breaks at specific locations The CRISPR Cas system has emerged as the preferred method of gene editing and offers a powerful technology for crop improvement The use of CRISPR in plant research has led to significant improvements in crop performance in terms of yield nutrition stress tolerance and resistance against agricultural pests and diseases This book explores the cutting edge field of genome editing its applications and potential to revolutionize the genetic improvement of crops This is a valuable resource for researchers in crop genetic improvement graduate and postgraduate students in molecular biology and biotechnology programs and professionals in the field

**Advancement in Crop Improvement Techniques** Narendra Tuteja, Renu Tuteja, Nishat Passricha, Shabnam Saifi, 2020-06-13 Advancement in Crop Improvement Techniques presents updates on biotechnology and molecular biological approaches which have contributed significantly to crop improvement The book discusses the emerging importance of bioinformatics in analyzing the vast resources of information regarding crop improvement and its practical application and utilization Throughout this comprehensive resource emphasis is placed on various techniques used to improve agricultural crops providing a common platform for the utility of these techniques and their combinations Written by an international team of contributors this book provides an in depth analysis of existing tools and a framework for new research Reviews techniques used for crop improvement from selection and crossing over to microorganismal approaches Explores the role of conventional biotechnology in crop improvement Summarizes the combined approaches of cytogenetics and biotechnology for crop improvement including the importance of molecular techniques in this process Focuses on the emerging role of bioinformatics for crop improvement

*Plant Tissue Culture: Propagation, Conservation and Crop Improvement* Mohammad Anis, Naseem Ahmad, 2016-10-08 This book presents basic concepts methodologies and applications of biotechnology for the conservation and propagation of aromatic medicinal and other economic plants It caters to the needs and challenges of researchers in plant biology biotechnology the medical sciences pharmaceutical biotechnology and pharmacology areas by providing an accessible and cost effective practical approach to micro propagation and conservation strategies for plant species It also includes illustrations describing a complete documentation of the results and research into particular plant species conducted by the authors over the past 5 years Plant Biotechnology has been a subject of academic interest for a considerable time In recent years it has also become a useful tool in agriculture and medicine as well as a popular area of

biological research Current economic growth is globally projected in a highly positive manner but the challenges many countries face with regard to food feed malnutrition infectious diseases the newly identified life style diseases and energy shortages all of which are worsened by an ever deteriorating environment continue to pull the growth digits back The common thread that connects all of the above challenges is biotechnology which could provide many answers Molecular biology and biotechnology have now become an integral part of tissue culture research The tremendous impact generated by genetic engineering and consequently of transgenics now allows us to manipulate plant genomes at will There has indeed been a rapid development in this area with major successes in both developed and developing countries The book introduces several new and exciting areas to researchers who are unfamiliar with plant biotechnology and also serves as a review of ongoing research and future directions for scholars The book highlights numerous methods for in vitro propagation and utilization of techniques in raising transgenics to help readers reproduce the experiments discussed



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